DEFINING BEST INNOVATION PRACTISES

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5 Defining Best Innovation Practises

Defining 'best practise standards' for successful innovation is not a trivial task. This chapter aims to present a non-exhaustive, but high-impact proposal to the best practises in innovation. The secondary aim is to provide a backdrop for the innovation audit questionnaire developed for use in a competence audit for technological innovation. The beta test version of the questionnaire is included in Appendix C.

The chapter takes its structure from the innovation model developed in a previous chapter. By keeping the model close at hand for easy referral, aspects of the model may also become clearer.

The external environment to the organisation is discussed first since it is often one of the more generic areas of innovation. The four areas, which form a part of the external environment, may be identified as **Technology, Market and Customer, Industry** and **Political, Economical and Social.**

The second part of the 'best practises' in innovation focuses on business structures and resources of the organisation. By examining the heart of the organisation, including its structures, resources and leadership, one might form an opinion on the organisation's innovation fostering nature. The 'best practise' section on the organisation may be divided into **Strategic, Implementation** and **Fostering Environment.**

Thirdly, the individual, an often unmentioned part of the innovation process is examined and highlighted for best innovation practises or competencies. Innovation will not happen without human involvement and their knowledge, competencies,

products. The lesson of not just buying but further development is clear, as portrayed by current eastern countries increasingly developing their own technologies.

In auditing technology as part of the innovation process, the key aspects relating to its building function, must be identified. As initiator of typically *radical* or technology *push* innovation, technology is seen as the cornerstone for new development in a particular field. As such, the content and implementability of technology, has grave consequences for the time span of a new innovation's development. A rule of thumb indicates that innovations with more than two breakthrough technologies are more likely to fail than succeed, helping managers to choose between different proposals. As such, the readiness of technology, according to dynamics of technological change, influences the outcome of most innovations.

5.1.1.1 Dynamics of Technological Change

Technological innovation takes time to diffuse into the market, especially when radical or poorly understood technology is being implemented. For example the basic oxygen steel making process took twenty years to get to the 90% implementation point in the United States. Earlier processes took even longer. Other technologies do however penetrate markets faster. Television for instance took only 10 years to penetrate the market in excess of 90%.[1]

A major task in the management of technology, is the understanding and description of the possible diffusion period of a new technology. When addressing the rate of technology adoption by the market, two elements may define the field: the *extent of use* and the *time*.

> That is, the *extent* of technology in use as a function of the *time*.[1]

To employ these two elements some definition of terms is required. A description of the diffusion of technology should start with the following:

- A definition of the technology
- A specification of the population or its proxy within which the technology diffuses
- A choice of a parameter which measures the extent of diffusion

By defining these aspects of the diffusion process, initial values are obtained for use as a foundation in future analysis.

To illustrate diffusion of technology, several models have been developed over the years. The 'S'-curve evolutionary model has found the most acclaim and is widely used in the forecasting of diffusion and substitution of technology.[2] As shown in chapter three the 'S'-curve may be used to forecast several different processes, of which technology diffusion is one.

The importance of technological adoption and diffusion can be astronomical for the innovation process.

> Firstly technological innovation requires a source of available technologies for instant inclusion into products or processes.
>
> Secondly if diffusion of technology and innovation into the marketplace is slow, large amounts of investment capital is needed to finance the product

and marketing campaign, often resulting in other innovators passing the initial highly indebted innovator.

Thirdly if diffusion is too slow, next generation products, often better and more suitable to the market, cannot be developed for a lack of funds and other funding institutions' interest.

For these reasons, technological innovation may often be a process where large amounts of resources are needed. To compete, companies need large resource piles and an ever-present vigil in the innovation environment. Others, without the resource availability, have to produce products under license and often renounce innovation to the struggle for survival.

5.1.1.2 Key Technologies

Organisations implement corporate strategies in order to ensure long term growth and survival. Generally the focus falls on products and the supply thereof to current and future customers. Technology and innovation seldom feature as prominently in strategic planning as they should, often with far reaching effects. One reason for not including technology or innovation into the strategy might be because the returns on investment on technologies and innovations are often difficult to calculate. To remedy this, key technologies, in the same manner as core competencies, have to be identified and classified. For the purpose of this identification and classification, a technology *balance sheet* might be used as proposed by De Wet.[3]

The process starts by developing a framework for the product market interaction. The matrix morphology, as shown below, contains the different markets where the organisation's products find their application. This presents a clear picture to the management of the company.

Market Matrix

Markets \ Products	P1	P2	P3	P4
M1	X			X
M2		X	X	
M3	X	X		X
M4		X	X	

Figure 5.1: Market Matrix, Source: De Wet[3]

Additional information such as *market share, market sizes, market dynamics, product maturity* and *competitor behaviour,* should be used in conjunction with the matrix. This immediately indicates 'where we are', 'where to go' and 'when to get out' clearly.

When technology and process information are added to the matrix, a more detailed explanation of organisational status is reflected. It is here that *key technologies* need to be judged and entered into the organisational framework.

Technology Balance Sheet

		Products			
		P1	P2	P3	P4
Markets	M1	X			X
	M2		X	X	
	M3	X	X		X
	M4		X	X	

Key Technologies								
T1	T2	T3	T4	Processes				
X			X	PR1	X	X		X
		X	X	PR2	X			
	X			PR3	X	X	X	
		X		PR4		X		X

Figure 5.2: Technology Balance Sheet, Source: De Wet[3]

Key technologies are defined as those capabilities in the form of *information, methods, artefacts* or other, enabling the organisation to execute individual processes. And similarly the processes are defined as the 'value addition activities' in the organisation, capable of producing products or services. This 'technology balance sheet' integrates key technologies with market sectors, illustrating the current position of the organisation clearly. An example may be observed in Figure 5.2.

Organisations build their products on core competencies as well as key technologies. Without a good knowledge of these technologies and how to effectively utilise them, organisations will seldom reach the desired focus to stay ahead of competition. Only by identifying internal, as well as external key technologies, and pursuing those to the ultimate, can organisations stay innovative.

5.1.1.3 Predicting Future Technologies

> *The future was predictable but hardly anybody predicted it.*
>
> — Allan Kay [Apple]

Technology is never only about the here and now, but mostly about the future. Technological forecasting has in recent times won back its appeal, since the time it was developed. Managers do however now realise that forecasting is not the alpha and omega and apply it therefore only as a guide.

Five of the more common methods used in technology forecasting includes *monitoring, expert opinion, trend extrapolation, technology trajectories*, and *scenario analysis*. Some of their characteristics will be discussed below.

Monitoring

Monitoring is to watch, observe, check and keep up with developments, usually in a well-defined area of interest

— Coates *et al*[4]

Patent monitoring and scanning is one of the common technological forecasting techniques used. Others areas which may be consulted include

published sources such as annual company reports, articles and press, various journals, various databases, symposium and conference proceedings, and many more. Unpublished sources such as trade shows, exhibitions, tours or conferences as well as industry contacts or friends may yield valuable information as well.[5]

Ashton *et al*[6] define the steps of monitoring as:

- Define user needs
- Prepare a monitoring plan,
- Acquire source materials,
- Analyse results,
- Disseminate monitoring products,
- Review monitoring performance.

As example a patent analysis process may be discussed:

> The advantage of studying different patents is the detailed information they contain. Many different inventions and innovative companies may be studied through the patent office, hence its popularity in the field of competitive intelligence gathering. By statistically analysing large numbers of these patents, broad patterns or trends that may be significant to the development of new technology paradigms may be identified.
>
> As technological indicators, patent databases represent some of the more direct sources of information. Other indicators such as organisational R&D expenditure, number of scientist or engineers and number of scientific papers and technical publications, may be used for competitive intelligence analysis as well. These are not used so often, yet they represent a fair source of information on new technology. Despite some shortcomings to patent scanning, by examining R&D expenditures as well as patents in a particular industry, economic benefits of technology developments may be statistically proved,[7] making patent searches a worthwhile forecasting technique.
>
> Different outputs from patent analysis can be utilised in technology forecasting. Patents can provide insight into an organisation's strategies for exploiting technologies internationally. This information can then be used to make judgements about the economic potential of an individual organisation's inventions. Since patent protection in many countries is expensive, the more countries in which protection is sought, the higher the economic potential of the patent and technology.

Patent analysis is by no means the only method used in monitoring and scanning. Monitoring and scanning does however play an important part in the discipline of technology management and the assessment of threats and opportunities, requiring the implementation of all relevant methods and sources.

Expert opinion

Expert opinion is often used in the field of technology forecasting. Institutions such as the IPTS (The Institute for Prospective Technological Studies), focus

on providing relevant technological forecasting information, in this way acting as an expert in many fields. Experts may often offer insights easily overlooked by technological monitoring and scanning, for they know their field intimately and can make deductions on the importance of different technologies.

Scenarios

Scenario planning and development is a key component to strategic planning. It is often coupled with technology, because of the impact technology has on the future. Technological intensive organisations often construct complex technological development scenarios to improve their planning for the future. Examples include Motorola, NEC, Intel and many others. Figure 5.3 illustrates an example from NEC.

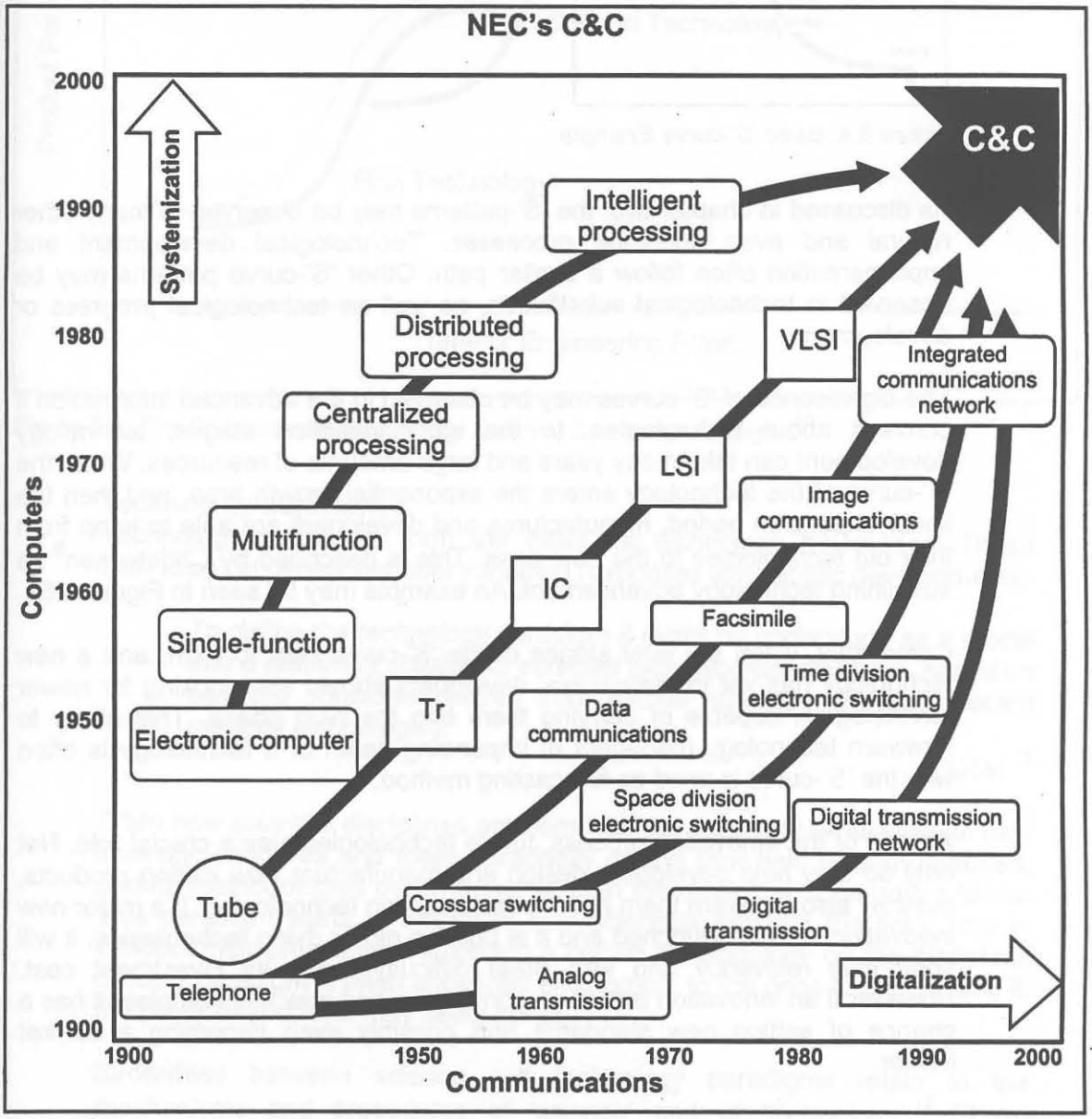

Figure 5.3: NEC's C&C,. Source: Koji Kobayashi[8]

With the help of future scenarios as shown above, organisations may lead into the future instead of passively waiting for the future to happen to them.

Trend extrapolation

'S'-curve analysis forms one of the corner stones in technology trend analysis. This technique is based on mathematical analysis of technology development and the correlation it seems to have with natural growth patterns. Figure 5.4 illustrates the principle.

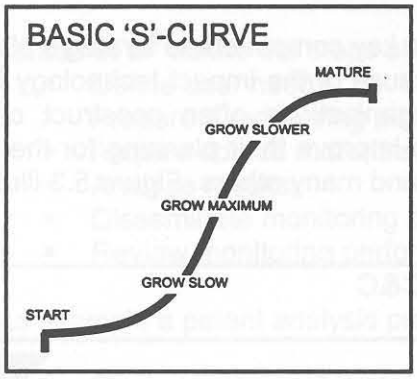

Figure 5.4: Basic 'S'-curve Example

As discussed in chapter two, the 'S'-patterns may be observed in many other natural and even unnatural processes. Technological development and implementation often follow a similar path. Other 'S'-curve patterns may be observed in technological substitution, as well as technological progress or development.

The significance of 'S'-curves may be observed in the advanced information it conveys about technologies. In the early inception stages, technology development can take many years and large amounts of resources. When the 'S'-curve of the technology enters the exponential growth area, and then the linear expansion period, manufactures and developers are able to jump from their old technologies to the new ones. This is described by Christensen[9] as sustaining technology advancement. An example may be seen in Figure 5.5.

Conversely, when the later stages of the 'S'-curve start to form, and a new technology has yet to materialise, developers should start looking for newer technologies, capable of carrying them into the next phase. This ability to forewarn technology managers of impending death of a technology is often why the 'S'-curve is used as forecasting method.

As part of the innovation process, future technologies play a crucial role. Not only do they help developers design and manufacture new exiting products, but they also forewarn them about possible dying technologies. If a major new innovation is to be launched and it is built on old or dying technologies, it will soon lose relevancy and with great difficulty repay its investment cost. However if an innovation is built on converging and new technologies, it has a chance of setting new standards and possibly even becoming a market leader.

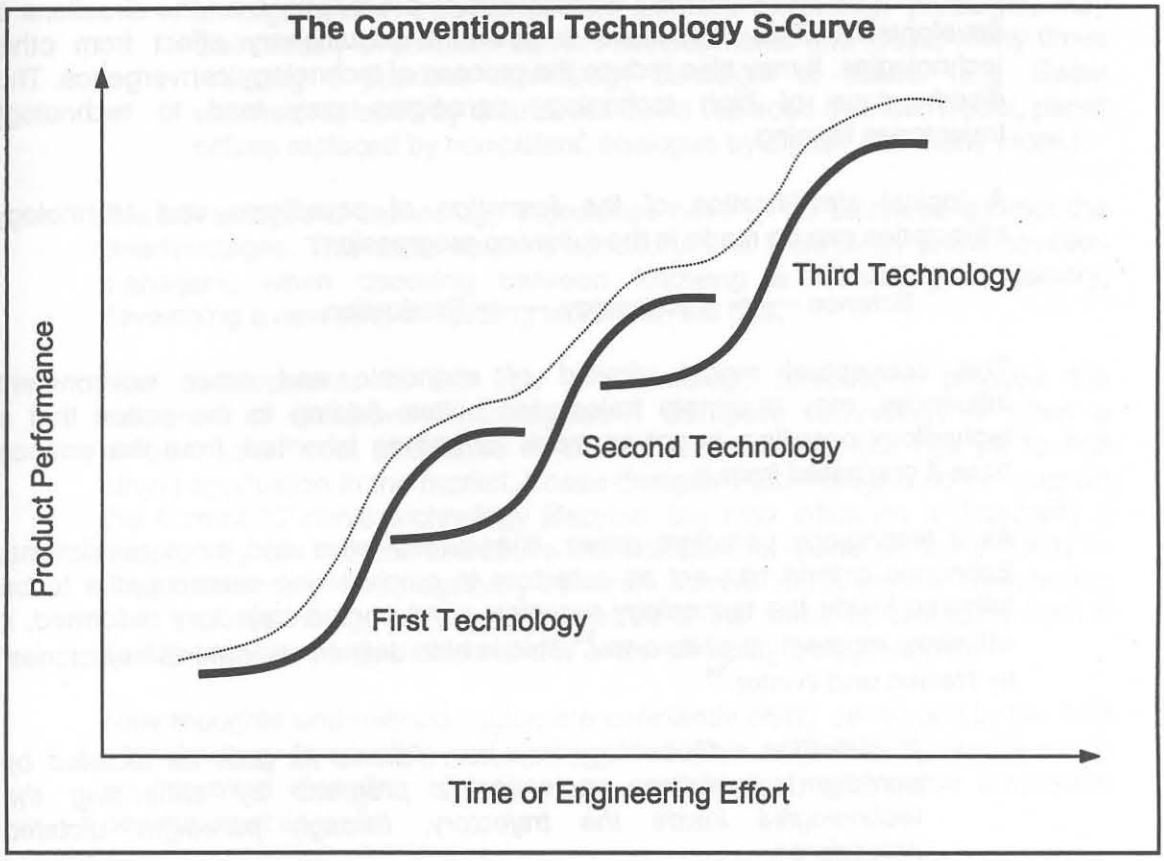

Figure 5.5: The Conventional Technology S-curve, Source: Christensen[10]

Technology trajectories

Technology paradigms form the basis for technology trajectories. These technological paradigms offer intriguing responses to scientific developments.

> *To define the technology paradigm it might be understood as a model and a pattern of solution of selected technological problems, based on selected principles derived from natural sciences and on selected material technologies.*
>
> — Dosi [11]

Often new scientific disciplines are born with the discovery or analysis of new scientific principles and ideas. Gradually as the new field is acknowledged, and its methodologies become ingrained in the discipline, a paradigm forms. This paradigm starts to dictate to new scientists entering the field, how to conduct their procedures, enforcing a certain methodology on the discipline. Since a paradigm is often undefined and 'logical' to the ones trapped inside it, the previous proposal may seem harsh.

Similarities between science and technology paradigms relate to the mechanisms and procedures of 'science' and of 'technology'.[12] These paradigms often lock the fields of study or research into particular directions, procedures, methods and ideas. Many new technologies are born in science laboratories, and it is important that the science paradigm present in the laboratory does not instil its limitations on the new technology.

A technology paradigm may embody strong prescriptions on the directions of development. This may have a powerful exclusionary effect from other technologies. It may also reduce the process of technology convergence. This disadvantage of high technology paradigms may lead to technology trajectories forming.

A logical simplification of the formation of paradigms and technology trajectories can be made in the following progression:

Science ⟶ Technology ⟶ Production

This conceptual model, devoid of economic and other environment influences, may illuminate trajectories better. Adding to the notion that a technology paradigm is not so much formed as inherited, from the science base it originated from.

As a technology paradigm grows, it assumes more and more restrictions. Economic criteria can act as selectors in emphasising certain paths to be followed inside the technology paradigm. And once a trajectory is formed, it will show momentum of its own.[13] This is also defined as 'natural trajectories' by Nelson and Winter.[14]

> *In definition a technology trajectory follows its path as dictated by paradigm restrictions, and shows progress by enhancing the technologies inside the trajectory, through paradigm dictated procedures.*
>
> — Nelson and Winter [14]

A technology paradigm may contain numerous restrictive variables. The following ones are some of the more common:

- Economic, institutional and social factors
- Technological history, fields of expertise
- Institutions specific variables such as public agencies, military and others
- Cost or labour saving capabilities
- Economically defined 'needs' from suppliers or customers

These are but a few, since most variables will have some effect on the paradigm, whether discarded or incorporated as restrictions.

As part of the innovation process, technology paradigms and trajectories influence the innovation process *positively* or *negatively*.

> The *positive* contribution is towards keeping 'noise' (useless information) limited and therefore enhancing development and project completion time. Another advantage is the specialisation inside a technology trajectory, which enhances products and new ideas in many ways.
>
> On the *negative* side, innovation is supposed to be about developing 'new' products or processes and can never be truly new if contained in a bound environment, no matter how diverse. Secondly by innovating inside a technology trajectory, the chance of outside intervention from

an organisation in a completely different technology paradigm, may disastrously overwhelm current developments and ideas; many times reducing a previous technology paradigm to ashes. (E.g. Swiss watches replaced by quartz, sail boats replaced by steamboats, paper offices replaced by computers, analogue by digital, and many more.)

The advantages of technology trajectories have to be balanced against the disadvantages. This could create a conundrum for technology and innovation managers, when choosing between following a technology trajectory, developing a new one, or splitting of from an old one.

New developments in the field of technology forecasting propose the existence of disruptive technologies. A disruptive technology is often a simpler, lower cost alternative to current technologies, but has jet to find strong application in the market. These disruptive technologies do not support the current 'S'-curve technology lifecycle, but may influence it drastically if adopted by the market. Disruptive technologies have the uncanny ability to 'break the mould' and negatively influence current technologies. Transferring from one technology paradigm to another is the same as changing from a sustaining technology path, to a new and developing disruptive one.

New thoughts and methodologies are constantly being developed in the field of technology forecasting and extrapolation. This will hopefully lead towards an improved discipline of technology management, and better innovation development as well.

5.1.1.4 Conclusion to Technology

Technology plays an important role in the total process of innovation, from ensuring the correct technology is available, to manufacturing a part, to providing personal computers to type the documentation for product support. Yet, even organisations with the best and most up to date technology will not automatically be able to innovate. Too many other external and internal factors influence the innovation process, one of which includes the product market. Without a strong market even the best and most creative organisation may flounder, yet the market more often than not commands the bottom line.

The following section will look at the *customer* and *market* and their influence on innovation. The importance of good market interaction will be highlighted.

5.1.2 Market and Customer

Customer relationships are increasingly becoming more important in marketing, as well as in the whole innovation process. The ability to build meaningful customer relationships will enable organisations to interact and gain valuable knowledge from customers, with the aim of improving new product development. In both innovation and marketing there is no substitute for understanding and knowing the customer[15].

However, not every customer wants or is prepared to build a long-term relationship with the developer. Many customers may provide one-time only sales-opportunities, representing a field of information where little emphasis is currently placed. Transactional efficiency and one time customer satisfaction, could become a large component of marketing, as global marketing strategies impact on once remote

market sectors. In the field of innovation, better monitoring and information gathering techniques will have to be developed to compensate.

To better understand and identify the best innovation practises in marketing, the implications of the market may be discussed under subjects such as purchase and *consumption behaviour, competitive environment*, *market trends* and others. These are discussed below.

5.1.2.1 Purchase and Consumption Behaviour

Strong marketing capabilities are based on an intimate understanding of purchase and consumption behaviour. Managing the purchase and consumption environment requires careful analysis of consumer characteristics and behavioural trends, as well as the social influences and environmental factors that influence behaviour. In the era of communication and global marketing, these characteristics and trends need to be understood on local, regional and global level.

Two types of decisions are required from customers, namely: *extended problem solving*, and *limited problem solving*. Since technological innovation often results in complex products, an extended problem solving decision is often required.

> Extended problem solving has a great deal to do with the perceived risk. When buying a computer for instance, there might be a risk involved with buying the wrong one. The difference between Apple and IBM for instance is great, and factors such as compatibility and future product support, play an important role. When the importance of unseen issues is high, customers need more information when making a decision on the worth of a product. A customer is 'said to be involved' if a particular product is important enough to warrant further investigation.

The importance of understanding the needs and requirements of the future market is important to every organisation. Purchase and consumption behaviour forms one of the keys towards understanding one's market, and its associated dynamics.

5.1.2.2 Competitive Environment

Competitive intelligence is often accompanied with thoughts of secrecy and espionage, yet most successful organisations use 'clean' competitive intelligence. There is seldom the need for crime in the information environment, if well-managed gathering and analysis are in the order of the day. Through patent information and direct or indirect signals, competitors may be monitored. This often provides early warning of new products or radical breakthroughs.

By methodically collecting and sorting key pieces of information, excellent competitive intelligence may be gathered and stored. This information can and does improve strategic decision making, as well as new product development. More discussion on competitor analysis will follow in section 5.1.3 on industry analysis.

5.1.2.3 Future Market Trends Foresight

Current market literature focuses on existing markets and how to serve them best. Through *segmentation analysis*, *industry structure analysis* and *value chain analysis*, marketing departments try to gain competitive advantage for their organisation's

products. However, how does one analyse a market that does not yet exist? This is often one of the predicaments when introducing a new technological innovation into the market. Within an established market, most of the rules for competition have already been set, yet in emerging areas the rules are waiting to be set.

Managers and organisations focus a lot of attention on the problem of getting and keeping market share. Many believe market share is the primary criterion for measuring the strength of a business' strategic position.

From an innovation perspective the following questions arise:

- How does one calculate the meaning of market share in markets that barely exist?
- Can business maximise market share in an industry where the product or service is undefined, customer segments have yet to solidify, and customer preferences are still poorly understood?

> *'Competition for the future is competition for opportunity share, rather than market share'. The question that therefore must be answered is, given our current skills or competencies, what share of future opportunities are we likely to capture? Which in itself leads to others: Which new competencies do we need to build to reach or capture more opportunities in the future, and how would our served market have to change?'*
>
> — Prahalad and Hamel[16]

In the race towards the future, top managers have to be just as concerned with maximising current market share, as they are with maximising future opportunities, or as yet non-existent markets. However, few market managers are equipped to deal with radical shifts in customer behaviour or societal change, yet if Toffler[17] has anything to say about the future, it will be one of miraculous upheaval and change.

5.1.2.4 Interaction

Strategic alliances can have a significant impact on organisations and their business environment. Companies with small domestic markets often find alliances with global players very lucrative. Not only can international alliance partners improve sales, they may also incorporate research, development and patents into their own products, generating valuable licence revenues.

The following three conditions as defined by Yoshino *et al*[18] have to be met in forming a strategic alliance:

- The two or more firms that unite remain independent, subsequent to the formation of the alliance.
- The partner firms in the alliance share the benefits of the alliance and performance of assigned tasks.
- The partner firms contribute on a continuing basis in one or more key strategic areas, e.g. technology, products, and so forth.

Strategic alliances are enablers of new technology development. In the initial undefined beginning of a new technology, many different approaches are necessary (start of the 'S'-curve). When alliances are formed, even between competitors, common development can be achieved. This reduces the amount of time and money necessary for developing technologies, until they become economically viable. At this

point however alliances are broken and each organisation starts to compete with its own products, yet often using the same underlying technology as the previous alliance partners.

Many current alliances exist today throughout the global business environment. Through the development of technology and improvement of total value chains, these alliances are great incubators for innovation. Although alliances seldom form to develop a single product, they often generate enough technology, incentives and possibilities for new innovation that after the alliance splits up strong new products flow from the previous alliance members.

5.1.2.4.1 Market and Organisation Interaction

It would be logical to assume that with an improvement in communication technology, interaction between organisations and customers would improve. This is exactly the case in marketing and the direction of changes in this field. Marketers challenge themselves to act in a more holistic way, incorporating diverse aspects previously unconnected with the discipline. All these changes have one goal in mind, and that is better interaction between all parties.

Interactive relational network management can be described as improving the bonding between existing and new parts of the value chain. It is the task of the marketing department of a organisation to help every individual in the value chain network to think of every customer they serve as an individual. In this way they will improve understanding as well as better workmanship on products and services, enriching the total innovation process.

Cross-functional activity management involves the task of making sure everyone, no matter how small the task he or she performs, makes a valued contribution to the total success of the innovation to his/her best ability. Marketing may often be seen as a group of cross-functional activities requiring everyone to manage a sub set of the total range of marketing activities. Thereby the whole can become more than its individual parts.

Information management is and will play an increasingly important role in innovation as well as marketing in the future. New database software enables organisations to apply predictive models to customer data and improve market orientation. Information management technology, increasingly enable organisations to interact with their customers on a one to one basis; subsequently improving relationships as well as mutual understanding.

Acquisition and retention management is based on the principle that retaining customers is more profitable than attracting new ones. Keeping and teaching current customers is advantageous to innovation, once the lead user principle can be applied. Better information about new and current products can also be obtained from retained customers.

Transaction and relationship management does however play almost as an important part as retention of old customers. Focusing specifically on the immediate needs of the customer and disregarding the potential of him/her becoming a regular customer, will teach organisations to satisfy customers the first and only time. This trend impacts negatively on the amount of information obtained from customers and often also on innovation.

Customer interaction has an extremely important function in the technological innovation process. It is important to realise that marketing departments seldom understand direct contact between customers and engineers or innovators (as can be seen in above-mentioned marketing jargon). Innovators however receive validation and motivation from customers, as well as new ideas. In return customers are educated (about a new product or idea) to a degree, and when the innovation finally appears on the market, it is more easily accepted.

5.1.2.4.2 Market/Customer Influence (Market/customer development)

There are many environmental issues shaping customer behaviour. Individual characteristics also play a role in defining customer needs and requirements. With the aim of diffusing a new innovation into a new market, these individual and environmental issues have to be used to the innovator's advantage. Although individuals have their own individual characteristics, these are malleable and can be influenced if approached correctly or for a long enough duration of time. The most common way of influencing individuals is through the environment they live in.

Shaping the human living and working environment is fast becoming one of advertising's major purposes. Some parts of New York for instance are so plastered with advertising that the visual environment is almost totally controlled by advertisers. Besides advertising other avenues of influence exist and some of them might include *culture*, *social class*, *personal influences*, *household influences* and *situational influences*. These will be discussed below.

Culture plays a significant role in most populations. Common values, attitudes and meaningful symbols help individuals interpret, communicate and evaluate their worlds as members of a certain culture group. By understanding the culture in a specific market segment, its advantages and pitfalls may be identified. This in turn leads to more appropriate marketing techniques as well as total innovation processes.

Social class can affect the implementation of innovation in a direct way. Brand names play an important part in defining a social class and this can be exploited. By instilling a specific brand as an upper class identifier, such as Cartier, Rolex, Rolls Royce and others, ridiculous profits can be accrued. It is however extremely important to adapt the innovation process to these specific classes, since brand names will never be able to support poor quality innovation.

Personal influences are the most crucial when diffusing an innovation. Knowledge of specific individual characteristics in a market can often be spotted in lead users. These users are often technically inclined and know a great deal about the operation of the product. They can successfully be used for testing and evaluation purposes. By monitoring their responses, specific likes or dislikes can be identified and implemented in the final product.

Family and household influences have a unique area where information and decisions are sometimes left to specific individuals. When identified these individuals can prove extremely profitable. They often play a gatekeeping role of gathering information and influencing communication on proposed products. If a new innovation for toddlers is launched, the appeal should not be directed at the toddler only but the parent as well, since she/he is the one with the purchasing power.

Situational influences can many times result in prolonged diffusion for innovation. It may also improve the diffusion process. The South African market has seen a profusion of 4x4 vehicles in the last couple of years, and has become a test environment for new 4x4 automobile models. Due to the natural environment and the perceived requirements of the South African driver, 4x4 technology has been adopted faster and with more zeal than in many other countries. The situational influences clearly enhance the testing and introduction of new 4x4 technologies in the South African market. Other situational influence factors may include the *purchase environment* and situation, the *communication* situation, and the *usage* situation.

Advertising has major cost implications and developing a market for a new technology may often cost more than an organisation is willing to pay. First to market, or fast follower strategies, play an important role in implementing new technologies. Choosing the best one to follow may be a solution to a resource-depleted organisation. By deciding on a fast follower strategy and waiting for another organisation to spend the millions in market development, the fast follower may be able to capture market share with less resource intensive advertising campaigns. In so doing reducing the risk and cost of failure if the market does not like or appreciate the new product.

5.1.2.5 Conclusion to Marketing

Many non-technology oriented managers and organisations, feel the market is the ultimate judge and source of competitive advantage. Although this viewpoint has many years of success and research behind it, one flaw exists. Markets are unable to need or ask for new things. Sure they often require improvements on current products or services, but seldom if ever do markets have the ability to define a new paradigm. For how could someone desire or need the undefined? The only true paradigm shifters are the individuals busy in the field of experimentation and discovery, for through discovery new knowledge is created which may lead to new innovation pursued.

Listening and testing the market undoubtedly improves innovators' understanding and ability to satisfy their needs. The innovation manager therefore has to ensure that the total innovation function has as much interaction with the market as possible. This does not only improve the innovation, but the understanding and worth the market assigns to the hard work done by the innovation team

5.1.3 Industry

Current business strategies emphasise the importance of core competencies and competitive advantage for the future survival of organisations in a globally competitive environment. These activities are said to form the heart and brain of the modern technology based organisation. This is often possible through outsourcing certain non-core functions to specialists. Alliances with other firms are thus becoming increasingly important in modern business. When managed correctly, this focus and outsource strategy may help the organisation to reduce its overheads, and improve the current capabilities. This often results in a more streamlined and competitive organisation.

In the era of take-overs and growth by acquisition, many large ungainly international organisations were established. These oligopolistic entities often grew to improve synergies between functions, thereby improving vertical integration in the industry. By acquiring businesses in the value chain, thereby shortening it, these large

organisations were able to control the product from the raw materials stage, right through to sales and after service. In the early parts of the twentieth century the Ford Motor Company owned large tracts of pine plantations with the aim of using this wood in their Model-T Fords. Thus taking the methodology of vertical integration to the extreme. Today however, the difficulties in managing such a huge process have become more apparent, and few organisations are brave enough to try their hand at it.

The promise of greater profitability and synergy between disciplines are some of the reasons why vertical integration is still seen in modern organisations. But, as Peters[19] states:

Synergy is a snare and a delusion...

— Tom Peters

...and should therefore not be followed blindly in the hope of managing the total value chain. The easy road of growth by acquisition may often lead to death by restructuring for many or most of today's large oligopolistic firms, possibly as soon as five years[20] after they went on the acquisition spree. These firms, in the aim towards managing the total value chain, are seldom capable of managing the complex and extensive diversion of functions contained inside their new oligopolistic organisations.

It is often said that in large organisations, with every new employee being appointed, the organisation's effectivity improves with an ever-diminishing amount. While the administration and overhead costs increase with an ever-increasing amount. This leads to the logical conclusion that the smallest number of people with enough knowledge and experience to 'do the job', is also the most effective amount. It is this empirical observation that often results in small organisations stealing market share from large organisations. It surely enabled a small company like Apple (in the early days), to severely influence and steal market share from the much larger IBM Company.

In large organisations the amount of revenues lost, due to slow reaction time, and poor cultural fits between the core organisation and the newly acquired one, may lead to shedding all non-core assets and capabilities.

5.1.3.1 Alliances and Industry Analysis

Industry analysis and competitive intelligence often conjure up images of romantic, sometimes dangerous and often illegal acts of espionage and spying, so clearly portrayed in films of the seventies and eighties. The fact of the matter is that an established discipline of totally legal competitive intelligence gathering exists, with strong links to most of the top 500 global companies. Not only does this discipline include competitor analysis, but other aspects such as *benchmarking*, *structural industry analysis*, *regional and governmental benefits* as well as *international advantages*.

The discipline of structural industry analysis was greatly expanded by Michel Porter and his development of the five competitive forces model.[21] This model as Figure 5.6 illustrates is the basic industry structure found in the value chain of a product, comprising the *organisation*, its *suppliers*, potential *new entrants*, *substitutes*, as well as *buyers*. These are the players capable of commanding the attractiveness of returns, differentiating the highly profitable industries from the low profit ones.

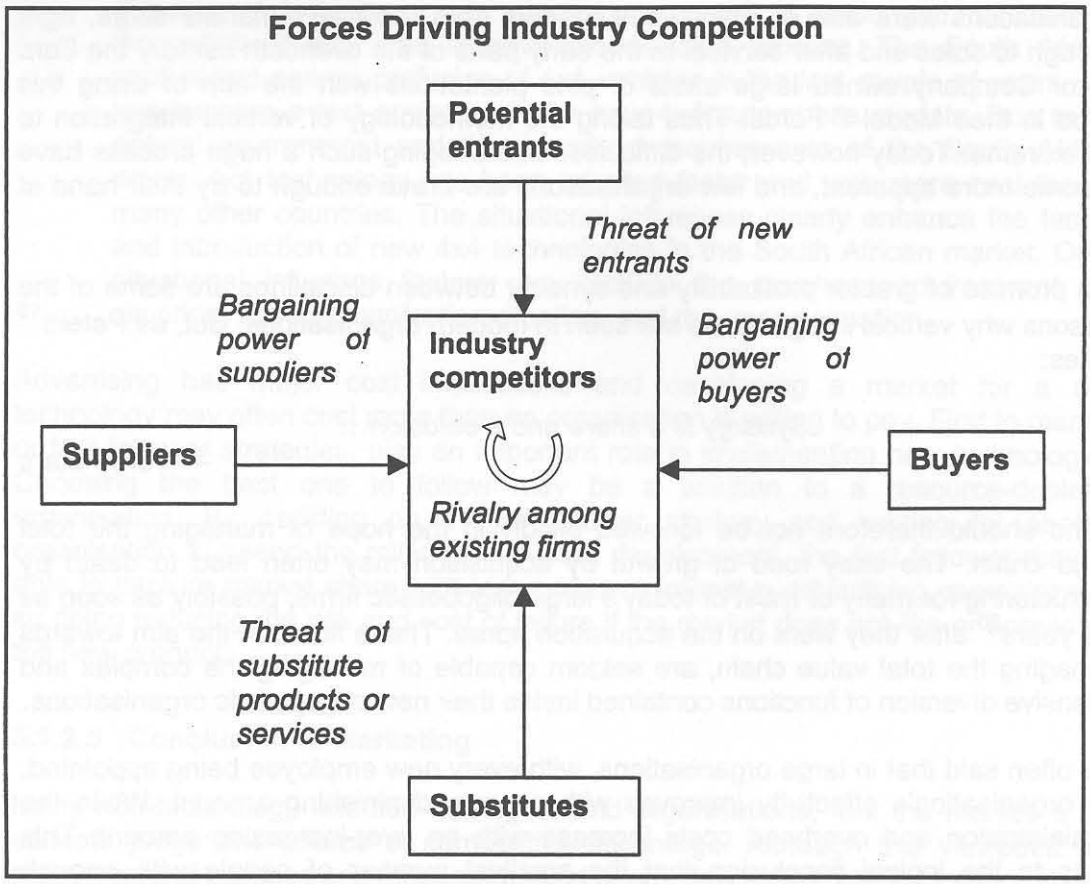

Figure 5.6: Forces Driving Industry Competition, Source: Porter[21]

Profitability and competitiveness may be improved, through collaboration between the organisation and its suppliers, as well as its buyers. By focussing on the supply side offering mutually beneficial advice as well as assistance, the organisation may be able to improve the service, reliability, production processes, and products received from the supplier. In turn this could improve the organisation's own position, by enabling it to shift towards better materials requirements planning options such as JIT or Kan-Ban systems.[22] For example the surge in SAP™ and Baan™ software implementation in recent times, are proof of the benefits that can be derived from strong interaction between parties in the value chain.

Strong connection between the organisation and the customer, may improve not just the amount of goods sold, but offer other advantages as well. Involving select groups of buyers in the new product development process may enhance the overall acceptability of the final product. The involvement will also improve understanding on the buyer's part of the reasons for including certain unknown attributes to the product. Concurrent engineering is one of the disciplines advocating early involvement of all relevant parties, including suppliers and buyers. If the organisation is able to influence these groups, much may be gained in the areas of competitiveness and profitability. The statement by Porter[23] holds true: 'The ultimate aim of competitive strategy is to cope with and, ideally, to change those rules *(that define the industry structure)* in the firm's favour'.

Some of the methods discussed next enable the organisation to improve as well as influence its industry environment.

5.1.3.2 Benchmarking

Benchmarking is a tool for identifying 'best practises' at various companies, with the aim of adapting and implementing these towards own improvement.

Benchmarking follows a four-step approach. The Shewhart or Deming cycle[24] is the basis for this fundamental quantifying method, and consists of the following four steps:

- Plan
- Do
- Check
- Act

The first step includes planning the benchmarking study, defining the necessary processes, as well as the measures of process performance. Additionally the organisation's ability at their own processes, and the companies that the study will use as a benchmark, should be identified. This is illustrated in Figure 5.7.

Questions such as 'What should we benchmark?' and 'Whom should we benchmark?' form the basis of the first step.

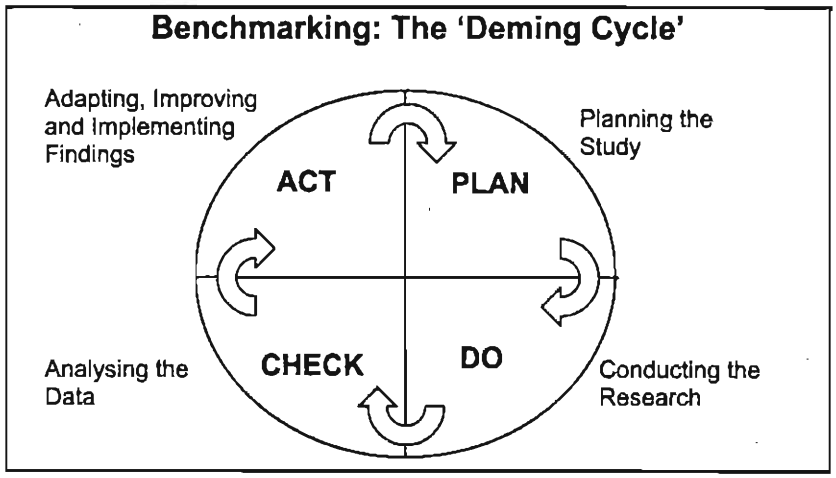

Figure 5.7: The Deming Cycle, Source: Watson[25]

Step two consists of the primary research, which includes investigating public disclosures about the particular processes of the target companies. It is important to learn as much as possible, before making direct contact with the target organisations, since many are unaware of what has been written about them in the press and trade publications. When direct contact is made, it can be in the form of telephone, written or site visits to make detailed observations.

The third step in the cycle is the process of analysing the gathered data, and determining the studies findings and recommendations. The analysis consists of two processes. Determining the discrepancy between the companies, by using the metrics as defined by the planning stage, and identifying the processes that facilitated the performance improvements at the leading companies, which formed part of the benchmark.

> *The last step* in benchmarking involves the improvement, adaptation and implementation of the appropriate benchmark enablers. With the aim of changing an organisation, benchmarking has a built-in bias for action. It goes beyond just conducting a business process study, or obtaining a relative measure of business performance.[26]

As part of the innovation process, benchmarking can help weak and poorly innovative organisations improve their innovation success rates. Benchmarking for innovation can, apart from traditional benchmarking, have some interesting advantages. By benchmarking for innovation, the ability to adapt innovation procedures from any organisation, and not only those within one's own industry, becomes possible. This magnifies the ability of innovation benchmarking, to find the best of the best, and apply those processes on the home front. Since different industries tackle innovation differently, by searching for unique techniques and processes, organisations can extract only the most effective ones, and adapt them as world leading methods in their own organisations. This expands the benchmarking principle, by removing current barriers that exist when benchmarking in a specific industry.

5.1.3.3 Competitive Environment

The competitive environment is about knowing one's adversaries, and when to close in battle, or to form temporary alliances. Strategies for defence and attack form a large constituent of this discipline. Methodologies in the field of technological interaction include aspects such as predator-prey, pure competition and symbiosis of technologies, as proposed by Pistorius and Utterback.[27] These interactions between technologies are just as applicable to the interaction between innovations. It is therefore important to understand the actions and reactions of competitors.

When analysing competitors, the unwritten rules guiding their actions should be investigated. These rules often point towards their destination in the development of new products, and may be used for anticipating their future activities. With this knowledge in hand strategic responses may be constructed beforehand to the advantage of one's own organisation. The following as proposed by Burgess[28] may be of assistance when analysing competitors and their possible future moves:

> **Mission and objectives** — *find out about the future and past in the competitors annual reports and other documents.*
> **Satisfaction** — *does the competition seem satisfied with their own performance.*
> **Motives and drives** — *remuneration and long or short term results. Do they want to become industry leaders or are they content?*
> **Current strategy** — *what is the current strategy, and is it reachable? How does this compare to our own?*
> **Future objectives** — *does foresight and future planning form a large part of strategic planning? Is there a vision of the future?*
> **Market served** — *what market segment does the competition service well? Which segments contribute the largest part of sales? Which would be defended strongly or poorly?*
> **Globalisation** — *is globalisation a priority and are sources of demand and supply being globalised?*

Resources — *what is the organisations cash position? Trends in financial results? Key people?*
Management style and intro-organisational conflict — *how is the competition's management perceived? Do they encourage entrepreneurship and innovation? Are they authoritarian? How do employees perceive the business environment inside the firm? Is conflict and failure accepted and managed well?*
Empowerment profile — *does diversity exist in the organisation? Are rights and religious days of minorities observed?*
Response profiles — *how does the competition respond to threats and opportunities? Does it over or under react?*
Transitional product rollout strategies — *how is the firm likely to introduce its products into foreign markets?*
Countries of origin effects — *what perceptions exist about the competitor's country of origin and how do this affect them? Communism or wars severely influence the global perception of countries as well as their products.*

Many other measurements of competitor capability and characteristics exist. By methodically collecting and sorting key pieces of information, excellent competitive intelligence may be available. This information can and does improve strategic decision making as well as new product development.

5.1.3.4 Ultimate Leadership

Although ultimate leadership is idealistic it has a very important goal. As the global business environment shrinks, many organisations will find themselves attacked heavily in all national and international markets. There can no longer be such a term as a local market, for international organisations increasingly enter all emerging markets with the aim of gaining global dominance.

5.1.3.5 Conclusion to Industry

The industry environment holds many different threats and opportunities. Identifying these to the advantage of the organisation, is what industry analysis is all about. Aspects such as competitive intelligence, alliances, benchmarking and learning from each other, offer organisations in an industry the ability to survive and prosper, if correctly applied.

5.1.4 Political, Economical and Social (P.E.S.)

The political environment and the trends therein have an impact on technology and technological innovation[29]. Although politics and technology influence each other, certain global trends may be identified as drivers. To a certain extent these trends do not necessarily drive the direction of individual technologies, but create the means and opportunity for their development. For example the United States of America created a strong incentive in the form of grants and motivation when the 'Space Race' was on. Currently emphasis falls on biological research and thus government grants are increasingly made available in this domain. It can be clearly seen that certain technology areas are of more importance than others, and it is crucial to most organisations to be aware of possible grants, tax incentives and other political, social and economical advantages. With this in mind, it makes sense to have close links with national, as well as international governments, in order to capitalise on incentives in the fields of technology or innovation.

The economic world is possibly one of the strongest drivers of technological development. Competitive advantage and money drive most organisations, which in turn drive the development of technology and new innovations. As time and distance disappear in the new millennium, so will the demand for commodities (mining, manufacturing and agricultural products) become less important[30]. Instead demand for information, services, knowledge and intellectual capital will build. This can clearly be seen in the enormous rating placed on current 'Internet Stocks', like *America on Line* and *Amazon.com.* These information and service providers are valued much higher than mining, manufacturing or agricultural organisations, simply on the fact that they are build on intellectual capital and service, as well as offering enormous growth possibilities. Therefore, being on the right side of economical development and investor perceptions, may prove extremely advantageous for technological development and new innovations.

Most organisations would attribute a large part of successful innovation to segmenting and entering the correct markets. Undoubtedly this is correct, yet markets are driven by certain forces of which one is social beliefs, actions and needs. For example a social change in the market had a disastrous effect on the Ford Motor Company. Ford designed and developed the new 'Edsel' for young upcoming couples, yet they misjudged the social needs of the population segment so badly, that the 'Edsel' was probably their biggest disaster ever. Ford had to go back to the drawing board and completely redesign the vehicle, better directing it at the newly emerging market.

Technological innovation can sometimes occur without serious consideration for social needs, this however, is only possible if the technology is strong enough to influence a social change, as can be seen in the information revolution. When such a change is made, many opportunities for new innovation in that particular field become available, advancing technological development.

By identifying and pursuing relevant innovation enhancing factors, organisations may be able to substantially improve their development and innovation resources. By keeping a lookout for influential national and international parties, cultivating links with national and international governments, and deriving ultimate advantage from national and international innovation incentives, may significantly improve organisational innovation abilities.

Although the P.E.S. factors do not always directly impact the innovation process, they do play a role in organisational survival. As Kondratieff proposed in his discussion on the interaction between the economic environment and technology development one may see the result that one has on the other, as discussed in chapter 2. Organisations disregarding these environmental forces may find themselves in deep trouble when technology, politic, social or economic paradigms shift. For the business environment is never in absolute equilibrium, offering many threats and opportunities, as it changes.

5.2 Organisational Issues

5.2.1 Strategic

Every modern organisation, large or small, can no longer rely on exogenous factors for competitive advantage. Innovation and dedication to technology and customers, will be the driving forces within the twenty first century. The information age enables

a process, whereby knowledge can accumulate, to the advantage of Science and Technology; almost forcing civilisation to discover or develop incredible new concepts. All this impact directly upon the modern organisation, by reducing its knowledge base and underscoring its products. One thing is absolutely clear. No complacent, tradition bound organisation will be able to survive the twenty first century.

To grow into the new all different global environment, understanding and preparing for the future becomes most important. Foresight and vision are two of the strategic terms emphasised by business schools and academics, for they are the barometers to the business environment and its possible needs. The term 'foresight' dominates in an exiting management book by Prahalad and Hamel,[31] describing precisely the methods and processes crucial to competition in the future.

5.2.1.1 Strategic Planning

Strategic planning is based on identifying corporate objectives for the future, in response to perceived threats and opportunities by understanding the company's strengths and weaknesses.[32] Strategic planning provides a framework to guide the choices that determine the future direction and nature of an organisation. As such it provides the basis for all long range and operational planning. It is the highest level of decision-making concerning a company's basic direction and purpose, in order to assure long term health and vitality of the organisation. A strategy is broad in scope and concerned with goals and the means of attaining them. Strategic decisions should be non-routine, important, complex, holistic, and future oriented. Without strategic planning, organisations stumble along in a state of masked chaos, offering no chance for purposeful technological innovation.

> *The reality of strategy lies in its enactment, not in the pronouncements that appear to assert it.*
>
> *—Burgelman and Rosenbloom*[33]

Strategy is emphasised as the determining factor in directing organisations towards a higher pace in technological innovation. For industrial firms, competing in the technological environment, a combination of factors in three domains is crucial:

1. The development of new ideas, products and processes;
2. The adoption of new ideas, products and processes developed elsewhere;
3. The successful marketing of the output of the new product development program.

The technological innovation process relies on exceptional organisational strategy for underlying direction and support. Without a strategy that includes innovation as the means towards reaching the future, technological innovation will not be accomplished.

5.2.1.2 Active Foresight Programme

Tradition, complacency and success are some of the enemies of modern day organisations who want to stay innovative. Another one and possibly even the greatest, is a lack of foresight. Most CEO's (Chief Executive Officer), MD's (Managing Director) and others involved in the management process, will agree that change is happening more rapidly today than ever before. They may also agree that

the rate of change may increase as information technology enables humans to be more effective. The logical conclusion from this would be that managers would be spending more and more time anticipating change and future threats or opportunities. However, this does not seem to be the case,[31] and one wonders why not.

Prahalad and Hamel[31] aptly describe an analogy to the amount of time spent on serious consideration of the future. They state that they often find managers on average spend 40% of their time looking outside the organisation, and 30% of that time on looking three, four and five years into the future. Of the time spent looking into the future, as little as 20% is spent on attempting to build a collective view (with other employees and colleagues) on the future. This results in a staggeringly small amount of 2.4% that the typical organisation spends on building a collective perspective of the future. This fuels the debate on realisation of future threats and opportunities, and how an organisation may possibly be able to capitalise on, or defend against such actions.

The obvious question at this time is where does this foresight come from, or how can it be obtained. Since no crystal balls with glimpses of the future exist, the basics of constructing a foresight strategy take time and creativity. Developing foresight requires more than scenario planning; it requires a will to make something happen. It often starts with what could be and then works backward to what should happen for that future to materialise. This type of foresight is unique, for it is active. Instead of reactively predicting the future, organisations are shaping themselves to be part of the construction and final outcome of the future. This type of future building is what the Motorola Company embraces. They are totally committed to satellite based personal communications for instant world-wide data interchange. This is also the foresight, which drove JVC in the development of the VCR as well as Bell Atlantic's view of information, entertainment, and educational services made available to every home in its service area.

A deep understanding of trends in lifestyles, technology, demographics, and geopolitics supports industry foresight. Yet ultimately it requires more than sheer knowledge, it rests on imagination and a sense of curiosity. 'Foresight is the product of eclecticism, of a liberal use of analogy and metaphor, of an inherent contrarianism, of being more than customer-led, and of a genuine empathy with human needs'. Prahalad and Hamel.[31]

Foresight, if correctly implemented and thoroughly entrenched throughout the organisation, can be a driving force behind innovation. For innovation to flourish, organisational goals specifically requiring innovation, is necessary. In this, foresight plays the crucial role, for foresight not only proposes a future, but also requires the organisation to make that future happen. Foresight and innovation are partners, and one without the other can never be as potent as in their combined form.

5.2.1.3 New Generation Products in Accordance with Foresight

When studying new product development, literature teaches the importance of product platforms and incremental improvement. Modern competitive environments require differentiation in the extreme, nullifying the concept of incremental improvement. For organisations to overcome incremental differentiation, radical innovation becomes necessary. Radical innovation, although costly and risky, does create enormous possibilities.

You don't leap a chasm in two bounds.

—Chinese proverb

Tom Peters[34] goes so far as stating 'You can't improve your way to success', meaning incremental innovation can no longer be a strategy towards success. Even though the concept of Kaizen,[35] as practised by many Japanese organisations, strive towards perfection through incremental changes, perfection for perfection sake can be disastrous. Inadvertently it boils down towards avoiding fundamental change and only improving marginally upon yesterday's paradigm.

Incrementalism is innovation's worst enemy.

—Nicolas Negroponte, MIT Media Lab

As crucial as it may seem, the fragmented view of only pursuing radical or chasm bounding innovation, cannot easily happen in a vacuum. For organisations to make the 'leap across the chasm', a foresight or future plan is necessary.[36] By means of such a plan, goals and requirements might be set in preparation for the 'leap across the chasm'. The Motorola Company is well known for its vision of the future, and how they plan to, affect or conform to it, to position themselves in the most advantageous position possible. Yet Motorola will not simply 'leap' on faith alone, they carefully plan and build enough competencies, through alliances and current product ranges, to be able to snap into action the moment all criteria for final chasm jumping are met. In this, incremental innovation can play the part of preparation for shifting to new paradigms and radical new products. Incremental innovation should not be misjudged as a strategy capable of delivering sustainable competitive advantages.

5.2.1.4 Foresight and Business Strategy Link with Innovation

Organisations with poor technological innovation records may often try to improve the process through motivation, and requiring more innovation from their brightest and best employees. Often the required innovation is stated in vague terms, leaving it up to the innovator to 'be creative' and find something new. The same might happen in a process environment, where management requires new ideas on improving the process, yet send out vague requirements about innovation or new ideas. It therefore comes as no surprise when employees, in an effort to be creative and inventive, come up with ideas directly opposed, or even completely removed from the organisation's business strategy. An example in the packaging industry in South Africa, where management asked employees to be creative and think of entrepreneurial or new innovations, delivered amazing results. One of the employee's proposals was so far removed from the business as to propose (innovate) a new fishing hook design.[37]

The *first step* in improving ideas in the organisation is making employees aware of the organisational strategy. Even though most employees often know the strategy, it seldom impacts directly on their daily activities. Emphasising areas of the strategy where innovation is required and focusing on goals and objectives can generate better ideas and more useful creative activity.

The *second step* and the more strategic one is linking the innovation strategy with the corporate business strategy. Goals and objectives set in accordance with the corporate and foresight strategy will bring the innovation process to a keen focus. This will empower creative and entrepreneurial employees in improving their idea submissions, reducing the risk of being turned down, as

well as the mental frustration of knowing a good opportunity is sliding out the door. Administration wise, managers will be freed of turning down the ridiculous proposals, and freer to evaluate the better-focused ones. By cutting out the ridiculous and finding the strategically focused proposals, the evaluation committee will not be forced to turn down so many proposals, improving employee and innovation related activity morale.

Innovation strategy is possibly the most crucial part of the process of managing innovation. Without such a strategy, no organisation will be able to develop new products, without straying from their core competencies.

5.2.1.5 Selecting the Correct Structure for Innovation

Organisations commonly employ different structures when managing new projects. Just as some project structures are better to use for certain projects, innovation team structures may have different advantages. Innovation team structures are borrowed from the project management discipline, for a new innovation is often structured and implemented under the auspices of project management.

Certain structures work better for certain projects or innovations. Four dominant structures, as identified by Wheelwright and Clark,[38] can be shown to enhance or debilitate particular forms of innovation.

The four project structures as proposed are the *functional team structure*, *lightweight team structure, heavyweight team structure* and the *autonomous team structure*.

In the *functional team* environment, people are grouped principally by discipline, and managed by a functional or discipline manager. This structure is conducive to incremental innovation, since few cross-disciplinary actions take place.

The *lightweight team* structure incorporates a project manager, who co-ordinates different disciplines through liaisons. These do not influence the disciplines directly and only the liaisons get information from other disciplines. This structure is more conducive to incremental innovation, with some free ranging creativity.

When *heavyweight team* structures are used, a strong project manager leads the project, and interacts directly with all participants in each discipline. This enhances information flow, leading to better ideas and more creative innovation.

Tiger teams or *autonomous teams* are almost small businesses in their own right, including their own employees, and financial systems. These teams are best for radical innovation, or developing new technology not yet adopted by the organisation. They are however dangerous since their autonomy give them an elevated position compared with other organisation employees. This may often result in envy and negative competition between the tiger team and the organisation[39].

In essence the organisational strategy is there to provide the innovation process with the necessary resources and strategy. By creating an atmosphere where direction and means are provided, the strategic side of the organisation may fulfil its obligation to the innovation process.

5.2.1.6 Conclusion to Strategy

Top management influence the innovation process through the strategies, plans and visions they create for the organisation. How else could one expect innovation in an organisation without specific strategic incentives in place to foster it? Innovation is often regarded as a wild and unpredictable process, yet many organisations have shown this is not the case. By including directives and goals for the innovation process in the organisation's strategy, methodical innovation will occur more and more frequently. Even though breakthrough innovations will only come once in a while, by improving and innovating consistently, the chance for the one great breakthrough is much improved.

5.2.2 Innovation Process Implementation

New technology and its acceptance by non-technical people, is of great importance to the technology manager in the organisation. Innovation often embodies technology, and is therefore affected by the difficulties of changing human perceptions and actions. Even inside the organisation it may sometimes be difficult to convince employees of the advantages of a new innovation. Being unable to change management's or accounting's negative ideas on a new innovation, may end up by sinking a possible new innovation project.

'Change' management plays an important part in the implementation of new technology. To skilfully manage change inside the organisation, Student[40] identifies five factors:

1. The *influence* and how this is applied,
2. The amount of *familiarity* employees or recipients of the implementation has,
3. A basic period of *testing* before implementation,
4. The amount of associated *stress* accompanying the change required,
5. A *chance* variable, allowing for a measure of luck.

Influence forms the focal element in any successful change process, and can either be employed advantageously or negatively. By forcing or requiring participants to change through domination or fear, negativity will surface immediately. Participation, when used as change technique, may also fail, for participants may soon feel manipulated and become negative towards the change. This brings us to the crucial point, that if individuals are forced in any way to change, they will resist, regardless of how much sense it may make. People do not resist change; they only resent being changed.

Conversely people seldom resist change when it comes in the form of creating or being part of something. In this regard people tend to support things they helped to create, as well as processes or implementations they have influence over;[40] or if the employees were consulted in the decision processes, that resulted in a change. Any of these procedures strengthens the behaviour in people to accommodate change and newness.

Through participation, an added advantage is motivation to ensure successful completion of the change, therefore reinforcing the decided upon course. When employees have influence over the outcome and prescriptions of their tasks, work can become more meaningful, contributing towards an overall feeling of well being.

Familiarity underscores the importance of time as an element of change. The human brain has a tendency to reject sudden changes, yet slow and methodical introduction of ideas can have a marked effect on the acceptance of radical new things.[40] Time must pass for ideas to become acceptable, and employees to forget how they worked in the past without the new concepts. Familiarity breeds comfort and acceptance, and wherever possible, innovation should be implemented on a pilot basis in carefully chosen parts of an organisation, before putting it into a system.

Testing acknowledges the fact that participants will test the soundness of the innovation and the degree of support it will receive from other important participants. Most people are naturally curious and willing to experiment, they also have need for stability and predictability. Through testing, the change-implementers offer the participants a chance to evaluate and become familiar with the change, as well as the option to compare it to current procedures or systems. This, in turn, empowers the participant in making a choice of acceptance or rejection, without it reflecting negatively on his/her person. When implementing new ideas, a necessary response to 'we are different — it won't work here', is to allow for a period of testing to create acceptance.

Stress acknowledges the fact that facing the unknown is a fundamental and disquieting threat. Behavioural change challenges an individual's adequacy, and is far more complex than merely acquiring new intellectual skills from classroom training or programmes. In such a scenario, self-esteem is easily threatened before change, and it is only after successful change implementation, that a sense of self-confidence and well being can improve again.

Another aspect of stress can occur when slack is reduced, and members of a department are asked to work differently or more efficiently. The probability that an organisational change will cause stress, is directly related to the degree of behavioural change required for adoption of the innovation

However, stress in some cases can be quite positive. The presence of stress, prior to change, might signal the need for change, as well as improve the possibility that some action will be taken. In such a case, stress elicits initial co-operation, if the proposed change is perceived as a means of reducing the stress. During the changing process, stress may help speed acceptance of change along, in this way. If stress is too great, withdrawal and aggressive behaviour will result, impacting negatively on organisational performance.

Chance is ever present and may add problems as well as opportunities to a new innovation implementation. Since change impact on human capabilities and routines, one should never expect the logical, and be prepared for problems as well as opportunities.

5.2.2.1 Adoption of Technology and Innovation

Technology adoption is crucial in small and large organisations. Every organisation while trying to survive and grow into the future, needs to consider the amount of technology and innovation required, to be successful. This implies that, without correct management of new technology and innovations, organisations will not be able to adapt to changing new circumstances.

Without these new skills, technologies, peoples, methods and ideas, corporate environments can become stale, formal and bureaucratic, resulting in cultures where little or no scope for innovation exists. Innovation cannot happen in a vacuum and needs support from resources, culture and management inside and outside organisations.

With continued adoption of new innovations the added bonus is that people, including managers and employees, inside the organisation, become accustomed to change, increasing their potential to accept new and strange stimuli. Frequent adoption also stimulates learning, for adopting new innovations require new procedures and knowledge, therefore forcing participants to study continuously. Therefore frequent innovation and technology adoption can become a strong driver for human resource improvement in the field of creativity.

5.2.2.2 Timing and Implementation Speed

Fourteen years ago, Tushman and Nadler postulated:

> *...in today's business environment there is no executive task more vital and demanding than that of sustained management of innovation and change...to compete in this ever-changing environment, companies must create new products, services, and processes; to dominate they must adopt innovation as a way of life.*
>
> — Tushman and Nadler (1986)[41]

Today, companies are faced with the additional demand of responding fast to this ever-changing environment. Timing has become one of the crucial aspects of innovation implementation and development. Having the correct timing and the capability to react fast enough, enables companies to launch and introduce products in the correct market window, enhancing their possibilities for success.

Timing of innovation adoption is not only crucial to companies producing and selling innovations, but also to firms busy adopting certain new innovations. The criticality of timing and innovation adoption can be seen in the effect it has on every part throughout the organisation. As such it becomes a multi-functional strategic, managerial and operational issue.

The timing of implementing innovation is influenced by many factors, of which strategy forms an important part. The problem with research in this area however, lies in the fact that it has often been undertaken with little consideration for previous studies, and is therefore extremely fragmented. A large amount of research has been done and through synthesis, key areas can be identified.

As a first stem towards this, Table 5.1 is supplied, where the vast literature in the field is divided into parts. This can be seen as a representation of current knowledge on the timely introduction of new innovations.

FACTORS — SUPPLIER'S SIDE
Environment and industry specific factors (e.g. reputation, technology standardization, market dynamism) Firm specific factors (e.g. competitive strategy, product policy, customer/market orientation, technology strategy) Pre-launch activities (e.g. R&D allocation, collaboration with customers, technology gatekeeping, proficiency in critical success factors in development, NPD in networks) Launch activities (e.g. mode of exploitation, marketing proficiency, identification of lead users) Selling centre (e.g. capitalise on relationships, customer orientation) The innovation and its characteristics (e.g. decision process, information flow, adoption process) Buying centre Organizational/managerial factors (e.g. structure, employee characteristics, communication, attitude to risk) Economic factors (e.g. technology strategy, technological diversity, production technology) Firm specific factors (e.g. product/market strategy, competencies) Customer market focus (e.g. diversity of customer base, demand, receptivity to innovations) Environment and industry specific factors (e.g. competitive intensity, barriers to entry, stage of industry development)
FACTORS — ADOPTER'S SIDE

Table 5.1: Factors Affecting Adoption of Technological Innovations, Source: Tzokas and Saren[42]

5.2.2.3 Ultimate Advantage of Available Resources

People, technology and money are possibly the key resources in the development of successful new innovation. For organisations to grow and be successful, they often focus on these resources as measure and control instruments. This may be observed in the strong financial control process present in most organisations today. Implementation of innovation requires the setting aside of some of these 'strict control systems', by allowing ideas and new projects to develop through their 'difficult' times, where they often consume copious amounts of man hours and finances.

It is in this stage that 'skunks' and 'bootleggers' have their greatest influence. By inhabiting a corner out of the way of the normal business operations, they are often able to defy some of the 'red tape' associated with new ventures. They often work on small budgets with limited resources, resulting in the notion of getting the basics right the first time. For example: Whittle's prototype jet engine was conceived, developed and first tested in just such an environment.[43] Clearly illustrating the importance of sometimes letting the strict monitory and resource control systems, slip a bit.

5.2.2.4 Balanced Repertoire of Product Development, Production and Distribution

A part of the new product development, as well as resource allocation process, is to decide on the best mix of innovations, or proposed new products, to develop further. Wheelwright and Clark[44] refer to this as the organisation's 'aggregate project plan'. This plan organises the type and risk involved with new projects, into a manageable model, where resources might be assigned with care, in contrary to current practise, where resources are often awarded on the bases of which new project presentation looked the best. In such an aggregate plan, the risk reward ratio might be adjusted to include 'hi-risk high-reward', as well as 'low-risk moderate-reward' projects.

5.2.2.5 Early Involvement of all Players

Technology 'push' and market 'pull' innovation are often the subject of debate on the best methodologies, when considering new innovations. Although these differ significantly, they both require early involvement of all 'players' in the innovation game. The notion of concurrent engineering[45] has found great acclaim in the engineering environment, yet often these new methods do not include users or scientists, whom are many times crucial to the development of new technological innovations. Even if these groups are included, few engineers and new product developers know how to interact with them, to the advantage of the project. It is therefore critical to include all 'players' into a communicative environment, to encourage the transferring of ideas and knowledge. Gillette clearly understands the value 'knowledge about the customers' may have on the innovation process. Every working day 200 American males lather up at Gillette's South Boston plant, to test out new products and ideas.[46] In this way Gillette is able to stay one step ahead of competitors, with innovation after innovation.

5.2.2.6 Conclusion to Innovation Process implementation

With the best strategy in the world, but not the ability and competencies to implement it, innovation is bound to stay a pipe dream. Organisations have to change continuously, and the implementation of new technologies, to help the innovation process in the organisation, may sometimes prove difficult. Settled employees, unaccustomed to change, may hinder any form of innovation, by being unable to cope with their new tasks in the innovation process. The innovation manager has the task of streamlining the innovation process, and constantly improving individual competencies. Enabling them to better innovate. Therefore by getting the right information to the right people, at the right time, so that they can take the right action, may be of prime importance in the implementation of innovation.

5.2.3 Fostering Environment

Every organisation has a certain feel about it. When one enters the front door a feeling of wealth, professionallity or tradition may often be pervasive. The environment and the way people dress, speak volumes about their capabilities and emotional state. By controlling these, an organisation may go a long way in improving, or hampering, the environment for successful innovation.

Spescom, a JSE listed South African organisation, for instance, allows some of their more creative employees, the freedom to wander around bare foot

and dress almost any way they like. Only when interaction with clients are necessary, will these employees be asked to dress 'neatly', to portray a professional image. However, if these employees were forced to wear ties and suits in their daily tasks, their creative spirit might be corroded, and they would probably be inclined toward looking for alternative employment.

When trying to build an organisation with highly innovative capabilities, one will have to create a physical and social environment for an innovative 'culture' to flourish. Although some control in the form of direction and structure is required in this, it should enhance, instead of debilitate.

5.2.3.1 Four Factor Theory

Research into climate and innovation, led West[47] to believe four factors were of major importance. A review of the literature proves these as consistent with many teams, and therefore relevant. The four factors observed by West may be described as a model for work group innovation. A brief listing of the four factors include: *vision, participative safety, task orientation* and *support for innovation.* These are described in more detail below:

Vision

Vision is the idea of a valued outcome, which represents a higher order or goal, and a motivating force at work

—West and Farr[48]

Groups with clearly defined focus, and objectives, are more likely to develop new appropriate methods for reaching these. West asserts that work group vision has four component parts: *clarity, visionary nature, attainability*, and *sharedness*.

Clarity refers to the degree the proposed vision has a valued outcome to individuals in the group, and thus reinforces their commitment to the group goals.

Sharedness refers to the extent the vision gains widespread acceptance with individuals within the team.

Further visions should be relatively attainable, if they are to initiate innovation, since if the goal cannot be reached, it may be demoralising and negative for total innovation.

Partcipative Safety

Participativeness and safety are characterised as a single psychological construct, in which the contingencies are such, that involvement in decision-making is motivated and reinforced, while occurring in an environment, which is perceived as interpersonally non-threatening

—West and Farr[48]

The more people participate in decision making through influence, interaction, and sharing information, the more likely they are to invest in the outcome, and offer new ideas for new products and improved ways of working. The essence of this principle is therefore based on participative safety, which influences the

group interactions wherein the predominant atmosphere is one of non-threatening trust and support.

Task Orientation

'A shared concern with excellence of quality of task performance in relation to shared vision or outcomes, characterised by evaluations, modifications, control systems and critical appraisals'

—West and Farr[48]

Within groups, the task orientation factor is evident by emphasis on individual and team accountability; control systems for evaluating and modifying performance reflecting upon work methods and team performance; intra-team advice; feedback and co-operation of opposing opinions; constructive controversy; and a concern to maximise quality of task performance. This factor hence describes a general commitment to excellence in task performance coupled with a climate, which supports the adoption of improvements to establish policies, procedures and methods.

Support for Innovation

...the expectation, approval and practical support of attempts to introduce new and improved ways of doing things in the working environment.

—West and Farr[48]

Support for innovation varies across teams, to the extent that it is both articulated and enacted. Employees more accustomed to change and improvements will be more inclined to accept innovation.

An aspect of the organisational environment is the identification of key people that form part of the innovation process. Thwaites,[49] and Maidique[50] refer to champions of the innovation process and making them 'visible' to less experienced employees taking part in the innovation process. This enables the employees with the specific competencies in innovation to be utilised by many of the innovation projects to the advantage of the organisation.

Another aspect of the fostering environment is the philosophy of developing skills in innovation. By constantly improving the competencies of employees in the workplace chief executives are able to lift the aggregate innovative capability of the organisation. Quin,[51] as well as Thwaites[49] state the importance of organisational learning, and not just from external sources but from trials and tribulations inside the organisation. Management should set an example to innovation teams where failure is followed by vigour for success in stead of hopelessness.

'*To encourage reward and recognise innovative individuals...*' writes Nicolson[52] on the organisation 3M. He is referring to the methods used by 3M to harness the competencies settled in their employees to the full. And rightly other organisations should listen to the methods employed by 3M for they have been heralded as one of the most innovative organisations in the world. Through a mixture of freedom, forced innovation and listening to their customers 3M was able to create 30 percent of sales from products no older than four years. This means 3M has to stay focused and keep innovating for every year that percentage of sales has to be filled with new products, illustrating the seriousness 3M takes innovation.

3M is possibly the landmark when researching or writing on innovation. Through their creative strategies and formal innovation programmes they are able to improve the organisational fostering environment immensely. It is not as many people think only the 15-minute free time that makes the difference but the total culture and environment where innovation is expected, required and encouraged.

5.2.3.2 Conclusion to the Fostering Environment

Nurturing and building an organisation's environment, able to foster innovation, may easily be disregarded by the lucky few who posses them. In many organisations such a culture does simply not exist, and probably never will. Changing attitudes, habits and methods in an organisation is virtually impossible. As Peters[53] state it is often easier to kill the old, and start from scratch, building the correct environment from foundation upwards. Some of the measures discussed above, may improve an ailing environment, as well as keeping a working fostering environment healthy; for ideal environments may decay of their own accord, if left unchecked or maintained.

5.3 Individual

Innovation can not consist of only technology and business, but requires the active involvement of individuals[54] as well as the management of each of these three aspects. Many biases are deeply ingrained in the very threads of corporate fabric. People naturally tend to listen to others 'like them', and disregard those who are 'unlike them'. Changing this dynamic requires placing as much emphasis on the human aspect of innovation as is placed on the technological and business aspects. Corroborating the importance of the individual in the innovation Znaiden may be quoted.

> *My approach recognises the human factor as the single most important element for innovation. Nothing else really matters.*
>
> — Znaiden[55]

And although managing humans might be considered diametrically opposed to managing a manufacturing process, for instance, innovation can not succeed without human participation. This brought the author of this thesis to the realisation of the possible gap in the discipline of innovation auditing and modelling, namely the involvement of the individual.

Few, if any, innovation models, or even innovation audits, currently contain human related issues. This thesis therefore aims to propose the subject as initial inclusion to the innovation audit process. Due to the newness of the inclusion, some aspects might not be as structured or all inclusive of the discipline of human management and understanding, as might be expected when conducting formal innovation audits. None the less the following three sections were found to have high influence on the innovation process, and were included for testing and learning about this aspect of innovation.

5.3.1 Personality and Emotions

The question, why employees are in their current job positions, and their enjoyment of their daily tasks, may be judged by a 'lottery question'. The question builds the scenario where the employee or individual wins the lottery, and then receives a large monetary prize. By thus removing the one key ingredient from the employment environment, that of money, true reasons and attitudes for working, might come to the surface. Although the question may be unfair, it does illustrate an interesting

point, when the importance of financial gain, and its influences, are revealed. It also relates directly to motivation and the possibility of encouraging employees to be creative and innovative in their environments.

If employees work 'for the money' they will seldom if ever be compelled to be as creative as possible. Especially if few monetary rewards are available, and the environment is one of stagnation and complacency. In this regard, employees often find themselves in an environment of monotonous daily tasks, with no scope for creativity. Getting out of this rut requires persistent focussing on creativity, as well as scheduling specific creative tasks, or creativity sessions.

An important part in motivating, and fostering innovation, is communicating the strategic organisational goals to all employees. This, as well as describing the part each employee may play, may serve in motivating employees to contribute creatively to reaching goals and strategic missions. Many studies show that, if given some leeway as well as a reachable goal, most employees will be more creative, yet remove this target and bureaucracy, and mediocrity may push under even the most brilliant employee.

Personal psychology is, as Znaiden[55] states, the single most important element to innovation. It is true that the inspiration for innovation cannot be brought about through resources, organisation, money, environment or processes imbedded in the organisation. It is the self-motivation, and determined psychology of the human employees, responsible for innovation.

The rate-limiting factor for innovation is not as stated the environment, organisation or lack of resources. It is more likely to be the way employees think of themselves and their own innovation perceptions. If innovation can be cultivated inside people's heads, they can go a long way, with minimal resources or organisational support. The biggest rate-limiting factor to innovation, will always be the perception and thoughts of the employees, and not any other external factors. This is also why leadership, rather than management, forms a key component of growth and development, which can only occur through innovation.

If such an understanding and leadership environment is present in an organisation, some key areas may be addressed to improve total innovation output.

> A **fierce sense of independence** needs to be instilled in each employee. This not only helps with individual creativity, but also ensures groups do not start following the leader, resulting in less than effective creativity and innovation.
>
> **Self-motivated** people are essential. Although difficult to teach or instil in an employee, clear discretion should be made when employing new people, to find well motivated enthusiastic candidates.
>
> Making sure that **self-direction** play a role in the development and future prospects in, and around, the working environment.

The concept of self-direction could be one of the most interesting and best indicators of employee innovativeness there is. As corporations become less concerned about employment security, and more directed towards growth, employees need to take care of themselves, by thinking of what they are doing for themselves. Employees need to become more selfish to survive.

In the last twenty years of the twentieth century, many changes took place, with advances in medical, electronic and political environments. One change that has been silently brushed over by many, has been the growth of self-reliance, expected from society and especially working people. The amount of freedom that is allowed to any employee today, is staggering, if one looks back to what it was like only thirty years ago. Yet this freedom comes at a grave price. Just as firms were more rigid and bureaucratic in the sixties, so were they much more concerned with the welfare of their employees. It was not uncommon for a person to work for one firm throughout his life, and enjoy high job security throughout this time. The drive towards quality, growth, efficiency, and effectively, changed all this. No longer can organisations afford to keep redundant workers or managers, and as such, many restructuring have take place. Being lean, mean and efficient, means under no circumstances does employees have job security

We are very fortunate to live in a society where any idea may be actively expressed, without being shouted down, or burned at the stake. Even though ideas are not always believed, or rejected, by old paradigms, they can at least be brought out in the open and looked at for advantages. In South Africa, for example, we are seeing a revolution in music, sex and fashion, and these are many times the silent drivers of new reform in business and commerce. Some of the new development in South Africa has already been felt in the blooming information technology industry, where strong organisations such as Didata, Comparex and Datatec, embark on expansion, here and abroad.

Freedom and reform are however not always positive. Through added freedom, and a search for growth, individuals many times get run over and their worth demoted to rands and cents. Therefore, when organisations merge and diversify, many individuals are misplaced or even expelled, for not fitting or simply being redundant. Therefore, with increased freedom, a severe decrease of employment security is common, changing many individuals' lives and security.

Based on this decrease in security, individuals need to understand the need for life long education, and learn to work for themselves. No longer should we strive towards working for someone but rather strive towards working for ourselves even if working in a large organisation. This might seem to be a contradiction in terms for how may one work for a large organisation and *still* work for yourself? Easy, working for yourself requires only that you set your own goals and reach them in your own environment, by aligning your own goals with those of the organisation you may work for a large organisation and yourself as well. This does require a mind shift towards self-improvement, but when accomplished it improves the reason for working and the satisfaction obtained form it. Improving ourselves should therefore be central to everything we do, for if we do not improve ourselves, no one else will. Questions such as what are you doing every day, to best position yourself for change?, 'what are you doing day in and day out, to gain maximum control over your future, and have the greatest freedom of choice?', 'what are you doing for yourself?'. In each of these questions we need to determine how loyal are we to ourselves; how dedicated, committed and hard working are we for ourselves? This is a legitimate response to a corporate environment that seldom cares for employees, as they did in the past.

When working for a large or even small organisation, this selfishness leads to other unique capabilities. No longer do resources or time constraints restrict self-directed employees. More and more these employees are seen to be creative and innovative in their work. For their work is being done for themselves, and innovation is almost natural to the self-motivated individual. Understandably, to improve and learn, and be

ready for change, one makes sure innovation forms part of the daily routine. For innovation has been the source of learning and discovery for mankind over the ages.

Thus to motivate employees to be more innovative, their basic belief in themselves needs to be addressed. They need to be encouraged towards individuality, self-motivation, entrepreneurial behaviour, which all stems from the self. These concepts need to be supported by real life circumstances, and strong leadership, helping and motivating towards reaching personal and company goals. In these circumstances, a capable leader can clearly have a remarkable affect and success ratio, for fostering more innovative thoughts and actions.

5.3.2 Knowledge, Experience and Background

The field of knowledge management and intellectual capital is starting to make major inroads into management practises of high technology organisations. Human and organisational competencies are receiving a lot of attention in the form of core competence management, technology management and knowledge management. This is the result of global competition between high technology businesses, which requires a constant development of new ideas and better products. And the only source of new ideas and better products, is highly capable human beings. Finding, keeping, and improving these organisational assets will influence the capabilities of organisations to stay competitive. Cognitive styles of different individuals play a role in how they solve problems. Organisations may be one step further on the road of building a competitive human resource base, by identifying those employees best suited to innovation.

Cognitive style, and problem solving, can have a marked effect on the creativeness of people. Recently, researchers have given increased attention to specific dimensions of these cognitive styles and methods. Kirton[56] proposed that individuals can be located on a scale, between those who can do things 'better', to those who can do things 'differently'. Conversely Jabri[57] conceptualised creative thinking and problem solving as composed for two independent modes of thinking: 'associative' and 'bisociative'. Associative meaning to use set routines, habits, adherence to rules and use of rationality and logic, while bisociative means to overlap separate domains of thought simultaneously, and a lack of following rules or disciplinary boundaries, with an emphasis on imagination and intuition. Typically then, associative thinkers would do well at systematic problems, with bisociative thinkers being better at intuitive problem solving. The intuitive problem solver, is therefore able to process information from various fields and different paradigms, and is therefore more likely to generate a novel problem solution.[58]

Neither of these styles is necessarily preferable in problem solving, yet the application of problem-solving style to task and work orientation, could have a positive influence on projects.

One may therefore expect an organisation with mainly 'learning by doing' or 'associative' employees, to be more comfortable in the arena of incremental innovation. While an organisation with mainly 'academic' or 'bisociative' thinkers, would excel at radical innovation.[59]

Touching on the same subject are the ways employees 'learn' how to perform in their working environments. Often a high degree of repetition exists in daily tasks, which negatively influence the human brain. This 'way of doing things' and the structures policies and procedures, may be so strong in an organisation, as to mould its employees into carbon copies of one another. They often are incapable of change or

interpreting problems outside the letter of the organisational charter. Organisations with these kinds of environments will find innovation extremely difficult.

A great deal of research on knowledge management is currently being done, and should be studied to isolate the implications to the innovation process. This is bound to become an important field as part of innovation, for the individual and his/her competencies are supremely important.

5.3.3 Interactions

At the individual level, climate is a cognitive interpretation of an organisational situation and may be labelled as the organisation's 'psychological climate'[60]. Components of psychological theory postulates that individuals respond primarily to cognitive representations of environments, rather than to the environments per sé.[61] The climate represents signals individuals receive, concerning organisational expectations for behaviour, and potential outcomes of behaviour. And this information is then used to formulate expectancies or conceptions.[62] People respond to these expectations by regulating their own behaviour, in order to realise self-evaluative consequences, such as self-satisfaction and self-pride.[63]

Consequently the following hypothesis was proven:

> *The degree to which individuals perceive dimensions of the organisational climate as supportive of innovation is positively related to their innovative behaviour.*
>
> Scott and Bruce[64]:

Hence, the critical relation between organisational climate, and innovative and creative behaviour can no longer be misjudged.

As social psychologist K.E. Weick[65] postulates: 'The organisation is the sum of its personal interactions of its members, and these interactions are conditioned by the inability of people to process all of the information they receive'.

As part of Weick's understanding, inside the organisation employees and managers act and make decisions on previous experiences, as well as interactions in their peer group. There are, however, discontinuities, differentiation and other variations in these, which do not lead to an immediate solution or route of action. These may be isolated and examined at a later stage.

Solving isolated problems without previous experience, can be done by drawing on heuristics and causal maps. Causal maps are particular sets of attributed causal relationships between remembered events, which make sense of current conditions. If used in problem solving, those that make sense will be selected, while others discarded. Through this, organisations may reduce ambiguity in decision-making, and reach common understanding of the thought process used in reaching the decision. By modelling these causal decision-making sessions, others may digest the decisions reached, leading to better organisational understanding of the common goal.

This process of internal negotiation and decision-making can result in the members of the organisation having a perceptible similarity of outlook, on certain issues. This could be suggested to be the reason for saying an organisation has a certain 'culture'.

By encouraging and appointing 'mavericks' or 'weirdoes' in the organisation, similarities in outlook may be avoided. Although culture is pervasive, 'mavericks' and 'weirdo's' help to bring variety in decisions, developments and general business practices.

Another study on the social aspects of innovation, Nemeth[66] comments on the mechanisms of social control, utilised by organisations, which may directly oppose creative innovation. Often, some of the 'most admired' companies emphasise mechanisms of social control, rather than innovation. They know the power of clear goals, worker participation, consistent feedback, a cohesive work force and a motivation system that underscores desired behaviours and values. This may lead, as Collins and Porras[67] note, to a 'cult-like' atmosphere, which includes a fervently held ideology, indoctrination, high degree of fit or uniformity, and elitism.

It is true that these social control systems work, otherwise these visionary organisations would not exist as they do today, for they enhance morale, loyalty, and security. The power of approval of peers can, and is, one of the most established findings in social psychology. When people are faced with a majority viewpoint, they are very likely to adopt the majority judgement, even against their personal convictions. Literally hundreds of studies have documented these findings.[68]

In the light of these findings on peer pressure and 'cult-like' cultures, how could a difference of opinion be possible? And who would venture such an unpopular action, if rewards and social censure might hang in the balance? It has been documented that even when employees know better, they allow their bosses to make mistakes.[69] This directly influences the innovation process, for until creative and new ideas are born, little if any, innovation is possible.

Directly opposed to this line of argument, run the findings by Zien and Buckler.[70] They examined the social aspects of innovation, and found that highly innovative organisations pride themselves on their stories of starting out, and making successful ventures into new arenas. These stories are not there, just for fun, but support and reinforce the principals of innovation and company identity (therefore a unified culture). By telling stories, myths, teaching parables and legends, new recruits get to know the spirit of the organisation, while long-time employees revel in attention of previous ventures. Many organisations have specific people collecting stories, and publishing them for all to read and enjoy. According to Zien and Buckler these stories foster innovation, by setting an example and motivating employees to strive towards innovating more.

The thesis by Nemeth, Scot and Bruce[70] however, opposes this view. They postulate and demonstrate, to a degree, the importance of diversity and individuality in being creative and innovative.

It is not surprising to find opposing views and understandings of the effective and ineffective actions to be taken, when trying to foster innovation. Many organisations correctly and incorrectly postulate their innovativeness, and therefore studies can only be as good as its underlying assumptions and data. With the diverse implementation and understanding of innovation, finding the best advice and procedures to follow, often rest on the shoulders of consultants and advisors, capable of pointing out the pitfalls in different strategies.

5.4 Conclusion

This chapter offered a non-exhaustive outlook on defining best innovation practises. A huge amount of research is still needed to complete the development of a representative list for these best practises. This might be accomplished with the help of many people and is subsequently not attempted in this thesis. The hope is that the areas addressed in the chapter illustrate the questions asked in the audit questionnaire and help to set a foundation for further development.

Setting standards for the innovation process is near impossible. Every organisation has its own methods and processes that work well for them, and are often reluctant to change these. However, some of the different methods and competencies of different organisations correlate with one onother. It is these that were discussed in this chapter. Based on the framework of a proposed model in chapter three, the best innovation practises were arranged in three sections, each comprising various subsections. In this manner the many different innovation standards are easily understood as well as incorporated into the innovation audit.

The following chapter will focus on a proposed audit questionnaire. The questions are based on the standards discussed in this chapter and should prove representative of each section.

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