A framework for managing risk in a changing business

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Thesis Summary

The rate of change in the business environment and its corresponding challenges present organisations with varying degrees of risk. Recent literature alludes to a growing concern that current business change initiatives provide less than satisfactory results. There are some methods available that address specific issues related to business change, but they lack a coherent and integrated approach to managing the risks associated with change. The aim of this research is to put forward a framework that provides the means for managing the risks of business change in an integrated and comprehensive fashion.

The research reviews the environment of the business under change, including the various business types, their industries, the types of change and the range of disciplines which provide the tools to manage the risks. The literature and business review provides the basis for testing a set of propositions by means of market research. All these facets are synthesised into a conceptual framework for managing risk through the complete solution life cycle; from risk identification through to process design, monitoring and control.

The framework is tested against an application that covers a wide range of business change types. This evaluation draws attention to the substantiation of the general framework while highlighting gaps. Software is key to supporting the framework. Available software offerings are reviewed and their shortcomings highlighted. Some supporting software has been developed to complement the existing range of market offerings.

In conclusion, the success of the research is evaluated, hypotheses are postulated and recommendations for further areas of study are made.

Proefskrif Samevatting

Die tempo van verandering in die besigheidsomgewing en die ooreenkomstige uitdagings, stel organisasies bloot aan verskeie risikos. Volgense onlangse literatuur toon huidige besigheidsveranderingsinisiatiewe nie die verlangde resultate nie. Metodes is beskikbaar wat sekere besigheidsveranderingsaspekte aanspreek, maar in meeste gevalle ontbreek 'n

duidelike en geintegreerde benadering om risikos, rakende die verandering, te bestuur. Die doel van hierdie navorsing is om 'n raamwerk daar te stel vir geïntegreerde en omvattende risikobestuur van besigheidsverandering.

Die besigheidsomgewing onder verandering word ondersoek, daar word gekyk na die verskeie besigheidstipes, industrieë, tipe veranderings en die reeks disiplines wat risikobestuurs riglyne verskaf. Die literatuurstudie en besigheidsoorsig verskaf die basis vir die evaluering van voorstelle deur middel van marknavorsing. Al hierdie fasette word saamgevat in 'n konseptuele raamwerk vir risikobestuur oor die volledige lewenssiklus van 'n oplossing, vanaf risiko-identifisering tot proses ontwerp, monitering en beheer.

Hierdie raamwerk is getoets teen 'n toepassing wat verskeie besigheidsveranderingstipes insluit. In die evaluasie word die aandag gevestig op die belangrikheid van so 'n raamwerk en terselfdertyd word gapings uitgelig. Die regte programmatuur is noodsaaklik vir die ondersteuning van so 'n raamwerk. Beskikbare programmatuur is ondersoek en tekortkomings is uitgelig. Ondersteunende programmatuur is ontwikkel om dit wat in die mark bestaan, aan te vul.

In die samevatting, is die sukses van die navorsing geëvalueer, hipoteses gestel en aanbevelings vir verdere studie gemaak.

Acknowledgements

This work would not be possible without the support of the following individuals and the researcher would like to acknowledge their assistance accordingly:

- Michelle, my partner, for her patience.
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Abbreviations

ABC	Activity based costing
AIM	Applied implementation methodology
APT	Arbitrage pricing theory
BPR	Business process redesign
CAPM	Capital asset pricing model
CBA	Cost benefit analysis
CID	Consumer idealised design
CNV	Cumulative net value
DBMS	Database management system
EIS	Executive information system
EMV	Expected monetary value
ERP	Enterprise requirements planning
EVA	Economic value added
IIE	Institute of Industrial Engineers
IRR	Internal rate of return
IT	Information technology
JIT	Just in time
LOB	Line of business
MCDM	Multiple criteria decision model
MIS	Management information system
MOR	Management of risks
MOT	Management of technology
NPV	Net present value
OPT	Option pricing theory
OR	Operations research
PE	Process element
PRIMA	Process industries manufacturing advantage
ROI	Return on investment
RONA	Return on net assets
RTC	Resistance to change
SD	System dynamics
SQC	Statistical quality control
TOC	Theory of constraints
TOP	Total operational performance
TQM	Total quality management

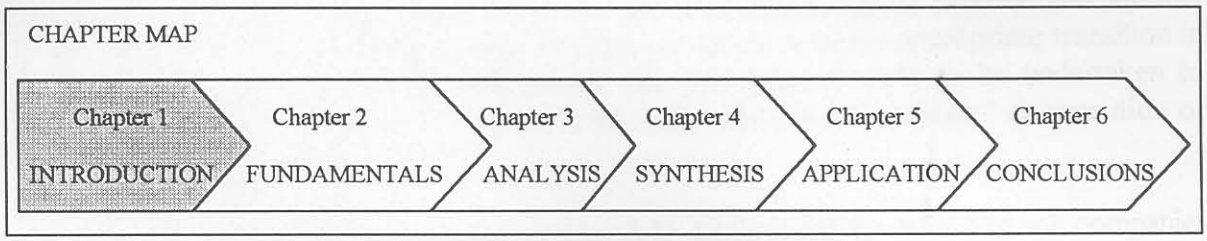
1. Introduction

"New times demand new measures and new men; the world advances, and in time outgrows the laws that in our fathers' day were best; and doubtless, after us, some purer scheme will be shaped out by wiser men than we, made wiser by the steady growth of truth."

James Russell Lowell

1.1 Chapter context

The purpose of this chapter is to introduce the need for the research and outline the approach taken to conclude the study.



1.2 Background

Commercial orientated entities have been evolving through the ages from the pre-Mesopotamian times through to the present. They have taken many forms, either adapting to the stringent environmental factors, or passing away, due to their inability to adapt. These forms have varied from individual survival to massive collective systems aimed at survival in the least. During this time the world has seen inter alia, the following forms of human interaction, either aimed solely at wealth creation or survival resulting indirectly from daily activity:

- Subsistence economies.
- Craft system.
- Feudalism.
- Manorial system.
- Mercantilism.
- Capitalism.
- Socialism.

Toffler has described the generic effect on the world, by means of three waves[1] [1]. Significant acceleration has taken place during the three waves, indicating that the business environment is changing at an increasingly rapid rate of change. Even during the embryonic stages of capitalism, this pattern became apparent as illustrated by Viljoen [2]:

Adam Smith, the father of capitalism, published his classic manifesto on the capital order in 1776 under the title The Wealth of Nations. In doing so he lent form to what is now accepted as capitalism, and to economics as an independent science. That same period marks the beginning of the industrial revolution of the last century. The number of patents registered in Britain alone during that period, and the rate at which they increased, show the expansion of technological innovation.

[1] Agricultural, industrial and technological.

PERIOD	*NO. OF PATENTS*
1700-1730	*149*
1730-1760	*230*
1760-1790	*976*

With all this change, the business enterprise has had to change accordingly, supporting either sound business reasons, or environmental prerequisites, such as legal impositions. These changes have had, and still have the intrinsic component of risk. This concept of risk, means different things to different people or different groups of people. An acceptable definition of risk is explored later in the text, but for present illustration purposes, risk is equated with the situation of looking into the future, where key parameters governing the future of specified system are influenced by one or more random variables.

To relate this back to the foregoing discussion, consider a feudal system. The feudal system was introduced into England after the battle of Hastings in 1066. This new system, implicated a decentralised form of government, law and economics. The new system was based on the loyalties and obligations between individuals of different social classes, and in particular between the appointed lord and his vassals [3]. Although, politics and economics were entwined, the net desired result of action was aimed at survival by the vassals on the one hand, and commutation of wealth by the lords on the other. In this instance, risk was present in the strategy employed with the vassals regarding obligations in return for property rights. Risk management strategies were devised in accordance with the needs of the commercial entity in line with the tolerances of the day. Clearly these designs would be far from politically correct in present terms, which indicates that risk management also needs to evolve in conjunction with the prevailing environmental dynamics.

Today, risks regarding macro business decisions are ever present, even in the restructuring of the business entities. As business in general has evolved in the fashion described above, so the specific business itself must evolve based on the requirements of its external and internal environmental drivers and commitments. Recognition of the need for appropriate transition in itself is inadequate. Risk analysis and indeed risk management needs to be undertaken to ensure the survival and indeed prosperity of the entity once the "transition" or execution of the business decision is completed.

Scott-Morgan writes of a survey conducted by A.D. Little in 1994 where 350 top companies in the USA were questioned about their business improvement initiatives [51, p6]. He observed that:

"almost every company turned out to be in the throws of a major change initiative - often to reduce overhead costs, streamline their organisation or increase sales, typically driven by a change in leadership, change in business direction, financial or competitive pressures. And over 80% of companies anticipated another major change within the next few years. ... Only 17% were really satisfied. Almost 40% were positively unsatisfied - often they had only gained partial success or else the whole initiative was taking too long. Nearly 70% of all the companies said they had experienced unanticipated problems and unintended side-effects."

Various topics of interest or "buzzwords" have taken shape as knowledge regarding business has matured. During the early part of this century, the principles of scientific management

carried much favour as a technique appropriate to the improvement of the business operations [4]. The focus then moved on towards the management of production, which provided an answer to the seemingly insatiable demand from the relevant markets. During the 1930's, saturation within the market gave birth to the concept of sales management, as a means to escalating the saturation level. With competition increasing and the consumers maturing, the 1950's brought about the concept of the management of marketing. The 1970's saw business take the concept of strategy from the militarists, as a means to providing a path through turbulent times. The 1980's saw the introduction of systems theory, looking at the business needs from a holistic perspective, as well as the emergence of the concept of logistics. The 90's have seen the emergence of the concepts of "business process re-engineering" (BPR) and globalisation.

A common pattern can be found throughout the employment of these techniques, namely the resulting change in the way the entity does business, and hence the corresponding requirement for the paradigm shift for all parties concerned.

This study is concerned with the success of these changes, where a change in the business is translated into the term, transformation. BPR for example, has been hailed as "the contemporary business improvement technique" due to the following reasons [39,5]:

- Quantum leap improvement vs. continuous improvement.
- Focuses on core competencies [6].
- Uses information technology to integrate and or replace menial tasks.

With the application of BPR during the past few years, various failures have also emerged however [7,8,9]. The author purports that BPR as with other approaches, needs to be adequately analysed in order to assess the risks, so that these can be managed accordingly. This study therefore, does not focus on an individual approach, rather on the risks that face a business entity while contemplating the transformation from one form to another. This transformation may involve the entity as a whole, or only an appropriate sub-system thereof.

1.3 Problem definition

From the preceding text, the business world has little problem in identifying the need for change, but making the changes successful is clearly challenging. Literature cites anything from 30% to 80% of change efforts as being unsuccessful [7, 8, 9, 82, 84, 90]. This does indeed set a strong case for further research to be done.

1.3.1 Problem statement

Many different approaches are being employed in the context of the greater capitalist system to provide suitable levels of improvement within the specific business system under consideration. These approaches may be aimed at dramatic improvement or incremental improvement, focusing on the work unit or organisation at large. Regardless of the approach or the solution(s) that the approach negates, elements of risk will be found inherent to the proposed and elected solution(s). The basis for selection is governed by the parties tasked

with the decision making, and hence the decision should be aligned with the criteria pertinent to those parties' frame of reference. Although the criteria may be subject to fluctuating conditions, internal or external to the particular business entity, the solution selection criteria must be directed by the raison d'être of that business entity. Based on that, the perceived risk of the proposal to the decision makers will carry varying levels of impact and hence desirability. As example, a low risk solution may provide low returns, yet on the other hand, a high risk proposal may yield a solution with higher returns to decision makers [10], be they investors or the management of the business entity under consideration.

The decision maker is faced with the following concerns:

- What risks are inherent in the alternative solutions under consideration?
- What is the nature of these risks?
- What could their impact be on the business entity?
- How can these risks, once identified, be objectively weighed up against the other criteria describing the attractiveness of the individual alternatives?
- What means exist to satisfactorily address the occurrence of these risks (either internally or externally)?
- How can the implementation of the elected solution be managed so as to satisfactorily address the associated risks?
- How to manage these risks, post implementation, as well as the incidental risks that may occur due to secondary and tertiary events in either ripple effect or unforeseen fashion?

The research problem lies therefore in understanding the nature of risks inbusiness change and how to manage these in an integrated fashion with the business change intervention. This must be achieved in a sustainable, yet cost-effective manner.

1.3.2 Purpose

The purpose of this study is to analyse the primary factors that influence the riskiness of business change interventions and to put forward an integrated framework for managing these risks.

The analysis of the primary factors involves an understanding of the business context, the various forms of business change and the resulting complications of risk. The variation of risk management approaches and the focus of their impacts with their respective advantages and disadvantages are evaluated in order to construct a general framework for risk management.

The theory provided is tested using various means from practitioner insights through to theory application.

1.3.3 Significance of the study

The significance of the study lies in the following areas:

- It tests assumptions and perceptions made in literature and practice regarding risks and risk management techniques in business change.
- It provides a common framework for managing risks in business change regardless of the type of business change, the type of business or the type of industry.
- The theory put forward in the study is already being used in practice. This illustrates its immediate contribution.
- Based on the failure rates of business changes described earlier, if this framework could reduce the rate by only 10%, it would make a significant contribution to the productivity of all industry involved in business change.

1.4 Research questions

Qualitative research focuses more on question setting as opposed to research questions, propositions and hypothesis [11] which are more appropriate for quantitative based research.

1.4.1 Grand tour question

The grand tour research question of the research is:

"How can the risks of business change interventions be successfully managed?"

1.4.2 Sub-questions

The sub-questions to the grand tour question are listed as follows:

- Can the high purported failure rate be substantiated and therefore confirm the need for this study?
- What risks occur when a business moves through a change?
- What types of business changes occur?
- Is there a common thread in risk across industry sector and type of change?
- What management techniques are currently being used to manage the risks of business change?
- What techniques and tools in diverse fields hold potential for managing the risks in business change?
- How can all the risk management factors be integrated into a framework, if this can indeed be achieved?
- Is the risk management framework practicable?

1.5 Objectives

The primary objective of this study is to provide a feasible solution to the questions posed in the preceding section. This offers a means of a conceptual framework for the identification and management of these risks, in addition to allowing for the integration with other concerns when dealing with business change as a whole. The identification of the points of interface are included in this primary objective.

There are secondary objectives related to this research. These are described as follows:

- The identification of generic criteria that relate to the risks inherent in business change.
- The establishment of appropriate models that provide a means for the identification of risk and the management thereof during business transformation related activities.
- The integration of the above into one coherent framework, providing a holistic basis for decision making (including models and method).
- The extrapolation through to practical examples.

The attainment of these objectives is tested via plausible theoretical foundation, and collaborated by an appropriate practical example during the course of the text.

1.6 Delimitations and limitations

1.6.1 Delimitations

The exploration of the appropriate means to the management of risk will encompass the business change environment. To this end, the work is parametrised by the following research qualifiers:

- Only businesses within the predominantly capitalistic environment are relevant to this study.
- The study of business change is not limited to business process re-engineering (BPR), but to activities aimed at business improvement, via the commissioning of the change of the particular character of the business entity under consideration.
- This study does not aim to invent or redesign techniques in well described areas of business and science, but rather to gather related concepts in an attempt to achieve synergy, by making use of appropriate practical examples, in order that clarity may be ensured. It is, however, in the integration, and the appropriate exploitation of the existing techniques that the objectives of the study are attained.
- The study is based on the South African business environment. Inferences in the broader world are however, discussed.

1.6.2 Limitations

The following limitations of the study exist:

- The integrated theory developed is tested via one application only which may raise concerns regarding generalisability. A number of interventions have been designed to assist in the substantiation of the theory. These include:
  - A hypothetical case is established covering an industry that the researcher has a reasonable amount of experience in. This case is designed to cover the full extent and scope of the study.
  - The researcher has interviewed top management in a wide range of organisations and countries regarding specific topics in the formulation of the theory. Countries included South Africa, Israel, Germany, Italy, Portugal, UK, Ireland, The Netherlands and Brazil. The sizes of companies ranged from 20 person companies to staff complements in excess of 60,000. Many of the companies were multi-national. The type of industries the companies operate in are manufacturing[1], financial services, mining, research and development, computer and allied services, shipping, engineering and construction, market research and consulting organisations. It can be noted that the profile of the organisations interviewed in the theory formulation resembles the distribution of the organisations involved in the market research (see Figure 27).
  - The application selected for substantiation covers a broad range of business change types which allows for a greater exposure to theory testing.

- A significant portion of the study involves qualitative data. A single researcher has biases in terms of mental model and background which may distort results. Efforts have however, been instituted to address these, namely the examination of validity and reliability [12]. The results of these analyses are given in chapter 5 and the conclusion. The use of triangulation in the research method [11] as described later in this chapter plays an important role in neutralising these biases.

1.7 Research method

1.7.1 Overview of the method

The approach to the research is diagramatically shown in Figure 1. This has been constructed to ensure that theory is validated against generally acceptable scientific method. This task is difficult in the softer sciences like business orientated studies, but nevertheless suitable rigour is required to ensure that the research meets acceptable validity and reliability conditions [13].

[1] Manufacturing includes chemical, steel and textile production.

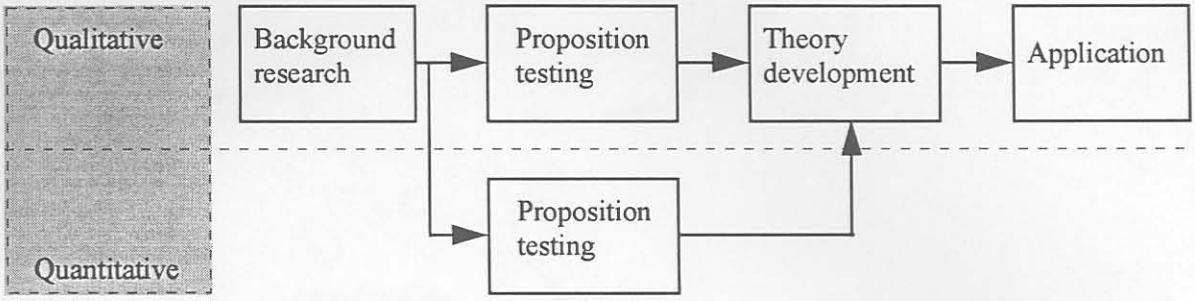


Figure 1 - Relationship between Qualitative and Quantitative Components of the Research

Figure 1 illustrates the interaction between qualitative and quantitative methods in the study. The reasons for selecting a mixed method (i.e. combination of qualitative and quantitative research methods) is based on triangulation, where the bias inherent in the researcher, data and model is neutralised [14] when used in conjunction with other research work involving other methods, data and researchers. Two further reasons for using the combined method are [11]:

- The first method is used to sequentially assist the second.
- Contradictions and fresh perspective emerge.

The research method is shown in Figure 2 in more detail. This is briefly described as follows. A literature review (1) of material directly related to the business field under investigation is done. This in conjunction with expert practitioner inputs (2) is crystallised into a range of stated research objectives and formulated propositions (3). The purpose of this is to establish a set of fundamentals (5) in order to build theory (7) from. The instrument used for testing these propositions is a market research (4) of the South African business environment.

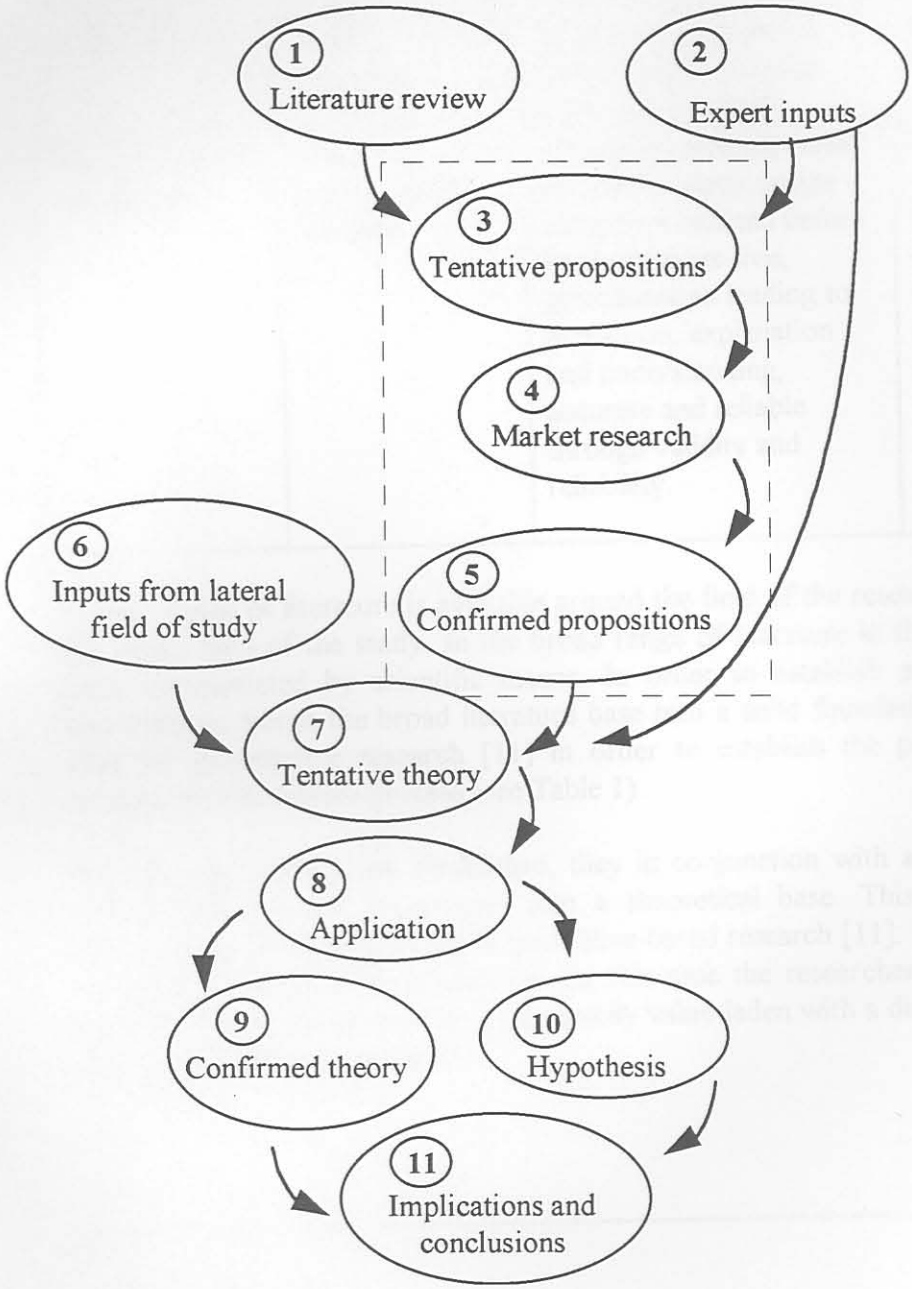


Figure 2 - Research Method

In order to put a theoretical construct (7) together, not only are the confirmed propositions (5) used, but diverse fields of study (6) are investigated in order to obtain innovative insights. This theory is then validated against practice by means of application (8). This validation results in a component of confirmed theory (9) as well as a set of hypotheses (10). The entire research is then tied together in terms of implications and conclusions (11).

1.7.2 Assumptions and rationale

The assumptions and rationale for the method is discussed with the assistance of Table 1[11]:

Table 1 – Assumptions of the Quantitative and Qualitative Methods

Assumption	Question	Quantitative	Qualitative
Ontological assumption	What is the nature of reality?	Reality is objective and singular, apart from the researcher.	Reality is subjective and multiple as seen by participants of the study.
Epistemological assumption	What is the relationship of the researcher to that researched?	Researcher is independent from that being researched.	Researcher interacts with that being researched.
Axiological assumption	What is the role of values?	Value-free and unbiased.	Value-lade and biased.
Rhetorical assumption	What is the language of the research?	Formal, based on a set of definitions, impersonal voice, use of accepted quantitative words.	Informal, evolving decisions, personal voice, accepted qualitative words.
Methodological assumption	What is the process of the research?	Deductive process, cause and effect, static design - categories isolated before study, context-free, generalisation leading to prediction, explanation and understanding, accurate and reliable through validity and reliability.	Inductive process, mutual simultaneous shaping of factors, emerging design - categories identified during the research process, context-bound, patterns and theories developed for understanding, accurate and reliable through verification.

A wide range of literature is available around the field of the research, but very little exists in the direct field of the study. In the broad range of literature in the periphery, very little has been substantiated by scientific means. In order to establish a point for departure it is important to merge the broad literature base into a solid foundation. This provides a strong case for quantitative research [11] in order to establish the point of departure. This is necessarily a deductive process (see Table 1).

Once the key drivers are established, they in conjunction with a sparse amount of directly related literature are constructed into a theoretical base. This process is predominantly inductive and lends itself towards qualitative based research [11]. In order to substantiate this theory, it is tested in an application. In this case the researcher interacts directly with the application area. Its evaluation is necessarily value-laden with a degree of bias. This again has a strong qualitative orientation.

1.7.3 Type of design used

The type of design used is a quantitative study which then leads into theory generation and a qualitative assessment. This is characteristic of a dominant qualitative design with a less dominant quantitative component. The advantage of this method is that it establishes a consistent paradigm while it probes certain areas in depth in order to [11]:

- Gain in-depth insights in specific areas.
- Achieve triangulation of results and constructs as described earlier.

Through-out the research however, correlations are made between qualitative and quantitative results in order to ensure consistency of thought or indeed explore contradictions. This is more a quality control mechanism rather than the main theme behind the constitution of the method design.

While the application serves to substantiate the developed theory, in some areas it may not be considered to serve as case based research if less than 4 cases are used [15]. Another school of thought however, indicates that better theory results from more in-depth analysis of a single case than from surface correlation between multiple case studies [16]. The application is therefore selected on these grounds. It is possible to further draw a distinction between an application and a case study.

A case study refers to the dissemination of a case where the constructed theory has not acted on. The synthesis of theory is based on examining the cases and effects of events and objects in the case or cases under study. It does remain possible that some underlying principle is not unearthed which in turn may compromise the theory in practice. Application on the other hand, "runs the theory through the gauntlet" as it were and should result in a more valid and practicable construct.

1.7.4 Role of the researcher

The epistemological assumption, namely the role of the researcher, is influenced by the two methods employed, namely the quantitative and qualitative methods. In the quantitative phase the role of the researcher is to be independent of that being researched as highlighted in Table 1. In this case the multitude of data is summarised into a quantitative form and put out to the population. This information is then interpreted using statistical methods. The researcher in this phase assumes an objective position.

A different role is assumed during the qualitative component of the study which comprises the larger contribution of the work. This role is subjective, value-orientated and biased. Another key characteristic is the intimate relationship of the researcher with the subject under consideration [11].

The researcher has worked in a wide range of companies across many countries as described earlier. The focus of the researcher's career over more than the past 7 years has been in business improvement. The level of these improvements has ranged from continuous improvement to strategic visioning if one refers to Martin's hierarchy of change types (see

Table 3). The researcher has consulted on two projects related directly to the line of this study.

It is one of these projects that is used for the application described later in the document. The researcher played the role of external auditor to the business intervention as well as the lead consultant in terms of the risk management component of the project.

In theory construction the researcher used one to one interaction with all organisational levels across the organisation. The purpose of this is to understand how perceptions vary across the organisation. Interaction at director level allows for unusual insights into holistic concepts. The primary vehicle used to gain access to the qualitative sources is by means of the researcher's business network[1].

1.7.5 Data collection

Various data collection procedures are employed in order that they are suitable for the various steps in the research. The various procedures are listed below[2]:

- Background information - Literature review.
- Expert/practitioner inputs - Unstructured open-ended interviews.
- Market research - See paragraph 3.3 (Market research: managing the risks of business change).
- Inputs from lateral fields of study - Literature review and unstructured open-ended interviews.
- Application - Observational notes by conducting the observation as a participant.

1.7.6 Data analysis

The data analysis is divided into two types. The approach to the analysis of the market research is described in detail in paragraph 3.3 (Market research: managing the risks of business change).

The qualitative data analysis is based on the following principles:

- Reduction of information into patterns and themes [17].
- Interpretation of this information using a schema, e.g. a mental model [17].
- Use of spatial information to represent concepts [18].

[1] At the time of the study, the researcher is a partner in the South African office of an international management consultancy.
[2] These are described in terms recommended by Creswell [11].

1.8 Thesis outline

The systems engineering approach is used during the study as a means to provide a holistic solution to the management of risk during the transformation of a business entity. This approach is founded on generic method, derived from basic principles as discussed in the next chapter. There are various benefits in using this approach, the following reasons being given:

- Problems are not sought merely to apply technique, rather solutions result from appropriate technique application.
- Generic, rather than specialised problem solving techniques are employed.
- The systems engineering approach can be applied to this study, as well as each problem area within the risk management environment.

The structure of this thesis is outlined in the following paragraphs.

Firstly (chapter 2), all material relevant to this study is analysed. As an integral part of this process, the fundamental concepts that are related to the study are described, in order that the reader may be provided with the foundation on which the ensuing reasoning will be established. Fundamental elements that are defined, based on the precepts of this work, include the systems approach, industrial engineering, operations research, business, the transformation thereof, business engineering, uncertainty, risk and the management of risk.

Further to this, various philosophies and concepts are described, which either incorporate these fundamental elements, or are complementary thereto. Research has been concluded in three areas which is presented in the text (chapter 3). The three areas of analysis have been based on:

- Acquiring knowledge from literature covering the direct work of study (i.e. as stated in the problem definition) as well as from experienced practitioners.
- Market research which tests a set of propositions gained from the preceding review.
- Analysis of methods used in indirect fields of endeavours as a means for gleaning innovative new insights.

Having taken the relevant components apart that comprise the making of risk management relevant to the area of business transformation, putting together feasible theory is required. Chapter 4 deals with the synthesis of the risk management model. This describes the building of the model and related components. This chapter is the culmination of the researcher's analysis, and the philosophising thereof which provides material for theory to be applied at a later stage. The synthesis is undertaken at a higher level to ensure a holistic approach.

These models are applied in the form of the theory pertaining to the area of risk analysis. This focuses primarily on the activities involving problem identification right through to alternative evaluation and selection. An important component of being able to solve the problem, is the requirement of criteria, and the metrics that need to be in place in order to measure the performance. This is described in relation to the other risk analysis activities.

The researcher contends that risk analysis is only part of the discipline of risk management. Once the problem has been identified and solved, it must be properly managed. The components of this as well as various strategies aimed at minimising risk are proposed.

The theory is applied in the form of a case study (chapter 5), where use is made of examples to firstly, illustrate the various issues concerned, and secondly to provide a test for the theory.

Managing the risk in the change of the business entity cannot occur in isolation. This needs to be appropriately integrated with analysis under consideration, whether it be issues pertaining to management in general, or business transformation techniques such as BPR, value for money audits, investment appraisals, etc.

The magnitude and complexity of the various models and their mathematics from a manual perspective are beyond practicality. To this end, the researcher has provided an overview software specification in addition to the developed software. This is described in appendix P.

In the text, and more in the application and in the conclusion, appraisals are presented. These are a critical evaluation forged by the researcher's analysis based on the information available during the course of the study.

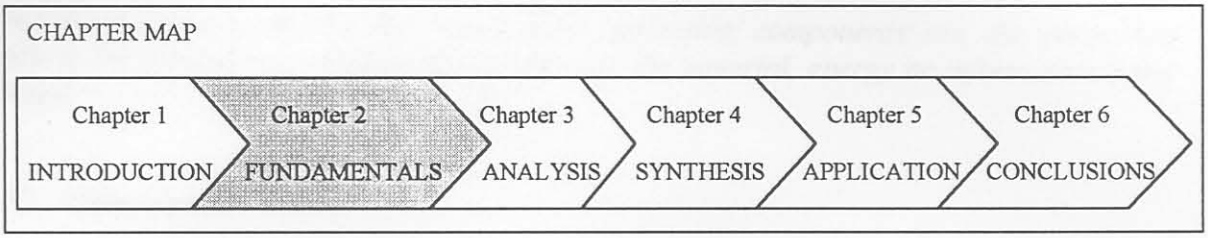
1.9 Chapter conclusion

This chapter has provided the context for the thesis both in terms of reasoning and layout. It has set the objectives of the study, the approach taken to achieve these objectives and the roadmap to the perusal of the thesis itself.

2. Fundamentals

2.1 Chapter context

The purpose of this chapter is to define the baseline from which analysis will progress towards the final conclusion.



This section describes concepts that are important to a holistic understanding of this study. Their purpose is two-fold, namely (1) to provide transparency for concepts alluded to later and (2) to establish building blocks for the construction of the theory purported herein.

2.2 Systems approach

During recent years, the employment of the concept of general systems theory has provided the means for reaping increasingly higher levels of synergy via the multi-disciplinary nature of the concept. This is done via the concerted integration of scientific knowledge and acumen across the various functional boundaries. von Bertalanffy, a pioneer of this concept put forth the following view [19, p176]:

"If we survey the various fields of modern science, we notice a dramatic and amazing evolution. Similar conceptions and principles have risen in quite different realms, although this parallelism of ideas is the result of independent developments, and the workers in the individual fields are hardly aware of the common trend. Thus, the principles of wholeness of organisation, and of the dynamic conception of reality become apparent in all fields of science."

The validity of the view is evident in the quotation taken from a person (von Bertalanffy) with an academic background in the biological sciences [20]and applied to the business environment. This case has been illustrated by various authors [21,22]. It is now appropriate to define a few key factors which are pertinent to the description of the systems approach.

2.2.1 System

A system is a meaningful combination of two or more components or subsystems, identifiable by their particular attributes, functioning in a manner conducive to the fruition of their common objective. The composition of a system is based on the meaningful organisation of the components, in such a way, that discernible boundaries can be identified from its supra-system. This means of classification is done by the analyst in order to understand the functioning of the system and components (if so required), thereby improving the overall

objectives of the system under consideration. The elements constituting a system, in simplistic terms are shown in Figure 3.

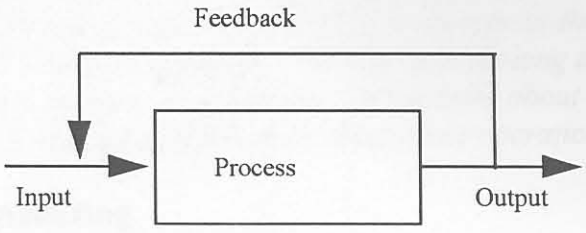


Figure 3 - Elements of a System

A system's components will perform a means of processing in order for all to attain a common goal. Figure 3 represents an open system where interaction in the form of material, energy or information across the system boundary takes place. In contrast, a closed system does not have input or output characteristics, and is subject to the forces of entropy. The implication is that a business entity, being considered in system terms needs appropriate interaction with the supra-system or external environment in order that the market forces have a favourable impact on the system. An organisation will have attributes unique to the particular organisation, hence the degree of "openness" or "closedness" is a relative measure.

Blanchard and Fabrycky [23, pp. 4-5] have defined three categories of components within the system, namely structural, operating and flow. Their functions are described as follows:

"Structural components are the static parts, operating components are the parts that perform the processing, and flow components are the material, energy or information being altered."

2.2.2 Cybernetics

The concept of cybernetics [24] pertains to the self-regulatory nature or self-governance of the system. Core to this, is the concept of feedback as illustrated in Figure 3. Kast and Rosenzweig [21, p. 107] describe feedback as follows:

"The concept of feedback is important in understanding how a system maintains a steady state. Information concerning the outputs or the process of the system is fed back as an input into the system, perhaps leading to changes in the transformation process and/or future outputs. Feedback can be both positive and negative, although the field of cybernetics is based on negative feedback. Negative feedback is informational input which indicates that the system is deviating from a prescribed course and should readjust to a new steady state."

In terms of the business entity, feedback would mean the need for transformation based on the output of the organisation, or the results thereof. Losses could indicate the need for relocation, cost-cutting, restructuring, new products etc. One of the best forms of feedback that a business entity can receive is from the market it supplies. This is open systems orientated and outward focused. In implementing a new "solution", the same process is used to manage the change process to ensure the attainment of the initial objectives.

2.2.3 Equifinality

Equifinality describes the characteristics of an open system where the output is related in some manner to the nature of the input. This concept describes a cause-effect relationship between the input conditions and the resulting state of the system under consideration. While this is true for mechanical orientated systems, this is not always the case for social systems. In business systems, this relationship may be analysed by the Ishikawa or "fish-bone" technique [29], as a means of deriving the core input signal, or core problem. Viewing this process in reverse, it becomes possible to achieve certain desired results via the implementation of varying, but predetermined inputs or stimuli.

2.2.4 Steady state

Steady state within a closed system is achieved via the final result of maximum entropy, i.e. chaos. Steady state within an open system on the other hand can be achieved via dynamic equilibrium resulting from the continual inputs of production factors in the case of a business entity. Raven [25, p.105] describes steady state operation as follows:

"By steady state operation is meant the equilibrium state attained such that there is no change with respect to time of any of the system variables. The system remains at this equilibrium state of operation until it is excited by a change in the desired input or in the external disturbance. A transient condition is said to exist as long as any of the variables of the system is changing with time. Considerable information about the basic character of a system may be obtained from an analysis of its steady state operation."

2.3 Industrial engineering

Industrial engineering is defined as follows by the Institute of Industrial Engineers (IIE) [26, P1.1.1]:

"concerned with the design, improvement and installation of integrated systems of people, materials, equipment, and energy. It draws upon specialised knowledge and skill in the mathematical, physical and social sciences together with the principles and methods of engineering analysis and design to specify, predict, evaluate the results obtained from such systems."

Bosman and Moll expanded the definition as follows [27]:

"concerned with the design, improvement and installation of integrated systems of human resources, materials, equipment, energy and information. It draws upon specialised knowledge and skill in the mathematical, physical and social sciences together with the principles and methods of engineering analysis and design to specify, predict, evaluate and optimise the results obtained from such systems. The discipline focuses on the perpetual improvement of these systems and their interaction amongst one another and the production factors to ultimately improve performance."

Analysis of the aforementioned definitions, implicates the industrial engineering discipline as follows:

- The industrial engineer is well equipped to analyse and design the means for improving business systems.
- The task of specifying, predicting and evaluating results related to the system are undertaken by the industrial engineer.
- As per previous conceptual definition of the task of business management [4], the management of a business and the skills of the industrial engineer are closely related, although the industrial engineer has a sound scientific viewpoint. The task of the industrial engineer can therefore be either participative or committed in the facilitation of managing the tasks associated with the business change.

2.4 Operations research

This section is based on Winston [28].

During the Second World War, scientists and engineers were tasked by the British military to analyse a host of problems. These problems included convoy management, bombing operations, radar deployment, etc. The use of mathematics and the engineering method in solving these problems was called operations research. Today, operations research, or management science, implies a scientific approach to solving problems involving scarce or costly production factors, using predominantly mathematical means. Operations research is, however, moving to non-mathematical means as well.

Winston [28, p 2] illustrates the operations research methodology in Figure 4.

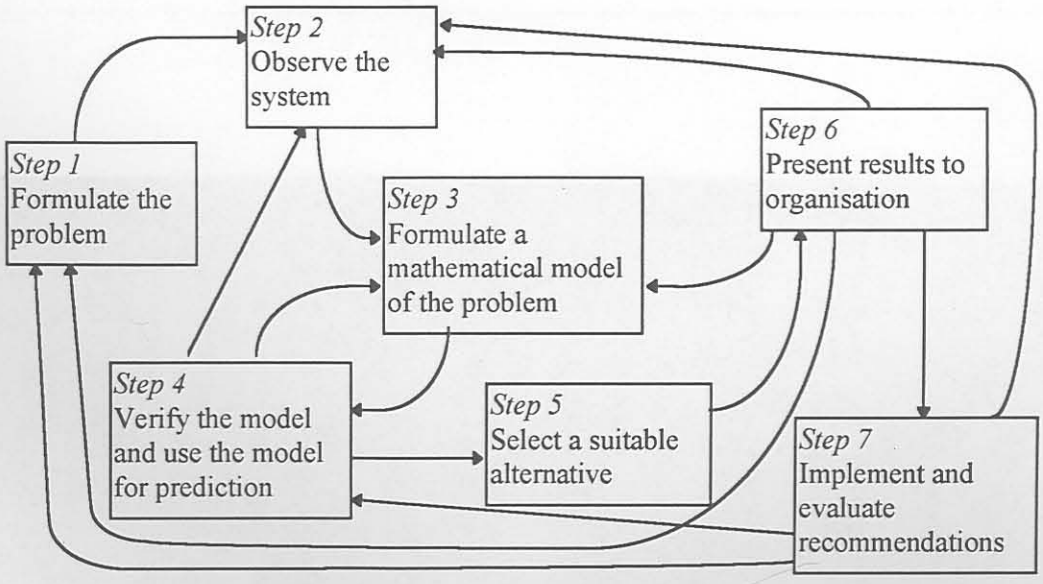


Figure 4 - Winston's Operations Research Methodology

As indicated in Figure 4, the elements of the methodology are forwards as well as backwards interactive. It is this iterative process that provides the means for a set of solutions that are appropriate for the problem under consideration.

The researcher describes a modified form of Winston's operations research or management science approach to problem solving as follows[1]:

- **Monitor the performance of the business entity against its predefined strategy**. In most cases a form of strategy will exist for the business entity where the desired direction of the business should be taken. If, on measuring the current status of the entity, the performance is found wanting, recourse is taken. Based on this model, it is now apparent that a problem does indeed exist.
- **Describe the problem**. The problem may not always be clear-cut, and some work may be required to provide a clear understanding thereof. The problem may be manifesting itself in various forms of symptoms, and more advanced technique may be required to isolate and adequately describe the core problem. The Ishikawa diagram [29] is one of several techniques available to undertake this form of analysis.
- **Define a model that simulates the problem**. The appropriate technique must either be selected or developed which adequately describes the "real world" representation of the problem under consideration. Part of this activity involves the collection and collation of data relevant to the subject field. The purpose of the data is to, firstly, devise a technique, secondly, build the model, and thirdly, test the model.
- **Generate feasible solutions**. Once the model, or models have been established, the various feasible solutions need to be generated.
- **Test the model(s) and its/their solution(s)**. The credibility of the models and solutions need to be confirmed. This is done via tests based on the original data and or confirmation with other knowledgeables via the Delphi technique as an example.
- **Select a single or appropriate portfolio of solutions**. The decision maker(s) must select a solution compatible to the objective evaluation based on the criteria relevant to the success of the business entity. Depending on the entity's means, a portfolio of solutions may be selected.
- **Implement the solution**. The next step is to implement the solution as determined by the relevant decision maker(s). This is often where the task is left to defend for itself. In reality the task of institution of change and the ensuing management thereof, takes as much if not more work. At this point the management changes from the hard issues (numbers) to soft issues (people).
- **Iterate**. As described earlier, business improvement is a continuous process.

Operations research encompasses various categories of techniques which are discussed later in the text.

[1] Conceptually, this approach is generic enough to be able to also tackle problem solving not directly related to operations research.

2.5 Business

In order to understand the nature of the system under consideration, so as to make recommendations regarding its improvement, it is essential to comprehend the fundamental nature of that system.

Business can be described as all concerted activity aimed at the sustained creation of wealth for its stakeholders, by the exploitation of its production factors. This activity is based on the commercial principle, where goods and or services are traded in exchange for an equitable form of remuneration, for the perceived value added, such as money.

The objective of a business as described in the context of this study is to create wealth on a sustainable basis. While this infers directly to monetary terms (making money now and in the future [30]), the other characteristics of wealth are also assumed.

The business, viewed as a system is part of the supra-system, namely its external environment. This is shown in Figure 5 where the business entity and environment are illustrated in terms of the systems approach.

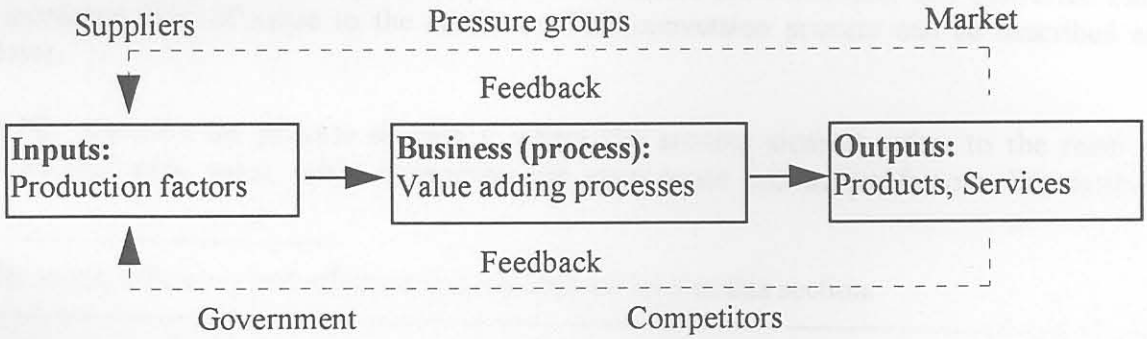


Figure 5 - Business Environment

A business must be based on the open systems approach. If this is not the case than it will descend into a state of atrophy according to the entropic principle. A business entity being an open system, is subject to much influence from the external environment. This influence is exercised by legal precepts, consumer requirements, pressure groups, competitors, technology advancement, etc. The external environment examines the outputs of the system and asserts critique regarding the nature of the outputs. This feedback may be examined and used for improvement or regulatory purposes by the management of this business entity. It is the systems choice to accept or reject this feedback. If this is rejected, the entity will experience a move towards a closed system perspective. If this feedback is used as a catalyst to change, the entity must devise a means of changing the processing characteristics accordingly. The relevant parameters will be adjusted, based on perceived value and juxtaposed risk, and managed appropriately.

From Figure 5, the business entity takes input (production factors) and adds market perceived value to this and then delivers this output (goods or services) to the targeted market. The value that is added is done via a predefined mechanism or process. The efficiency and

effectiveness[1] of the activities comprising the process, determine the nature of the value that is passed on to the output. Consider a business entity that grows and processes chickens for the market. The inputs, processes and outputs are described in simplified terms, as follows:

Good chicken stock is either purchased or bred. The chicks are given water, feed constituent of maize and various other nutrients, and medication. During the growth of the chicks, electricity, other utilities and varying skills regarding manpower are consumed. When these chickens are ready for slaughter, they are transported en masse, per house, to the designated processing plants. At the plant, the chickens are hung on shackles, weighed and then have their throats slit (for the benefit of the various religious consumers). The carcasses are then heated to the relevant customers' specifications and defeathered. The next step involves the evisceration of the birds where all the innards are collected for differing purposes. Some birds are frozen, while the others are processed further in various product forms, such as thighs, mixed portions, whole chickens, livers, heads, etc. These products are all packaged for the customer and then distributed countrywide to the relevant customers' required sites. This process is illustrated in Figure 6.

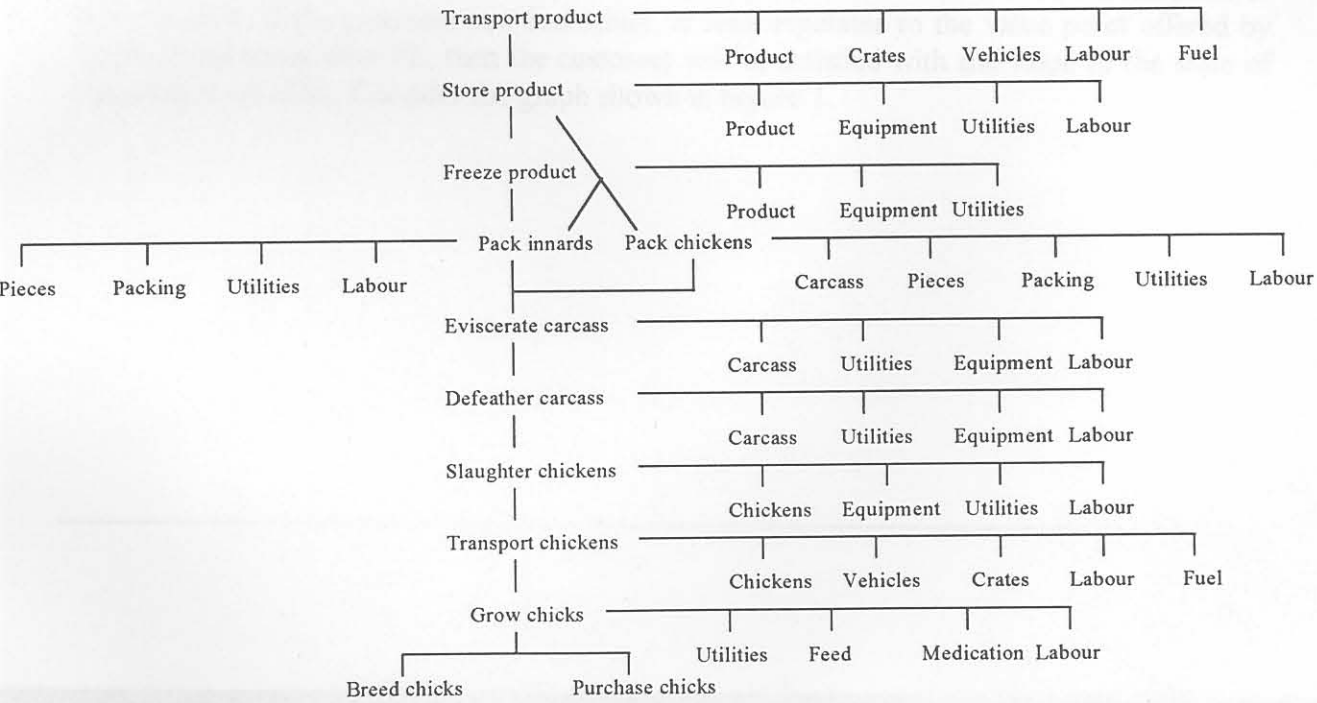


Figure 6 - Process of Producing Chicken Product

From this example, it is evident that many activities, make up the complete process that deliver the chicks in some form and then deliver the desired processed form to the end customers. During the whole process, production factors are consumed, and converted into an increased form of value to the customer. This conversion process can be described as follows:

Let PE_i describe the process element i, where the process element refers to the relative activity that adds value, while consuming the appropriate production factors. We further

[1] The terms, efficiency and effectiveness, are defined later in this section.

define NV[PE_i] as the net value added to the process element PE_i, were net value is equal to the difference between the cumulative net value for PE_{i-1} and PE_i . The cumulative net value for a product (CNV), relevant to the degree of processing, i.e. the last process element that has been successfully undertaken, is given by:

Equation 1

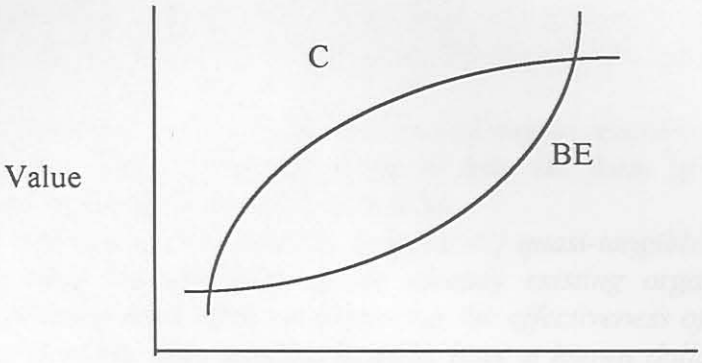
$$CNV[PE_i] = \sum_{j=1}^{i} NV[PE_j]$$

This current value of the product is relevant to the viewpoint of the system under consideration. To the business entity (processing the chicken), the value of the chicken item, after being processed by PE_i is seen as the proportioned consumed production factors, attributable to the item at that point. If the business system and its supra-system remains at status quo, i.e. no growth is required, then a commercial relationship could be established with a customer, where the customer could exchange the item for money, as example, at this break-even point of value.

In real terms however, influencing forces like inflation and social growth needs, require that the business entity exchange the item at a relative price, higher than the break-even point of value. The test of value is then whether the market forces of supply and demand are in equilibrium at this point. If the marginal rate passed through to the customer is unacceptable, then the business is at risk, as this item will not be absorbed into the market. Contingencies for primarily, survival, and secondarily, prosperity needs, must be put into place. When equilibrium regarding CNV[PE_i] is not achieved in exchanging the product for "money", the business entity is exposed to risks. These include:

- The organisation of the processes leading up to PE_i is too costly.
- The productivity in downstream process elements may be such that the difference between customer perceived value and "real" process generated value is too great, i.e. PE_i may be too soon for the business entity to seek an exchange.
- The customer does not have the means for utilising the product in its form after PE_i.
- The technology is such that the customer does not perceive equitable value for the cost that the customer must bear in exchange.

From the customer's perspective, value is seen differently. It is viewed entirely from a point of view of need. If the customer can find utility, at least equitable to the value point offered by the business entity after PE_i then the customer will be satisfied with the value of the state of the product on offer. Consider the graph shown in Figure 7.



BE: Business entity - real value
C: Customer - perceived value

Figure 7 - Value Curves

There are two points where the business entity's curve of real value and the customers curve of perceived value intersect. This indicates a feasible region, between these two points, in which exchange between the business entity and the customer can take place. Note that the real value curve includes proportionate production factor consumption as well as margin due to the real market forces. The feasible region can be described as the market value range for the item. This is the value that the market in general would be willing to exchange for, based on the relative process element, i.e. this is the area where the concept of value is common between the two perspectives. In this region the commercial relationship regarding the item is in equilibrium.

Taking normal market forces into account, the business entity would run a risk of not receiving fair trade for the item if tendered outside the feasible region. Beyond the upper intersection point, as an example, the risk is great that the item will not be purchased or traded by the customer, although the potential returns are equally great. This analysis does not imply that there are no risks within the feasible region. This analysis pertains merely to the market forces of supply and demand, and does not take other operational factors into account. These must therefore be considered in conjunction with strategies regarding the feasible region.

An overview regarding business has been given. Following this, a few key concepts are discussed, which, depending on their impact, colour the nature of the business entity.

2.5.1 Value, utility and benefit

The term value and utility has been used to considerable extent thus far. It is however important to understand what is meant by value. The Oxford Dictionary [74] defines value as:

"1. Worth, desirability, utility, qualities on which these depend. 2. Purchasing power, power of a commodity to purchase others, amount of money or (Econ.) other commodities for which the thing can be exchanged in open market."

Thuesen and Fabrycky [31, pp 17-18] define and draw a distinction between value and utility from the perspective of the customer as discussed earlier in the text:

*"The term **value** has a variety of meanings. In economics, value designates the worth that a person attaches to an object or a service. Thus the value of an object is inherent not in the object but in the regard that a person has for it. Value should not be confused with the cost or the price of an object in engineering economy studies. There may be little or no relation between the value a person ascribes to an article and the cost of providing it, or the price that is asked for it.*
*The general economic meaning of the term **utility** is the power to satisfy human wants. The utility that an object has for an individual is determined by him or her. Thus, the utility of an object, like its value, inheres not to the object itself but in the regard that a person has for it. Utility and value in the sense used here are closely related. The utility that an object has for a person is the satisfaction he or she derives from it. Value is an appraisal of utility in terms of the medium of exchange."*

The term benefit is frequently employed to describe the beneficial returns that may be encountered if an investment in kind is ventured. This can be undertaken via means of a cost benefit analysis (CBA) where the costs of investment are evaluated against the benefits returned to the investors. Parker and Benson [32, p90,92] describe the relationship as follows:

*"A **cost** is a measurement of the amount of resources required to obtain a product. Costs are expressed in quantitative dollars required. **Benefits** take the form of cost saving, cost avoidance, generation of new revenues and intangibles.*
There are three types of benefits: (1) tangible benefits; (2) quasi-tangible benefits, focusing most often on improving the efficiency of the already existing organisation; and (3) intangible benefits, focusing most often on improving the effectiveness of the organisation. Of the three types of benefits, only tangible benefits have a known dollar impact on cash flow."

Traditionally, benefits in the cost benefits analysis perspective have been associated with cost reduction [32, p12]. The benefits have been largely tangible in nature and can be related into financial terms for purposes of equivalence. Thuesen and Fabrycky [31, p 334] further define that the net benefit is equal to the advantages of the investment, less the disadvantages thereof. Parker and Benson [32, p12] integrate the concepts and value and benefit as follows. They extend the cost reduction perspective of traditional benefit to further take into account, the other inherent values therein. In other words, the intangible positive aspects related to the investment are taken into account and are quantifiable via appropriate means in order that equivalence regarding criteria are established. The purpose of this is to be able to establish the real worth of the investment.

2.5.2 Value Chain concepts

An extension of the concept of accumulating value is the value chain approach of Porter [33]. This is illustrated by Figure 8.

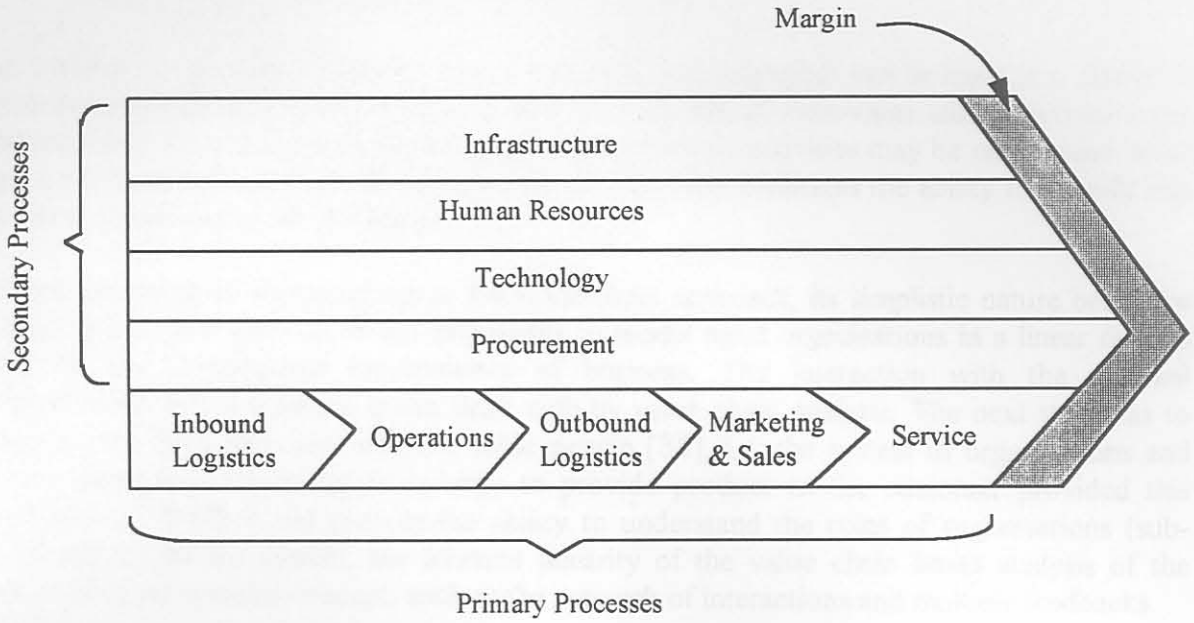


Figure 8 - Porter's Value Chain Structure

The distinction is made between primary processes and secondary processes. Primary processes are those sequential set of serial or parallel activities, aimed at providing the product or service of the organisation, for which that organisation is distinguished. This approach allows for focusing on the business entity's core competencies. Secondary processes are likewise a set of activities, but are however aimed at maintaining the successful continuance of an activity, or set of activities in the primary process.

Porter identifies the following five generic activities that are conducted in the main line of business (LOB) of an organisation. Inbound logistics describes the activities related to the receiving and handling of the business entity (system) inputs. Operations describes the processing that takes place within the entity, where the inputs are converted into the outputs, i.e. products or services. Outbound logistics refers to the activities that accumulate, store and distribute the outputs to the customers. Sales and marketing provide the allure and means for the customer to take ownership of the product. Service pertains to the process activities that either enhance or maintain the level of value of the product.

The generic secondary activities of Porter which ensure the success of the primary, are infrastructure, human resources management, technology development, and procurement. Consider the example of the chicken producer (described earlier), various supporting processes need to be put into place to ensure chickens are provided to the market at market value. There are two examples of secondary processes which must be effectively managed. In the first example, the business entity needs to have "good" information in order to provide the high volume, low cost product to the differentiated market. To be able to provide this information, a well managed process must exist that delivers this to the business entity. This then becomes the mission of the information delivering secondary process. In order to achieve this, the business strategy must be clear regarding its direction in the short to long term. To provide this, information technology plans must be devised and executed to support this strategy. This function must be staffed, infrastructure put into place, operated and maintained.

The management of capital in this process alone is a time consuming task[1]. The business entity then, is faced with a dilemma. It is in business because of its core competency of producing the right chickens in the right place at the right time. It does not have the correct knowledge and energy with which to run this process to its full potential. This is unless the business is able to continuously part with the huge amounts of capital required to maintain this process. It must be noted that a secondary process, being part of a business entity, cannot normally recover costs from outside the business system. All costs will therefore accrue to the real value of the product, which, as discussed earlier, may not be compatible with the customers' perceived value. The business is therefore faced with two alternatives, either it manages the process directly from within, taking the feasibility into account, or it outsources the process [34,6]. In either event, the value of the decision as well as the risks need to be identified and managed accordingly.

In the second example, the business would require much packaging material in order to present the product to the customer, in its various forms. The business would then be faced with the same decision as with the IT process. The decision should again be based on the holistic long term benefits and risks of the solution.

The value chain approach allows the business to align its operations with what makes meaningful business sense. It can easily identify if differentiation is taking place and whether this is appropriate.

In addition to providing business focus, the value chain approach can be used as a means of forming ideas on how transformation should be undertaken. Non-value adding activities can be identified for possible elimination, secondary, non-core activities may be outsourced while gaps between processes can be identified. In analysis, this facilitates the ability to identify risk areas in transforming the processes.

There are however shortcomings in the value chain approach, its simplistic nature being the major factor. It is difficult, if not impossible to model most organisations in a linear fashion due to the complicated requirements of business. The interaction with the external environment of the business is not dealt with by value chain analysis. The next step was to incorporate the value chain into the value system [35], i.e. the system of organisations and production factors working in synergy to provide product to the customer provided this perspective. While it did provide the ability to understand the roles of organisations (sub-systems) within the system, the inherent linearity of the value chain limits analysis of the richness of the systems concept, such as the network of interactions and multiple feedbacks.

To better utilise systems theory, Normann and Ramirez [36] provided the concept of the value constellation. In this model, activities are still evaluated based on the value brought to bear, but the linearity is set aside for a network approach. This provides for the ability to process simultaneously, in parallel, sequentially, and by different process elements. This approach allows for a range of possibilities (and hence risks) in which a business or businesses can be transformed. The concept of the value constellation brings into question, the reasons for traditional organisational boundaries as it advocates fluidity and flexibility in any direction.

[1] This example illustrates the situation typically experienced by a medium to large organisation. It is seldom that a 1 to 10 person company need to go through the rigours to this extent.

While it does reduce the need for traditional control due to the transparency of tasks ensuing from the close integration that occurs, its inherent fluid properties provide management difficulties.

In order to manage this value constellation satisfactorily, Ashkenas et al [37] provide a means of setting boundaries and analysing the effects of making certain boundaries more permeable. The authors identify four different types of barriers, namely vertical, horizontal, external and geographic.

They further advocate that vertical barriers need to be broken down via the distribution of authority throughout the organisation, information shared openly and rewards tied to the accomplishment of that position. Taylor [40] proposes that some failures of BPR have resulted from leaving much of the traditional hierarchy in place, particularly the reward structure.

Ashkenas et al view the horizontal barriers as those boundaries between business functions. Rayport and Sviokla [38] provide a means of achieving this in their virtual value chain concept. They describe a matrix of value chains where the traditional value chain [33], called the physical value chain coexists with virtual value chains. These are termed virtual as they do not take physical form, they facilitate the processing of information to provide competitive advantage. This can lead to the changing of products, services and even markets.

2.5.3 Process and functional paradigms

Since the advent of the surge of work around BPR theory, much has been discussed regarding the process versus the functional approach. Hammer [39] in particular, describes the requirements of the process paradigm as contrasting significantly to that of the functional paradigm. The concept of the functional approach can be attributed to the school of scientific management [40].

The basis of the process approach is to focus on providing value based desired results, not on work. This theory has been adequately expanded by the early proponents of BPR [5,39,41]. The change from process to functional bring the core paradigm of change in BPR which needs to be managed carefully. Sometimes activities have been embedded in functions that make limited apparent reason on initial analysis. The risks in transforming mind set and work need to be addressed accordingly.

2.5.4 Production factors

In order to produce income, the business system needs to add value by transforming resources into a form that a client or a customer is willing to pay for. This payment or exchange is aligned with the accumulated value (CNV[PE_i]) for the product or service. The resources absorbed or transformed in the processing that takes place are termed as production factors by economists. Lombard et al [42] have categorised the four general groups of production factors as follows:

- Labour.
- Natural resources.
- Capital.

- Entrepreneurship.

Other authors [26] have added methods, machinery and energy to the list. Bosman and Moll [27] have included information to the list as a factor becoming increasingly more valuable in conducting and transforming business today. Information is however only the middle tier in the data, information, knowledge hierarchy. Recent research [43] has shown that the successful management of an organisation's knowledge assets aligned with strategic objectives will provide one of the drivers of success in the future.

2.5.5 Productivity

The Oxford dictionary defines productivity as:

"Capacity to produce; quality or state of being productive, production per unit effort; effectiveness of productive effort"

In simple terms productivity is simply given by the following equation:

Equation 2

$$Productivity = \frac{Output}{Input}$$

Mundel [26, p1.5.1] provides a more formal definition of productivity as the:

"ratio of outputs produced for the use outside an organisation, with due allowance for the different kinds or products, divided by the resources used, all divided by a similar ratio from a base period. Hence it is an index; it has no dimension."

Productivity in its component sense is seen as the product of effectiveness and efficiency, where:

- Effectiveness is doing the right things.
- Efficiency is doing things right.

This is illustrated in Figure 9 where the objective is to achieve goal B from point A.

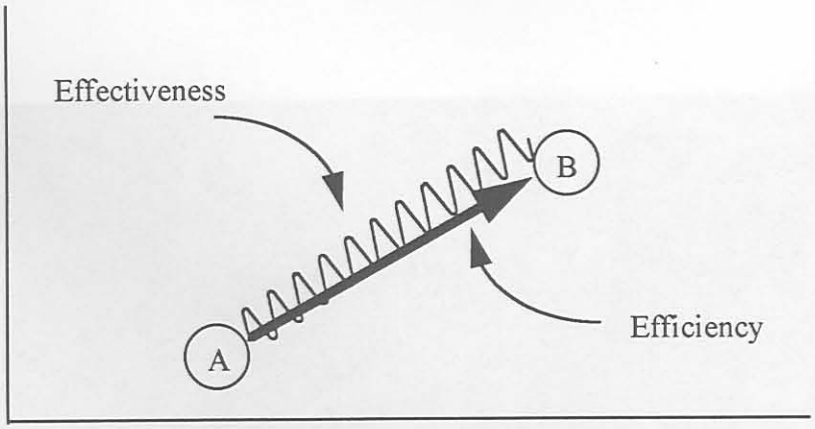


Figure 9 - Relationship between Effectiveness and Efficiency

From the figure, chasing the shortest path means achieving the goal effectively. Depending on how frugally (burn rate) this is achieved, is a matter of efficiency (thickness of the line).

Ackoff [59, pp50-52] describes the relationship as follows:

"Science, technology and economics focus on efficiency, not effectiveness. The efficiency of a course of action relative to a possible outcome in a specified environment is measured in one of two ways: either the probability that it will produce that outcome in that environment, or the amount of resources it consumes in producing that outcome in that environment. ... The effectiveness of a course of action in a specified environment is a function of its efficiency for each possible outcome and the values of these outcomes to those affected by them."

2.5.6 Business drivers

Business drivers pertain to those forces that are directly or indirectly shaping the future of the business. These forces may either be internal or external in nature. The business may or may not have the ability to influence or coerce the direction of these forces. These drivers can therefore change the state in which the business resides either knowingly or unknowingly and may have a negative or positive impact on the business.

Examples of internal drivers include the need to improve the safety of working conditions, and external drivers, the pressure by government to implement affirmative action initiatives.

2.5.7 Benchmarking

The concept of benchmarking has been used for many decades in the engineering environment where it has been used as a calibration mechanism for manufacturers of vehicles, electronic equipment and so on. This approach for the search of "best-in-class" performance has been adopted by business improvement practitioners over the last decade. Various formal definitions of business related benchmarking exists, but there is sufficient consensus however, over the generic standard setting attributes and mechanisms that strive to achieve this. McCarthy [44, p10] using Spendolini's model for defining benchmarking [45], proposes the following definition which incorporates contemporary thought on business related benchmarking:

"A continuous, systematic process, for comparing business practice of organisations that are acknowledged as world class for the purpose of organisational improvement."

Various types of benchmarking exist, being categorised in a way meaningful to the attainment of the practitioner's specific goals. Types of benchmarking that take place include product, process, cost, structure, functional, competitive, standards based, etc. Miller et al [46] however, provide an organisational hierarchy based framework that provides insight into this sort of categorisation, as well as what can be achieved by each. This is shown in Figure 10.

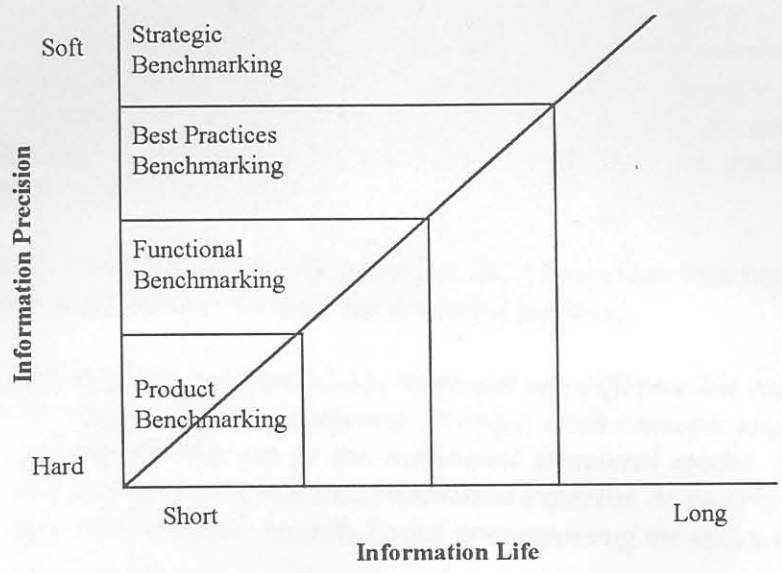


Figure 10 - Benchmarking Hierarchy and Effectiveness

From the literature, various benefits result for the business, these include:

- Having an external focus.
- Understanding the pressures of "world-class" requirements.
- Aligning the organisation with market driven needs.
- Pro-actively sets a course for organisational improvement.
- Promotes transparency of measures and targets for all throughout the organisation.
- Provides a positioning indicator of the organisation's health in terms of customer orientated and competitor demands.

These benefits are however, offset against certain disadvantages. The most important of these include:

- A ceiling effect results from trying to only achieve contemporary best practice.
- Creative aspects and doing things radically different are not easily promoted.
- Focus on subsystems (e.g. functional compared to strategic benchmarking) may result in sub-optimal solutions or may even pull in different directions. For example "best-of-breed" practice in functions may result in disjointed or mis-aligned processes or exercises.
- Making your own benchmarking information available could have a hollowing effect on competitive advantage.
- Establishing "precise measures" can be time consuming. If incorrectly done, it could lead to false targets and accordingly mislead behaviour.
- The initial costs in setting up a benchmarking process can be high without yielding immediate results.
- Another management improvement "fad" to deal with in organisations already tasked (either successfully or unsuccessfully) with a host of improvement initiatives.

2.5.8 Core competencies, capabilities and competitiveness

The hype of strategic planning has waned. Mintzberg [47] has indicated that managers have confused real vision with the manipulation of numbers. The value of strategy remains in the vision it engenders, not the development of hard plans. This is a reason why scenario planning is proving to be increasingly more valuable.

With the population and the variety of management techniques, it is the researcher's experience that "once this has been implemented, we will be there" unfortunately the business environment is constantly changing. A question arises, inquiring about solution sustainability. The concepts of core competencies and capabilities suggest a focus for addressing this. Hamel and Prahalad [6] define core competencies as:

"... the collective learning in the organisation, equally how to co-ordinate diverse production skills and integrate multiple streams of technologies ... is also about the organisation of work and the delivery of value ... is communication, involvement and a deep commitment to working across organisational boundaries ... Core competence does not diminish with use. Unlike physical assets which deteriorate over time, competencies are enhanced as they are applied and shared. But competencies need to be nurtured and protected; knowledge fades if not used ... They are also the engine for business development. Patterns of diversification and market entry may be guided by them, not just be the attractiveness of markets."

Until 1992, the terms competencies and capabilities had been used interchangeably. Then Stalk et al [48] put forward the following position:

"*Competencies and capabilities represent two different but complementary dimensions of an emerging paradigm for corporate strategy. Both concepts emphasise "behavioural" aspects of strategy in contrast to the traditional structural model. But whereas core competence emphasises technological and production expertise at specific points along the value chain, capabilities are more broadly based, encompassing the entire value chain.*"

Long and Vickers-Koch [49] define the relationship as shown in Figure 11.

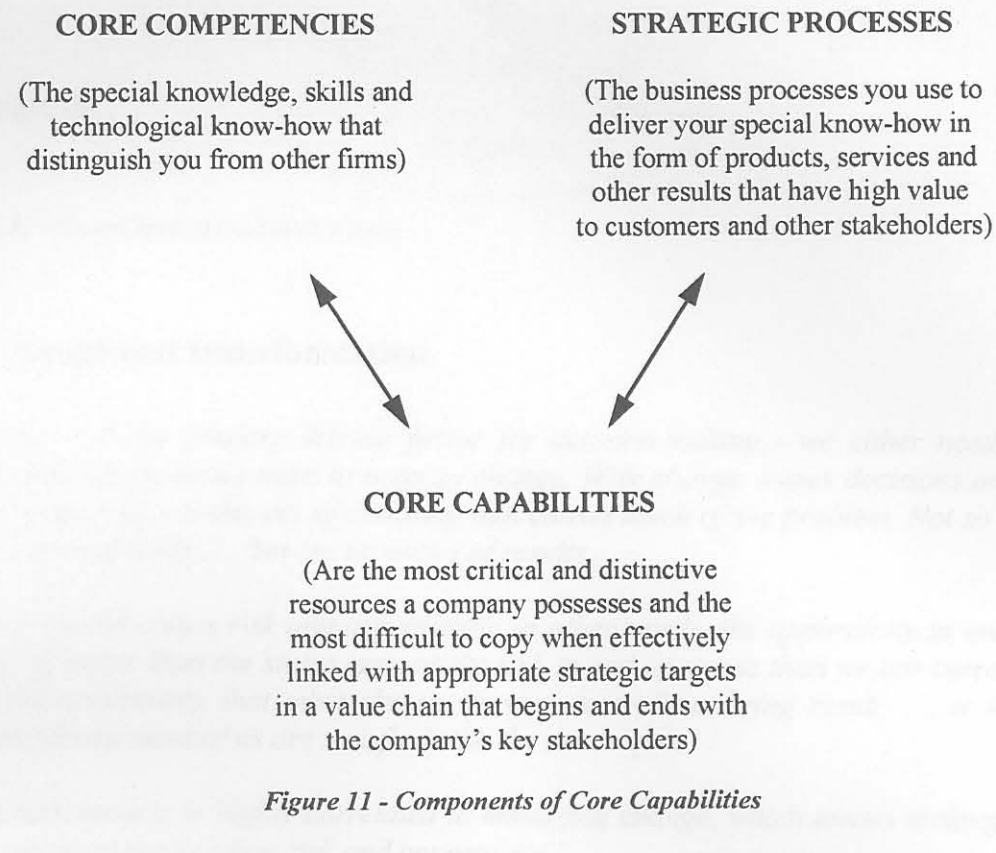


Figure 11 - Components of Core Capabilities

The authors indicate two prerequisites in order to become capabilities based. Firstly the value chain should be evaluated for areas where the margins are greatest between what the value stakeholders place on what is added and the cost of adding it. Secondly the processes and feedbacks need to be modelled and special capabilities identified supporting the stakeholder needs. The authors illustrate the core competencies value chain in Figure 12.

This analysis plays a very important role in understanding the core composition of a business and accordingly plays a pivotal role in analyses orientated around competitiveness. Reasoning around this is included as appendix H.

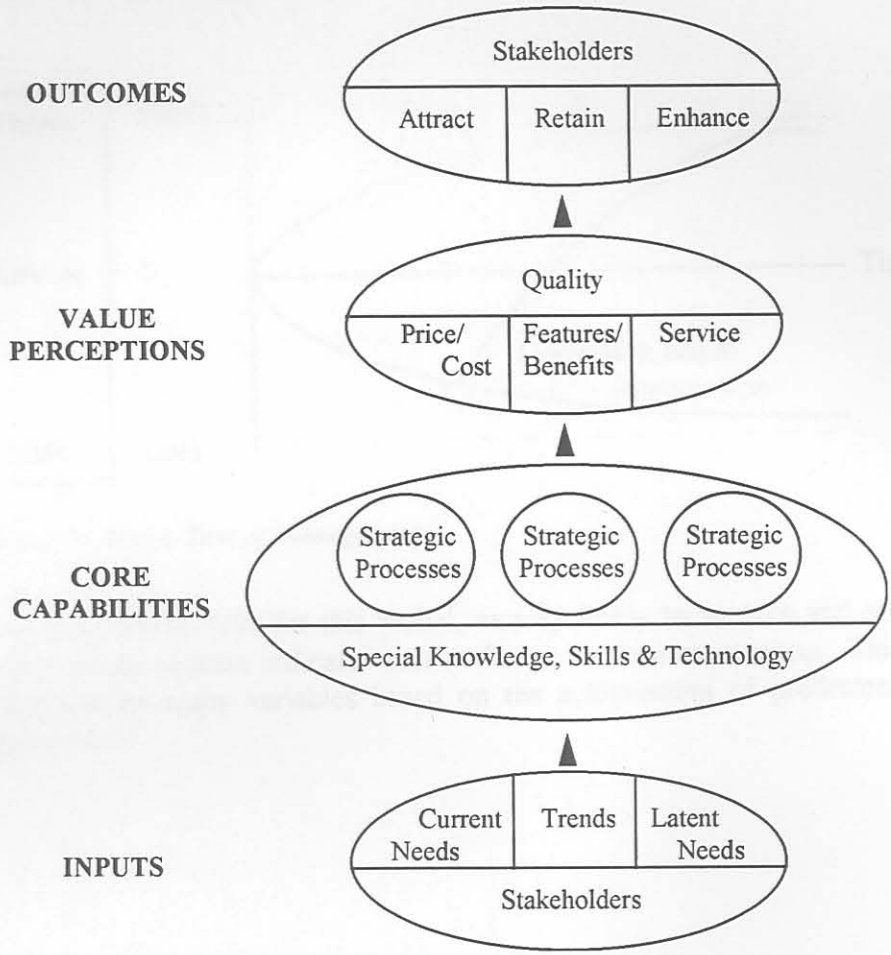


Figure 12 - Core Capabilities Value Chain

2.6 Change and transformation

"Change ... is the primary driving factor for decision-making - we either need to make change take place, or we need to react to change. With change comes decisions and the act of choosing. And it is this act of choosing that causes much of the problem. Not so much the act of choosing itself, ..., but the potential of results.

For with choice comes risk and opportunity: in other words, the opportunity to end up with something better than the status quo, or the risk to end up worse than we are currently. And given the uncertainty that most choices posses, as well as bring result, ..., it is easy to understand why most of us are satisfied with the status quo.

... Business success is highly correlated to managing change, which means making choices, which means understanding risk and opportunity."

Charette [10]

Change emanates from the need to improve a current set of circumstances. Transformation is facilitated through a change in form, whether it be outward appearances and or the intrinsic characteristics thereof. Change does not necessarily mean that circumstances will improve, the

reverse is also true. While it is the task of management to achieve the business goals, one of the functions to ensure this is to pro-actively embark on a path on continual[1] improvement.

Scott-Morgan indicates that there are four dimensions of risk, namely:

- Success rate.
- Speed of change.
- Magnitude of change.
- Parallelism (of change initiatives).

He indicates that the task of the successful organisation of the future will be to successfully manage the portfolio of change initiatives within the organisation, each with their own risk-reward profiles.

It is the task of managing the risks in business change to ensure that change is enacted in a positive and not a negative form. Figure 13 illustrates this concept.

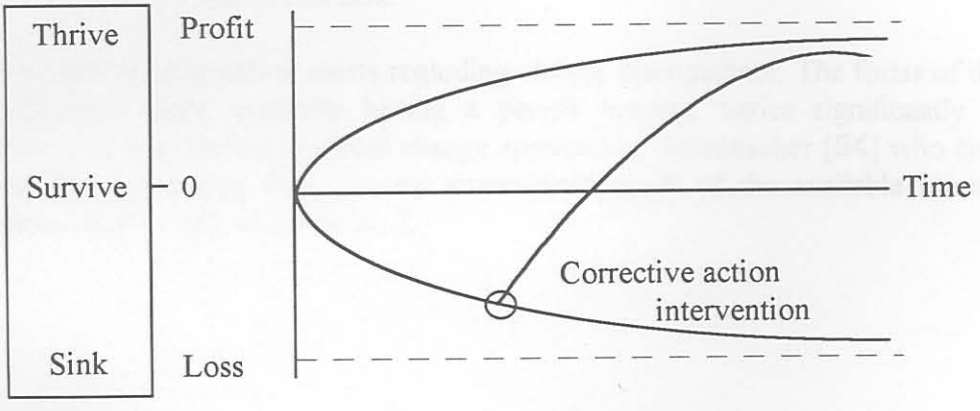


Figure 13 - Macro Task of Management

Two imperatives hold for this model, namely firstly to survive and secondly to thrive. The improvement process indicates that a change in state must occur. This change in state will affect one or many variables based on the achievement of predetermined goals. Consider Figure 14.

[1] This incorporates the concepts of continuous and dramatic improvement initiatives.

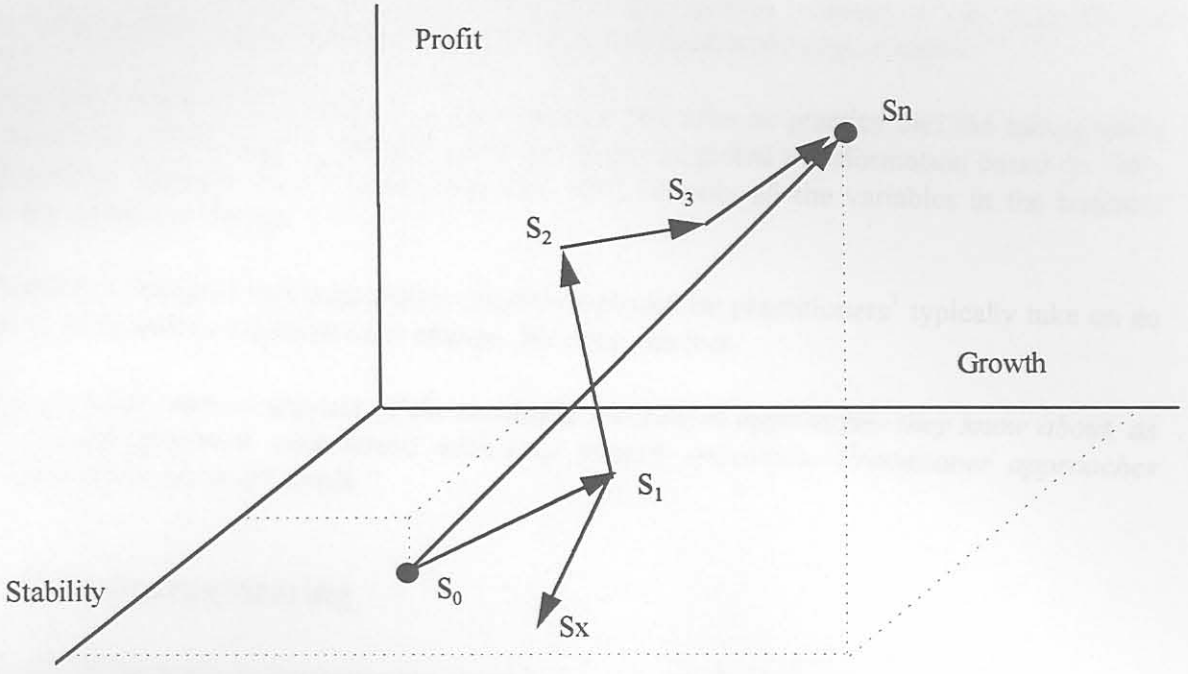


Figure 14 - Transformation in Business State

Figure 14 indicates the three components that need to be addressed in order to achieve the aims of the business as described earlier. These include the money-making focus, supported by the imperative of sustainability. The money-making aim is achieved via striving for profit and growth while the latter is supported by the combination of stability and growth.

Profit is measured by traditional means, growth is a function of typically economic value added (EVA) [50], while stability is measured by appropriate factors such as market share, acid ratio, debt to equity ratio and the like.

As Figure 14 illustrates, the goal can be achieved via maximum effectiveness ($S_0 \rightarrow S_n$) or via a set of sequential actions that ultimately result in the desired state. The task of risk management is to ensure that the transition chain ($S_0 \rightarrow S_1 \rightarrow S_x$) does not occur, or if it does occur, that the net effect is minimised. In many business improvement projects the requirements are well analysed and the desired goal S_n (the what) defined, but often never actually result [51,52,53]. The management of change through to implementation and operation is the rest of this task.

A wealth of information exists regarding change management. The focus of the literature and techniques while generally having a people bearing, varies significantly from individual orientated approaches to global change approaches. Schumacher [54] who conducted a study into the barriers to BPR success summarised much of the available literature on change management as shown in Table 2.

Table 2 - Classification of Change Management Approaches

	Individuals	Groups	Organisation	Environment
Psychology of the individual				
Social psychological approaches				
Cultural approaches				
Innovation approaches				
Global change approaches				
Practitioner approaches				

From Table 2, psychology of the individual deals with the individual person [54] where the character and the process of the change are the primary concerns.

Socio-psychological change is based largely on the premise that the individual is shaped more by the social environment than by their genes. The author put forward that culture is mostly unconscious to the members of the organisation even when new behaviour is required. He further indicates that

"this is one of the reasons, why new leaders introducing change in an organisation sometimes replace key positions with new people, external to the organisation."

Innovation approaches focus on the diffusion of a new idea or practice and the management of resistance to this. Global change approaches focus on global transformation based on "life-threatening" changes. These approaches deal with virtually all the variables in the business that are subject to change.

Schumacher indicates that approaches usually employed by practitioners[1] typically take on an eclectic approach to organisational change. He observes that

"they combine various aspects of the available theoretical approaches they know about, as well as add practical experiences with real change processes. Practitioner approaches typically intervene at all levels."

2.7 Business engineering

The task of the business improvement practitioner is to develop means of making a difference to the so-called bottom line of the business. Considering a generic system (Figure 3) and the value chain (Figure 8), there are four general ways in which the change to the bottom line can be made, namely:

- Changing the inputs.
- Improving the process.
- Improving the support infrastructure.
- Changing the system framework.

[1] He defines practitioners as consultants and managers.

Martin [55] purports that there are 5 disciplines involved in instituting change in a business aimed at improving its financial attractiveness[1]. These are:

- TQM, kaizen.
- Procedure redesign.
- Value-stream reinvention.
- Enterprise redesign.
- Strategic visioning.

The researcher however believes that another factor, namely financial optimisation is used to change the financial attractiveness of a business. Martin's definitions as well as the last-mentioned are summarised in Table 3.

Table 3 - Change Types Aimed at Business Improvement

Type of Change	Description	Example of Techniques	Business Results
TQM/ kaizen	The lowest level of change, kaizen creates a culture of continuous improvement. Often applied to a process, it can also involve a succession of small improvements to a wide range of elements, including products, manufacturing, modelling and selling, etc.	Workstudy, statistical methods, TQM, benchmarking, quality circles	Improvement in efficiency, quality
Procedure redesign	A middle-ground between the gentle continuous change of kaizen and the scrap-and replace upheaval of value-stream reinvention, procedure redesign alters existing procedures.	Process redesign, benchmarking, problem-solving, cost-cutting, TOC, ABC, ERP, JIT	Improvements in efficiency and effectiveness to a degree.
Value-stream re-invention	Identifying and replacing end-to-end processes that meet a customer's needs in order to serve that customer as effectively as possible. Invariably involving organisational change, it usually results in time and cost savings while improving quality and service.	BPR, technology management, rightsizing, benchmarking, product changes, value engineering, costing approaches	Improvements in efficiency and effectiveness, quality, overheads
Enterprise redesign	Concerned with the holistic redesign of the enterprise, enterprise redesign can be done by re-engineering existing organisations or by building new business units, factories, subsidiaries or affiliates.	Strategic alliances, portfolio management, corporate restructuring	Improvements in effective-ness, leverage, focus, increase in turnover and market share
Strategic visioning	Strategic visioning guides a corporation and shows where it is going. Of the comments of	Strategic management, core	Improvements in focus,

[1] He indicates that there are two further infrastructural change processes, namely (1) information technology development and (2) organisation and culture development. These can be likened to the secondary change processes which are required for the primary change initiative to succeed, while the former 5 are the options for the primary change process.

Type of Change	Description	Example of Techniques	Business Results
	"enterprise engineering", it is one that is unique to each enterprise.	competencies and capabilities, portfolio analysis	income stream, reduction in risks, increased leverage
Financial optimisation	Change in the financial characteristics of the organisation, e.g. financing via listing as a public company or taking advantage of tax-breaks, etc.	EVA, restructuring investments, financing options, "financial engineering"	Reduction in cash-outflows, improving financing of operations. Improving "ROI"

All six types bring about change in the way business is conducted, with a view to improving the "bottom-line" of the organisation. The last factor, namely financial optimisation, does not necessarily experience the same behavioural risks due to its use of financial instruments rather than predominantly human nature. The scope of this study is therefore limited to the first 5 types of business change. When financial optimisation techniques are relevant, where evaluating initiatives in the other five areas, these will be discussed. The same rationale is used for the infrastructural changes described by Martin.

It is therefore understandable that when a new business improvement technique emerges that people in the organisation become either confused or exasperated in terms of what to do next, and how this fits into the whole scheme of things. While there is solid motive around developing business theory, implementers are quick to exploit this, without necessarily understanding the fundamentals. This then quickly becomes a management fad without accumulating in an integrated fashion to the solid body of knowledge already available. Rigby [56] claims that a management theory has a life cycle consisting of six phases, listed as follows:

- **Deficiency**. Inattention to an important principle or change in conditions leads to a desire to change the status quo.
- **Discovery**. Creative thinkers develop (or dust off) solutions to correct the deficiency.
- **Euphoria**. Early success stories are highly publicised, lowering barriers to trial.
- **Over-extension**. Excessive application in inappropriate areas result in failure or less than expected results.
- **Derision**. Examples of failures become vociferous and critique becomes the order of the day.
- **Abandonment**. Businesses discard the technique and replace it with a more novel and fashionable approach.

While this is clearly a sceptical view of management theory describing them all as fads, it is the researcher's experience that this is how techniques have been received in many instances. The problem with being regarded as a fad implies that once the novelty has warn off, it is discarded and often ends up being taboo.

Bosman and Moll [27] however, believe that all management theories contribute value and must be evaluated and applied with appropriate discretion. It is only from understanding the fundamentals of business on the one hand, and the techniques available on the other, that appropriate selection and application can be made. In this way inherent benefits and risks can be identified and managed correctly.

The authors identify the concept of business engineering as providing the framework for the appropriate means of improving a business entity. The term analyses the constituents and explores the means for achieving the goals of business through the application of engineering-like principles to business. The concept of business is as defined earlier. The engineering approach is considered to be constituent of:

- Having a wealth of scientific tools (mathematics, physics, etc.) at ones disposal.
- Possessing a logical deductive as well as inductive reasoning ability.
- Having formal solution providing processes and frameworks.
- Possessing the ability to be creative and innovative.

The authors incorporate the principles into the (modified) model shown in Figure 15.

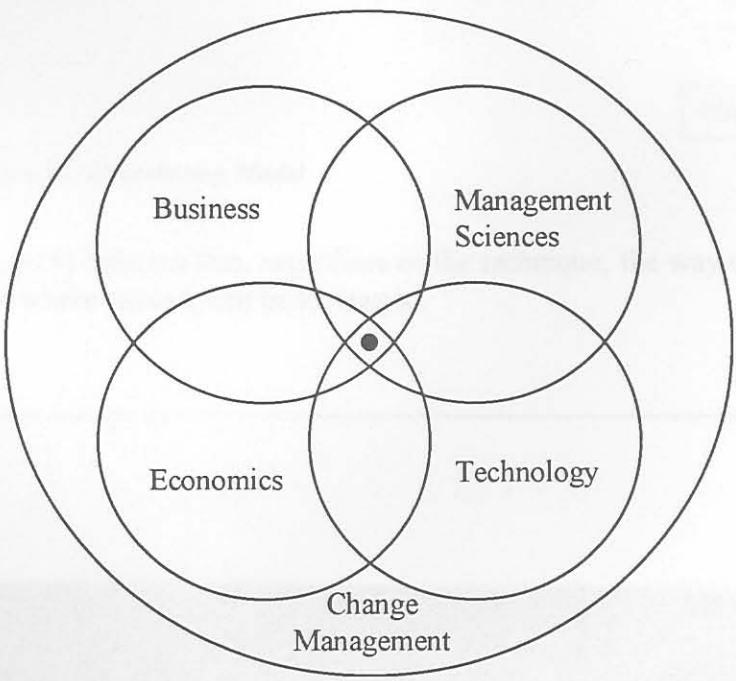


Figure 15 - Daisy Model - Principles of Business Engineering

From the figure, business, management sciences, economics and technology are fields where techniques/understanding can be drawn from, with the prerequisite that they are appropriate. The solution is seeded through the innovative ability and the change managed from inception through operation.

Watson [57] supports this approach where new approaches should not be immediately embraced, but well founded. He however expands on the term "business systems engineering" where the focus is on the systems approach while integrating the concepts of BPR and TQM. He adds that the advantage of building on theory that is already familiar, finds allies who can

readily accept the methods and therefore more willing to focus on delivering the desired changes. The author does not however provide the ability to bring improvement to bear in all possible areas as described in Figure 15. It focuses primarily on bringing about bottom-line benefits by working in the areas of process improvement, strategic enablers, products and technology. His business systems engineering model is shown in Figure 16.

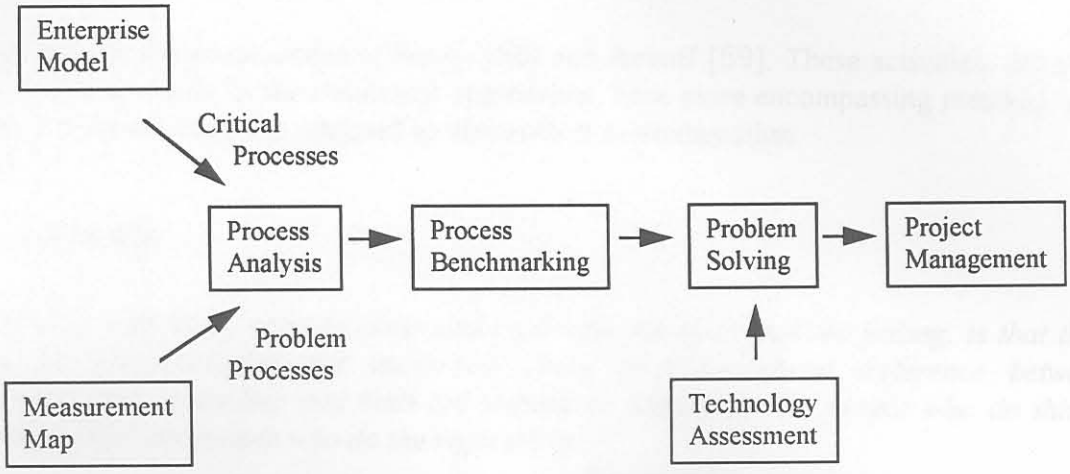


Figure 16 - Watson's Business Systems Engineering Model

From an engineering view point, Bosman and Moll [27, pp22-27] propose a generic engineering model shown in Figure 17. The generic phases of planning, analysis, design, construction, implementation, operation and phase-out can also be applied to non-traditional engineering environments as well, such as the redesign of a company's core processes.

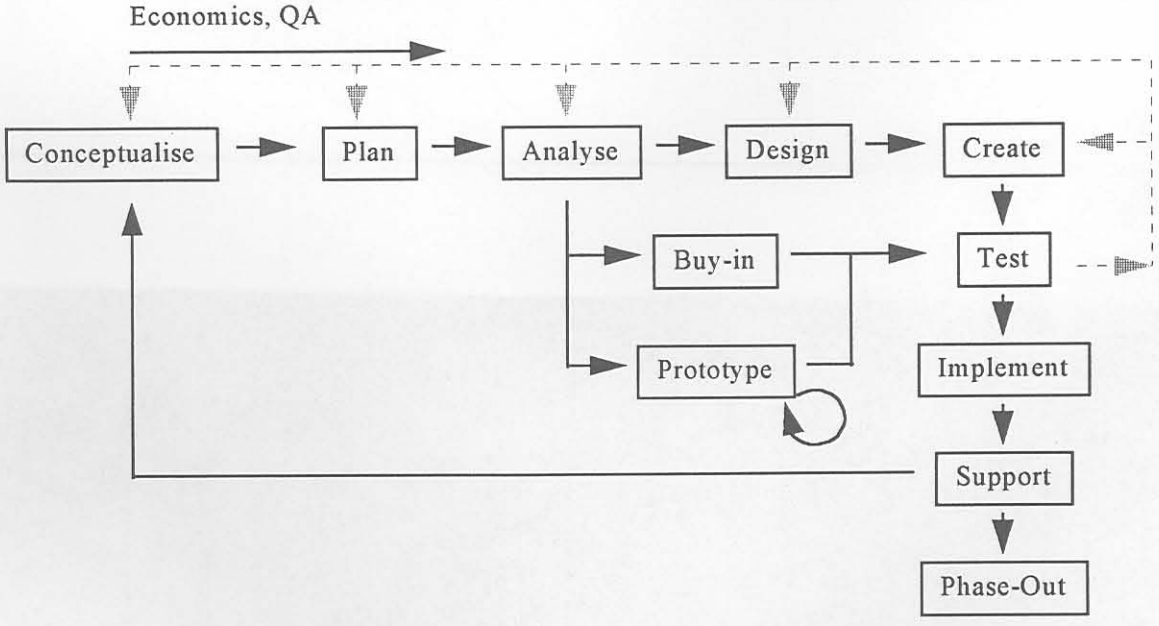


Figure 17 - Generic Engineering Model

Scott-Morgan [51, p11] believes that, regardless of the technique, the way change is brought about is the crux of where success can be leveraged:

"Since the start of the 1980s there has been a new wave of management thinking. TQM, intrapreneuring, downsizing, management by walking around, empowerment, one minute managing, teamwork, re-engineering, customer focus, learning organisation. The common denominator of all these new wave approaches is that to work they all require that we ***change the way people behave.****"*

2.8 Management

Several authors describe their techniques as risk management, where in essence, what is being described is only one important part of the management task, such as analysis. Traditionally four key functions of management where the full life cycle is implied, namely planning, organising, leading and controlling have been purported

This infers a parallel to the complete cycle in business change; from inception, through analysis, execution, monitoring, operation and phase-out. Considerable time is however spent on the planning function as this makes the execution of the other functions easier.

Champy [83] identifies the following activities as being relevant for the management tasks of the re-engineered manager, namely:

- Mobilising.
- Enabling.
- Defining.
- Communication.

This ties in with the propositions of Senge [58] and Ackoff [59]. These activities, although having the same words as the traditional approaches, have more encompassing meaning, e.g. interactive communication as opposed to hierarchical communication.

2.9 Leadership

"*The problem with many organisations and especially the ones that are failing, is that they tend to be over-managed and under-led. There is a predefined difference between management and leadership and both are important. Managers are people who do things right and leaders are people who do the right things.*"

Bennis [60]

This puts forward the view that draws a metaphor between managers and efficiency and leadership and effectiveness.

A wealth of literature exists that describes the various leadership models from contingency models to situational models. Some of these even date back to the 1930's. One of the most appropriate descriptions of leadership in the context of what is required in business today is

provided by Ball and Asbury[1] [61, pp184-207]. They describe leadership in terms of what they do as well as elaborate on the attributes of the outstanding leaders. These components are listed in Table 4.

Table 4 - The Behaviour and Attitudes of Leaders

Leadership Behaviour	Attributes of Leaders
• Leaders drive their organisations. • They inspect their environment. • They generate excitement. • Leaders get down to the coal face. • They blaze trails (entrepreneurial). • They make explicit and high demands. • Leaders have a strong vision. • They make meaning: power of language. • Leaders communicate. • They draw excellent people around them.	• Strong character. • Ambitious. • Bold attitude towards risk. • Disciplined. • Strong people orientation. • Committed almost to the point of obsession. • Consistent. • Expert in his/her field. • Intellectual as well as emotional.

The authors further indicate a 10 step approach to "inspired leadership". These are:

- Develop a powerful vision of the organisation that embodies an invincible business concept and which captures the imagination of the people in the organisation and makes meaning for them.
- Get into the driving seat, grip the steering wheel and put your foot down. It is the leader who sets the energy level and pace of the organisation.
- Get to know the coal-face, get down to it and inspect it.
- If your organisation does not excite you, bail out. Otherwise show your excitement to all around you. It is infectious. So is apathy.
- Demand the performance your people are capable of. The chances are that they are more capable than you give them credit for.
- Blaze the trail into new areas of opportunity.
- Make meaning for the people in your organisation.
- Communicate, communicate and communicate.
- Draw people around you. The power of even the most impressive person is dwarfed by the power of a team that "hums".
- Disregard the macho type who believes that feelings and attitudes do not matter. They are the bottom part of the iceberg. Understand them and engage the heart and "gut" as well as the head.

[1] This research was conducted in South Africa to establish the components of inspired leadership by the super performers.

2.10 Uncertainty and risk

"Certitude is not the test for certainty. We have been cocksure of many things that were not so."
Justice Oliver Wendell Holmes

Most authors [31,62,63,64] have differentiated risk and uncertainty as follows:

- **Risk** - when historical information (probabilities) does exist in order to describe the execution of future events which could result in a loss or gain in wealth, damage, injury or other consequences that deviate from the likely norm.
- **Uncertainty** - when this information is not available to describe the likelihood of future events.

Hertz and Thomas [64] extend the concept of risk beyond the lack of predictability of outcome. They include all elements of problem structure including the relevance of assumptions, the generation of strategic alternatives, the level of organisation information about the problem, the importance of consequences and the ability to achieve organisational goals.

If an undesirable action is certain, then this is not a risk. This is a problem.

2.11 Management of Risk

Various literature sources reviewed in this study described the importance of their analysis approach in managing risk. While sound analysis promotes the reliability of dynamic variables, it is only one component of the risk management task, This is implied by the definition of management provided earlier.

Frigenti and Kitching [62, p32] propose that:

"risk management is the systematic approach whereby the specific source (not the cause) of risk is identified and represented in order to minimise (project loss) or maximise (project gain) the impact on the achievement of the project's scope, organisation, time, cost and quality parameters."

This definition refers to the project management environment, but the same inferences can be drawn to the business change environment (this seems reasonable since most initiatives exist in project form as well). It may however be noted that this definition refers to the assessment activities and does not address the entire management task.

Charette [10,65,66] provides a comprehensive understanding of what the management of risk is and suggests an approach for the risk management process. The remainder of this section is based on this work.

2.11.1 Management of risk

Based on research conducted in the USA and Europe, two critical success factors exist for ensuring business performance. These are:

1. Minimising uncertainty
2. Maximising stability and predictability

Uncertainty exists in 3 general areas in the organisation, namely:

- **Operational information** - information needed to make decisions concerning the business. This involves from the operational level through to strategic.
- **Operational control** - relates to the degree of influence a business has over its own destiny due to internal or external interventions. The less operational control a company has, the more it can be influenced by others.
- **Operational time** - determines the turn-around time between internal or external stimulus and the business response.

Stability involves achieving alignment between actions and resources, while predictability involves the learning ability of the organisation and to direct this in adapting appropriately to change. Achieving the two critical success factors requires the understanding of the relationship between risk and opportunity. This is facilitated by Figure 18.

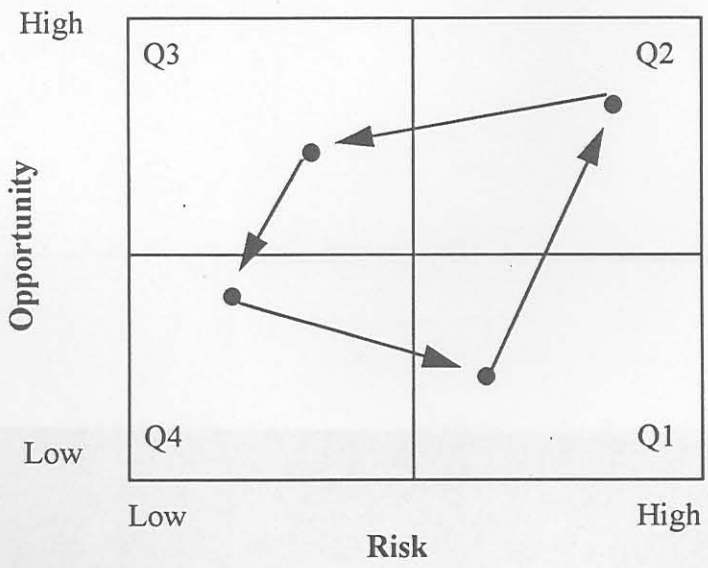


Figure 18 - Charette's Risk-Opportunity Combinations (Modified)

There is a continuous trade-off between risk and opportunity. New markets begin in quadrant 1 where risks are high and the opportunity low. A breakthrough in technology or process allows the move to quadrant 2 where high risks are accompanied by a high level of opportunities. As the market stabilises it moves to the cash cow (BCG matrix analogy) position (quadrant 3). As the market becomes more competitive it moves to a low opportunity as well as low risk situation. Being a cycle, the loop is recursive. It is important to note that risk precedes opportunity.

It follows that the business that can best minimise uncertainty is best positioned to manipulate this risk/opportunity cycle to their own advantage. Charette proposes the risk helix as shown in Figure 19 as a means of providing an understanding of the nature of the management of risk.

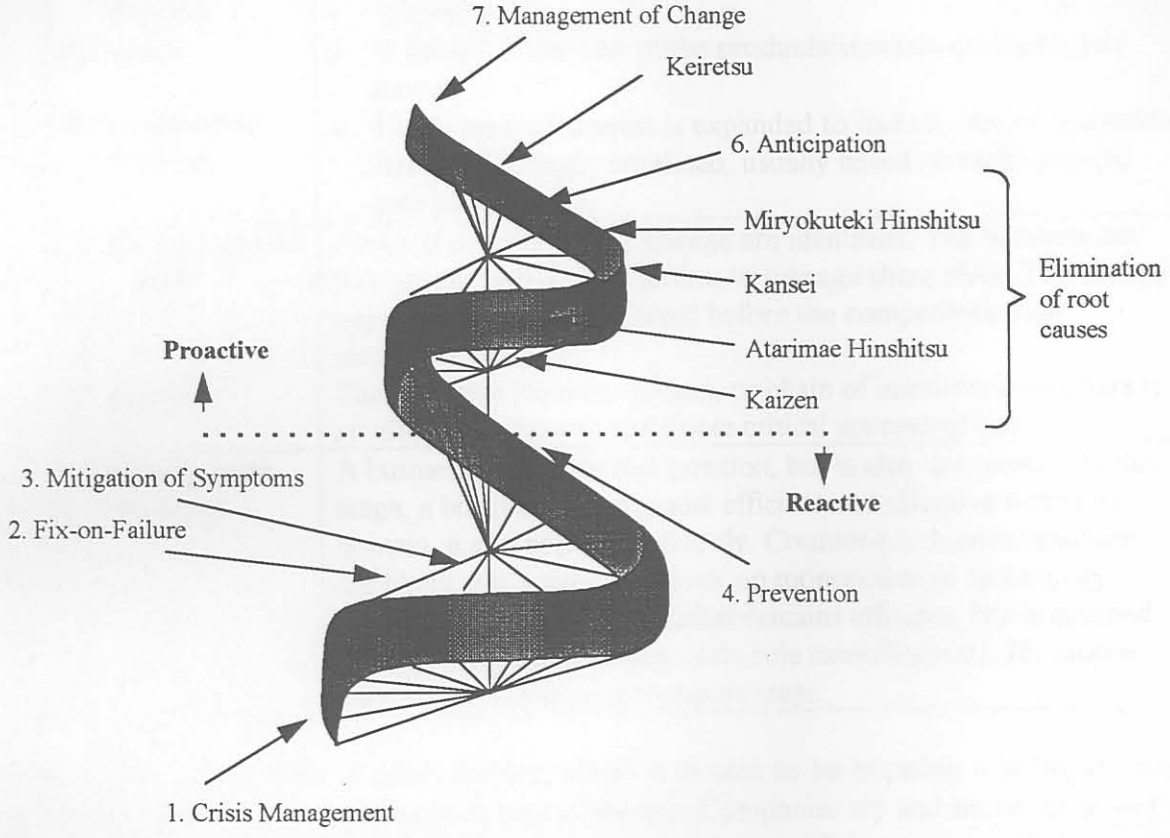


Figure 19 - Charette's Risk Helix

There are two different approaches to managing the risk/opportunity cycle (Figure 18). These approaches set the initial conditions that eventually govern the degree of both. These two approaches are reactive as opposed to proactive. Each of these approaches have stages which themselves rank in degrees as illustrated in Figure 19 (stages 1 to 4).

Table 5 describes each of these stages in terms of the effectiveness in the management of uncertainty in the business environment.

Table 5 - Description of Stages in the Risk Helix

Approach	Stage	Description
Reactive	1. Crisis management	Failure occurs faster than the organisation has the ability to deal with them. There is extreme uncertainty, instability and unpredictability. These companies are fighting for survival, being susceptible to competition.
	2. Fix-on-failure	It assumes that as each risk (or combination of risks) occurs, the resulting consequences can be repaired without significant impact. To operate here, planning must match reality. Most businesses today operate in this stage.
	3. Mitigation of symptoms	This is providing a contingency to cover the potential consequences of a risk's occurrence. This is feasible if the planning is within the projected limits of uncertainty. If this does not happen, then the fix-on-failure stage will become valid.
Transition	4. Prevention	This is typically the starting point of a business journey through the helix. Actions are taken to prevent the occurrence of the risk(s). In reality, risks will occur; the choice is either a reactive or proactive approach to the management thereof.
Proactive	5. Elimination of root causes a) Kaizen b) Atarimae hinshitsu c) Kansei d) Miryokuteki hinshitsu	BPR is one means of achieving this. Future variations are constrained by business processes that are (1) visible, (2) measurable and (3) repeatable. If these do not hold, then the business will slip into reactive mode. • Continuous process improvement. • The process' domain of interest is increased by addressing the "intangibles". • "5 senses". The user of the products/services are taken into account. • The domain of interest is expanded to include sets of processes that are seemingly unrelated, usually based on technological core competence.
	6. Anticipation of change a) Keiretsu	Areas of possible future change are identified. The business can then place itself into a position to manage these risks. This allows opportunities to be exploited before the competitors even perceive them. The Japanese Keiretsu system, or chain of interlinked suppliers is an effective means to anticipate critical sources of risk.
	7. Management of change	A business strives for this position, but is also dangerous. At this stage, a business is at its most efficient and effective within its domain, e.g. a perfect monopoly. Counter-productive reactions are likely, e.g. actions to break up monopolies or technology changes where the local market remains efficient, but is doomed to eventual extinction (e.g. slide rule manufacturer). Its success may also be blind to competitive traps.

The metaphor of the helix is taken further, where it is said to be spinning - indicating that much energy is required to move up or stay at the top. Companies try and move up or move their competitors down to a more favourable quadrant. In addition to competitors, other

factors like technologies, currency fluctuations, political impositions, etc. affect the behaviour of the helix as well. The shape of the helix is also dependent on the quadrant. In new markets, the helix is tall and thin, rotating very fast. In mature markets, the opposite is true.

2.11.2 The risk management process

Charette draws a distinction between the management of risk and the risk management process. He indicates that the management of risk implies:

"a systemic, holistic and/or multi-disciplinary approach to risk and its management, one which weaves elements of cost management, project management, security management, quality management, etc. into a unified whole."

The risk management process in contrast is however concerned with:

"a phased, systematic approach (possibly implemented through a unique tool or technique) to the analysis and control of risks occurring within a specific context."

In practical terms a manager may employ a risk management approach to a change action. To achieve this, one or more risk management processes may be employed. This could be interpreted as management of risk implying an organisation's philosophy while risk management implies method. The risk helix (Figure 19) pertains to philosophy.

The risk management process can be decomposed into two distinct areas, namely the risk analysis activities and the management activities. The literature generally uses the same approach in describing the components of each. Charette, however provides the relationship shown in Figure 20.

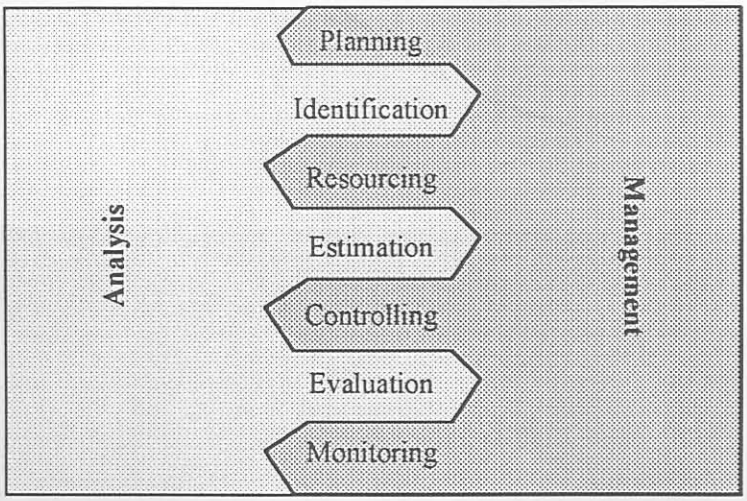


Figure 20 - Charette's Risk Analysis and Management Process

From Figure 20, it is clear that the risk management process is inextricably linked with the decision-making process. The nature of these components is summarised in Table 6.

Table 6 - Description of Risk Analysis and Management Components

Phase	Activity	Description
Analysis	1. Identification	Its goal is to find and describe all the risks that may exist. The correlating opportunities are also established. Top-down and bottom-up search techniques are employed.
	2. Estimation	Actions include estimating likelihood, consequences, timing, profiles, relationships, the value of the effort required to improve them and the prioritisation[1] [67] of these risks.
	3. Evaluation	This process means evaluation of the risks against a referent or level of acceptability, i.e. is the risk acceptable? Acceptability infers that it will not impact on current plans. If so, alternatives must be generated. This is an iterative process that may link back to identification. The critical element of this process is setting the level of risk acceptability.
Management of implementation	4. Planning	Once the analysis is complete, a decision is taken as to the appropriate course of action to be implemented. Whatever the action, this must be planned for.
	5. Resourcing	This is critical to the enactment of the aversion strategies. Highest priority enjoying attention first. Along with resource allocation, responsibilities and authorities are assigned.
	6. Controlling	Action is taken to ensure that the goals set earlier are indeed achieved. Communication is a vital component of this activity.
	7. Monitoring	This ties in with control. Risks are tracked against predetermined metrics or performance standards.

There are a host of factors that impact on a risk management process. Some of the most important aspects include:

- Decision processes are not always rational due to individual biases.
- Top down and bottom up approaches to analysis provide different views. The former typically focuses on resource allocation (capitalisation) while the latter on the nature of their utilisation (performance).
- Co-operation and buy-in from all concerned.
- A risk identified, evaluated and a contingency plan developed does not imply that the risk is no longer a reality[2].
- Errors that arise from poor or uninformed estimation of risks.
- Analysis tools must be used with understanding. They can derive precise numbers - but these may be contextually incorrect.
- The selection of the combination of risks based on types, number, severity and combination.
- The environment is constantly changing and hence the total risk profile changes as well.

[1] Bosman describes the prioritisation of the projects where risks are considered using fuzzy set theory [67].

[2] This is an important flawed perception typically induced by much literature. The incessant focus on the analysis components engenders a perception that a risk analysed is a risk managed.

Charette indicates that risk management if not properly practised is extremely dangerous. He provides the following guides to managing the risk management process:

- All organisations have some facets of risk all of the time. All in the organisation need to understand this.
- Concentrate on capabilities that exist, not good intentions.
- Use joint analysis to address a cross-section of risks (bottom-up and top-down approaches).
- Use a recursive approach.
- Use automated tools wisely. Tools can only help determine the answer, not the correct question.
- Call the risk management process, opportunity management. It sounds more positive which keeps it from looking like blame analysis.
- High level of communication.
- Develop a thick skin. Document assumptions and make the process for achieving these transparent.

2.11.3 The practice of managing risk

Charette puts forward that when managers are faced with decision-making, they require answers to the following 7 questions. These are:

- What are the risks involved, and are they higher or lower than in the past?
- Are the risks likely to increase or decrease in the future?
- What is the organisation currently doing to manage these risks?
- What is the schedule and expected results from alternative risk aversion measures?
- How will they know that these measures are being instituted?
- Who is responsible for these measures?
- How will communication of these risks take place internally as well as to the customer?

Companies that best manage risk, do not rely on individual experience. They have mechanisms aimed at providing reliable answers. These organisations possess 5 additional key characteristics, namely:

- They take a disciplined approach to decision-making.
- They hold a different perspective of risk.
- Management communicates a risk taking ethic to the organisation.
- They embrace a systemic view of risk.
- They perform continuous risk management.

In order for an organisation to move to the top of the risk helix [Figure 19], he proposes the following:

- Management of risk (MOR) must be addressed properly or the organisation will likely end up worse off.
- Starting this process involves time, discipline, money, accountability, attention to detail, a sense of timing, a number of false starts and some luck.

- The benefits of MOR must be determined and made transparent.
- Focus on the level of the process that is required and scale all details accordingly, while keeping the process simple.
- Align all procedures with the goal of improving decision-making.
- Use the fundamentals of the "seven questions" as the basis for decision-making.
- Allow time for the risk approach to become entrenched in the culture[1].
- Policies and guidelines around MOR must be established.
- Techniques should be aligned/consolidated where possible with the existing approaches.
- The level of unacceptable risk must be established.
- The MOR approach needs to be integrated with all other management initiatives.

The attitude of proactive organisations at this stage is one of adapting their perceptions and realising that decisions can be changed. Reactive organisations typically believe that decisions are cast in stone.

2.12 Business process redesign

Business process re-engineering (BPR) as it was coined by Hammer in the early 1990's [39] was propelled to the forefront of business improvement techniques. It purported a whole new way of doing business giving the so-called quantum leap that was increasingly sought after in a highly competitive world. A myriad of literature followed [5, 8, 9, 39, 54, 55, 57, 75, 78, 79, 80, 81, 82, 83, 84] and is still emanating from the "buzzword".

In summary, BPR is sold on the basis that an organisation which only continuously improves is actually falling behind in "real terms". These facts are made painfully clear by means of benchmarking, following which, statements are made alluding to the case for a quantum leap as shown in Figure 21[2].

[1] This requires a change in organisation behaviour. The way of addressing this is described later in this thesis.

[2] It is not just the BPR proponents who use this graph to sell their method. The "downsizers" use it as well. In this instance, a business case is made for significant cost-cutting in order to have cash for investment in new competitively focused areas. An example of this is McKinsey's Total Operational Performance (TOP) method. It can be noted that although the approach is cost cutting focused, it does use some process redesign technique where appropriate in the confines of the method.

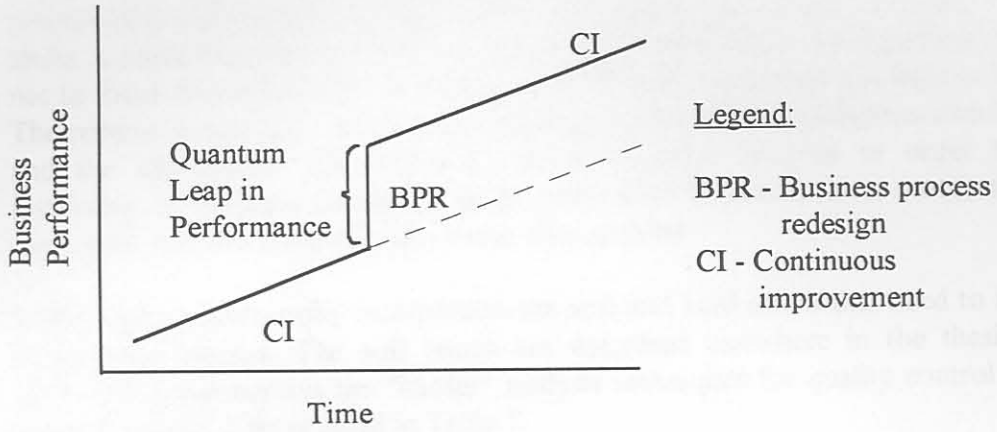


Figure 21 - Incremental versus Radical Business Performance Improvement

The focus of BPR is on getting businesses to focus on their processes and not to organise and behave functionally as in the past. Unfortunately in the process, business writers of the past like Weber, Fayol and Taylor [40] in particular were used as scape goats as they had purported functional and hierarchical thinking.

Much of the impetus for the BPR euphoria was given by the IT practitioners who generally purported that BPR was now possible due to advances in IT. Some industrial engineers may not agree entirely, but whether this is true or not was probably one of the reasons for many early BPR exercises being less than successful. Much hype was going into serious business restructuring by practitioners who were relatively inexperienced in (1) the domain of the business under consideration, (2) the method (BPR) being purported and (3) the necessary business skills and acumen.

In conclusion, BPR has made a significant contribution to economics and theory and will no doubt continue to do so.

2.13 Total quality management

The concept of quality has been moulded into the form of total quality management (TQM) as it is known today. Included in this list of contributions are Deming [68], Feigenbaum [69], Crosby [70], Ishikawa [29], Taguchi [71], Juran [72] and so on. Today, various accents on the concept of TQM exist. A useful definition is however provided by Watson [57, pp52-53]. He believes that TQM is about producing organisational change and creating value. He indicates that it is the combination of the following core components.

- *"A behavioural model for co-operation, which is based on teams functioning in a participative environment.*
- *The use of statistical tools, process analysis and management by fact to provide analysis of process elements.*
- *The focus on the customer as the driver of the business product and service requirements.*
- *The adoption of a closed-loop planning process that is consensus-based and empowering of teams because (a) it provides a participative framework that is based on the use of*

structured data analysis, internal business diagnoses and strategic benchmarking; (b) it negotiates the setting of enterprise objectives with the allocation of resources to achieve personal objectives; (c) it links organisational performance and competence development with individual performance and competence development through a closed-loop performance appraisal and recognition system.

- *The use of project management methods to deploy change initiatives throughout the organisation."*

This definition comes a long way from the early approaches to quality and TQC in the 1960's and 1970's. From this definition it is clear that TQM is a business improvement philosophy which aims at permeating the behaviour of an organisation while supplementing this behaviour with various tools and techniques. It is interesting to note that while the early proponents of BPR have gone to great lengths to clearly differentiate the approaches of BPR and TQM, Watson views

"re-engineering as an extension of project management to direct major strategic change initiatives that have been employed within the context of the robust TQM system."

It is assumed that Watson's viewpoint is that BPR is a technique which resides within the TQM philosophy. What makes the understanding of the relationship "fuzzy" is that practitioners and academics tend to label initiatives and then try to reconcile all and sundry under a particular banner. When addressing problems within an organisation it is important not to focus on a philosophy or technique and then try and relate this back to the organisation. The reverse should hold, namely the strategic needs of the organisation should be understood and the appropriate philosophy(ies) or technique(s) selected in order to facilitate the instituting of business change. It is the generation of wealth on a sustainable basis that is important, not which technique is better than another.

TQM, being a philosophy incorporates the soft and hard issues that need to be conducted for operational success. The soft issues are described elsewhere in the thesis. Bechtell [73, pp321-330] summarises the "harder" analysis techniques for quality control in an "analytical quality toolkit". This is listed in Table 7.

Table 7 - Analytical Quality Control Toolkit

Question	Tool
Where are the data?	Checksheet
With what frequency are our problems occurring?	Histogram
What has happened over time?	Line graph
Is the process in control?	Control chart
Which problems are most prevalent?	Pareto chart
What are the contributing factors?	Ishikawa diagram
Is there a correlation between factors over time?	Scatter diagram
What does the process look like?	Process flow diagram

2.14 Learning

"To practice a discipline is to be a lifelong learner. You never arrive; you spend your life mastering disciplines. You can never say "we are a learning organisation" and more than you can say "I am an enlightened person". The more you learn, the more acutely aware you become of your ignorance. Thus a corporation cannot be excellent in the sense of having arrived at a permanent excellence; it is always in the state of practising the disciplines of learning, or becoming better or worse."

Senge [58, p11]

Learning in literature and practice today is becoming a very important feature in the day to day activities of an organisation. Learning helps the organisation to improve, it allows synergy to take place and it facilitates not making mistakes from experience as well as the cognitive insights that it stimulates. Business today can no longer function in hierarchy mode where management are omnipotent and employees the mindless workers. The potential within the organisation needs to be harnessed from all people and applied in a creative, yet focused manner.

Senge [58], one of the foremost leaders in organisational learning proposes the exploitation of 5 disciplines in order to strive towards becoming the learning organisation. These are:

- **Systems thinking** - Systems thinking, the fifth discipline, is a conceptual framework, a body of knowledge and tools to make the patterns clearer between the interaction of all system components.
- **Personal mastering** - The discipline of continually clarifying and deepening personal vision, of focusing energies, of developing patience and seeing reality objectively.
- **Mental models**[1] - These are deeply ingrained assumptions, generalisations or even pictures or images that influence how we understand the world and how we take action.
- **Building a shared vision** - A genuine vision (as opposed to the all too familiar "vision statement") where people excel and learn, not because they are told to, but because they want to.
- **Team learning** - This is initiated via dialogue, vital because teams, not individuals are the fundamental learning units in an organisation. Without teams, the organisations cannot learn.

He [58, pp373-377] summaries the practices, principles and essences into Table 8.

[1] Compare with Barker's "paradigms".

Table 8 - Practices, Principles and Essences of the Learning Organisation

Discipline	Practices	Principles	Essences
Systems thinking	• System archetypes[1]. • Simulation.	• Structure influences behaviour. • Policy resistance. • Leverage.	• Holism. • Interconnectedness.
Personal mastery	• Clarifying personal vision. • Maintaining creative tension. • Making choices.	• Vision. • Creative vs. emotional tension. • Subconscious.	• Being. • Generativeness. • Connectedness.
Mental models	• Distinguishing data from abstractions based on data. • Testing assumptions. • "Left-hand" column.	• Exposed theory vs. theory in use. • Ladder of influence. • Balanced inquiring and advocacy.	• Love of truth. • Openness.
Building a shared vision	• Visioning process. • Acknowledging current reality	• Shared vision as "hologram". • Commitment vs. compliance.	• Commonality of purpose. • Partnership.
Team learning	• Suspending assumptions. • Acting as colleagues. • Surfacing own defensiveness. • "Practising"	• "Dia logos". • Integrate dialogues and discussion. • Defensive routines.	• Collective intelligence. • Alignment.

Brown et al [90, p217-227] provide the model shown in Table 9 to create a learning organisation.

Table 9 - Creating the Learning Organisation on 3 Fronts

Organisational Strategies	Leadership Strategies	Team Strategies
1. Create learning infrastructures	1. Champion a shared vision	1. Practice the art of dialogue
2. Promote experimentation	2. Manage confusion and tension	2. Develop the habit of reflection
3. Empower employees	3. Model learning	3. Embrace change

[1] System archetypes are generic structures, taken from the system dynamics field, are based on the principle that certain problems of structure recur again and again. The small number of these suggest that not all management problems are unique.

2.15 Qualitative and quantitative methods

There are two general categories of techniques used to assist in identifying, analysing and facilitating decision-making. These are either quantitative or qualitative methods. Quantitative methods deal with situations where data exists either in numerical format or can be translated to numerical format for processing by mathematical means. Qualitative methods on the other hand deal with situations where descriptive means are used on either numeric or non-numeric data.

Risk and uncertainty can be modelled using either qualitative or quantitative means, but in many instances risk is modelled via quantitative means due to the nature of information available and techniques developed. On the other hand uncertainty lends itself to modelling by qualitative means primarily due to the lack of historical information, and techniques such as Delphi provide more meaningful analysis.

The following definitions are used later in the text:

- Stochastic - contains one or more random variables
- Deterministic - contains no random variables
- Continuous - uninterrupted in time or sequence
- Discrete - Discontinuous, individually distinct

- Discrete-time stochastic process is a process where the relationship between random (distribution dependent) variables can be viewed at discrete intervals.
- Continuous-time stochastic process is a process where the random variables can be viewed at any particular point in time, not at fixed intervals.

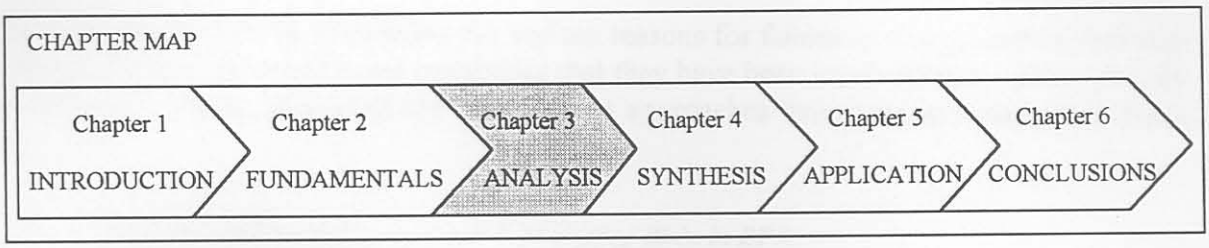
2.16 Chapter conclusion

This chapter has provided the concepts which are fundamental not only to the analysis phase, but to the study in general. Some concepts were only listed, while others where elaborated on in more detail. The rationale is that some level of knowledge is assumed and therefore only a limited range requires elaboration.

3. Analysis

3.1 Chapter context

Chapter three describes the analysis of the material available that can be directly related to business change risk, as well as the market research undertaken to form the synthesis described in the next chapter.



The Concise Oxford Dictionary [74] defines analysis as:

Resolution into simpler elements by analysing (opp. synthesis); statement of result of this.

The purpose of this chapter is to provide an analysis of the current literature, put this into a set of propositions and then to test this in the local market by means of a market research. The inferences of these two areas of research are highlighted. This analysis forms the building blocks for the synthesis of the theory in the following chapter.

3.2 Literature study: risk management of business change

The literature research is based on the five categories of business change methods described in paragraph 2.7. While an attempt was made to cover all relevant literature, the list is not exhaustive. A cross-section of the risks and management approaches as described in the literature has been formed. The major complementary thrusts have been analysed, used as being representative of the body of initiatives that are receiving most attention in literature at present. These are:

- BPR.
- Strategic alliances.
- TQM.
- Culture transformation.
- Business transformation.

While the first three focus primarily on specific groups of change types, the last two address business change issues, regardless of the change type. Culture transformation focuses primarily on the human dynamics within the organisation, while business transformation takes a pragmatic view on implementation of the change initiative. It aligns the requirements of the "hard" and "soft" sides of business change.

Some approaches have intentionally been left out. This is because they are either a sub-set of the approaches listed above, or because they dovetail so closely with various of the above approaches that their issues (risks and management thereof) are addressed accordingly. Some

of them are techniques which are instrumental in the process of the above methods. These approaches include:

- Benchmarking.
- Value engineering.
- ABC.
- ERP.
- Technology management.
- Rightsizing.
- TOC.
- JIT.
- etc.

3.2.1 Business process re-engineering

When Hammer [39] and Davenport [5] touted the concept of BPR in the early 1990s it was hailed as the panacea to dramatically bring about organisation's abilities to compete successfully in the 1990s. The researcher was in presentations where the light dawned on executives faces at the logical argument of receiving quantum leap improvement. Unfortunately as described earlier, many reasons resulted in achieving average results to failures in many respects. The father of the term "business process re-engineering", Hammer, admitted that between 50% and 70% of BPR exercises are probably unsuccessful [75].

This section describes the reasons stated in the literature for the so-called failures from a range of relevant authors.

(a) Hammer and Stanton

Hammer and Stanton [8,9] describe the top ten reasons for failure in re-engineering that they have experienced from the many companies that they have been involved with - either directly or indirectly. These, as well as the management approaches have been summarised in Table 10.

Table 10 - Hammer and Stanton's Approach to Managing Risks in BPR

Risk	Description	Techniques for Managing Risks
Don't re-engineer, but say you are	Efforts are called re-engineering because the name invites interpretation. They may be incremental quality improvement, rationalisation or automation.	• Make sure that re-engineering is understood before practising it. • Make sure re-engineering is executed and not anything else.
Don't focus on processes	Trying to apply re-engineering where it does not fit. Processes are re-engineered, not a function or organisation.	• Before re-engineering the process, they must be identified and aligned with the aims of re-engineering.
Spend much time	Too much time is spent on	• Understand, do not analyse.

Risk	Description	Techniques for Managing Risks
on analysing the current situation	analysing existing processes. Understanding is confused with full-scale analysis.	• Use the time-box approach to limit time. • Limit the length of descriptions.
Proceed without strong leadership	Re-engineering is top-down. Holistic perspective is needed. Resistance must be pre-empted. These cannot be achieved without strong leadership from the top.	• Begin and end the exercise with strong, committed, executive leadership. • Resistance must be pre-empted, not forced.
Be timid in redesign	The organisation lacks the ability to develop sufficiently imaginative ideas.	• Innovative process design and related skills must be taught. • Leaders must encourage people to pursue stretch goals and think out of the box. All new ideas should be considered. De Bono [76] and Neethling [77] recommend techniques in this regard.
Go directly from conceptual design to implementation	It is impossible to invent a new process design that will work effectively and achieve the performance breakthroughs without some trial and error.	• Before implementing an envisioned process in the "real world", create a laboratory to test the idea.[1] • Iterate until satisfactory results can be achieved.
Re-engineer slowly	Losing momentum of the re-engineering drive if the bulk of the exercise lasts longer than a year.	• Plans must be derived to show results in the short term - within 12 months. • Prevent scope creep.
Place some aspects of the business off-limits	All processes and functions integrate. Focusing on some and not others may result in the new processes not being "empowered" to operate.	• Processes must not be re-engineered in isolation. • Do not set limits to preserve a piece of the old system.
Adopt a conventional implementation style	A style of implementation not suited to process re-engineering is adopted.	• Use the correct approach to re-engineering implementation: fast, improvisational and iterative.
Ignore the concerns of people.	The underlying concerns of how people should behave in the future and how they will be rewarded are not addressed sufficiently.	• The personal needs of individuals must be considered. The new business must offer some benefits to the people in the "life after" re-engineering.

[1] Marcam Solutions have an implementation approach called AIM where BPR and ERP system implementation are integrated. Once the conference room pilot (CRP), (where the designed are developed and integrated) has been executed, a critical test phase called the business pilot (BP) is undertaken. A rigorous "real-world" situation is tested by experienced individuals. SAP has an approach which is different, but the objectives are similar.

Hammer indicates the need to address a few further risks however [8], namely:

- Communication must be clear, concise and frequent.
- The rigours of BPR are underestimated.
- Groups of people are not fused into cohesive, focused teams.

These risks along with the methods used to manage them are similar to those described by Kotter [7].

(b) Clemens

Clemens proposes that re-engineering remains risky whether too little effort or even if enough effort is put in [78]. He describes 5 risks typical of large scale system implementation listed below:

- **Financial Risk** - The risk that the project cannot be brought in on time and on budget. The justification for system investment may be jeopardised.
- **Technical Risk** - The capabilities of the technical solution are incapable of providing the desired solution.
- **Project Risk** - The project will not be implemented as planned due to issues impacting on the project.
- **Functionality Risk** - Completed systems do not have the required functionality.
- **Political Risk** - Systems are not completed due to organisational change, resistance or loss of commitment to the project.

This was the typical risk profile of MIS implementation during the 1970s and 1980s, with the relative weights of the risks listed accordingly. He believes however that the importance of these risks have reversed in weight, with political and functional risk being the most important in contemporary MIS implementation. A change in mindset and management techniques has to be adopted by MIS implementers. He adds that senior personnel need to achieve this to implement re-engineering successfully.

Clemens believes that sound business revisioning is pertinent to managing the risks relating to functionality. In order to manage this appropriately, he advocates the use of scenario planning[1].

[1] Analysis of this technique is provided later.

(c) Bently

Bently while not identifying the risks of BPR, provides a list of 6 factors of human and organisational development that need to be put in place in order for the BPR exercise to be successful [79]. These are listed as follows:

- **Core activities and core people** - The first stage must be to focus on the core activities and people and then to examine how they can be encouraged and/or released to optimise their performance.
- **Creativity and productivity** - Creativity of the core people must be released. working with empowerment, productivity can be increased significantly.
- **Diversity and innovation** - Participation and individuality must be unleashed, allowing talents to develop into innovation.
- **Focus on the ordinary** - Creativity and innovation focused on ordinary business aspects will turn them into extraordinary and competitive advantage.
- **Attend to the obvious** - Often the obvious is overlooked. This should also be focused on to test the fundamentals.
- **Spotlight fascination** - There is always a fascinating element of the organisation, e.g. products, processes, etc. This fascination or uniqueness should be highlighted as a theme.

(d) Hall et al

Hall et al [80] provide general areas that require attention when undertaking a re-engineering exercise. These are:

- Ignore global effects - A holistic approach is required to bring about improvements to the business entity. Individual processes should not be tackled in isolation.
- Lack of commitment - Absolute commitment must be ensured from top management.
- Lack of emphasis on customer needs - The needs of the customer should be the focus of the exercise or long term profitability will suffer.

(e) Fortnum and Wiebe

Fortnum and Wiebe [81] (KPMG) define three levels of BPR, namely functional improvement, process redesign and business rethinking. They add that the higher the level, the higher the risk. They list the following important risk management factors:

- Management commitment and leadership to manage the human aspects.
- Use of experienced external consultants to assist in guiding the organisations past the pitfalls.
- A phased approach is used where risks are identified at each and appropriate management actions initiated.

(f) Carr and Johansson

Carr and Johansson [82] undertook an investigation where 47 companies were researched in order to assess the best practices in BPR. The results of the research along with their experiences have been listed in Table 11.

Table 11 - Carr and Johansson's Risks and Best Practices for Managing BPR Initiatives

List of Risks	List of "Best Practices"
• Undertaking efforts with limited goals. • Less than full commitment. • Poorly defined processes. • Lack of strategic focus. • Inability to meet high expectations in BPR. • Failure to appreciate risk factors. • Insufficient change management attention. • Poor communication. • Attempt to re-engineer too many processes. • Not setting performance measures.	• Focus of core business processes, linked to the customer. • Radical change in thinking and working (behaviour). • dramatic improvement (performance critical to competitive advantage). • Recognise and articulate compelling need to change. • Executive level support. • High level of communication. • Create top-notch teams. • Use a structured framework. • Use consultants effectively. • Listen to the voice of the customer. • Select the processes for re-engineering. • Maintain focus: hold scope. • Maintain teams as a key vehicle for change. • Come to an understanding of the current processes quickly. • Choose and use the right metrics. • Understand the risks and develop the right contingency plans. • Have plans for continuous improvement. • Leadership is the driving force for change. • Growing use of modelling and simulation tools.

(g) Champy

Champy addresses a different aspect of managing risks in the re-engineering environment [83]. He believes that many of the failures of BPR can be laid at the feet of management itself. He indicates that an integral part of the re-engineering of the business requires the re-engineering of management itself. The reason for this is that the traditional management model (nurtured by Sloan, Weber, Fayol, etc.) is better suited to the business environment of more than 10 years ago where business was more or less static.

(h) Petrozzo and Stepper

Petrozzo and Stepper [84] have provided a method for successful engineering. The identification of risks and management techniques are similar in nature to those described earlier. They do however venture an additional risk of making assumptions using insufficient information that needs to be managed.

(i) Martin

Martin [55, pp474-475] describes the characteristics of a re-engineered enterprise as well as the barriers to achieving these characteristics. These have been summarised in Table 12.

Table 12 - Martin's Characteristics and Barriers to Achieving a "Re-engineered Enterprise"

Characteristics of the Re-engineered Enterprise	**Barriers to Achieving these Characteristics**
Empowered employees excited about reinvented value streams.	Management is cynical about empowerment. Functional managers resist cross-functional teams.
Change from a bureaucratic hierarchy to flexible cross-functional teams.	Top management wants a hierarchical system because it provides them with power.
Reward system that helps motivate value stream teams.	Top management will not change their top-heavy reward system.
New relationships with trading partners in which both sides benefit.	An attitude of "we do not trust vendors" makes reinvention of alliances difficult.
IT systems which get the right information at the right time to cross-functional value-stream teams.	Managers with their own fragmented databases resist data sharing.
A culture sharply focused on delighting customers.	The corporate culture blocks cultural changes in diverse ways.
Fast, fluid, flexible, knowledge infrastructure which supports reinvented value streams.	Mainframe computers systems are difficult to change. IT resents change.

The author proposes that one or more effective ways of determining the risks of BPR is by means of the Ishikawa diagram (described earlier). Once the risks have been identified, these can be limited to Pareto diagrams to evaluate the relative dangers of the risks. This can be facilitated by means of existing PC software tools. He provides 3 generic Ishikawa diagrams identifying the risks linked to the 3 re-engineering phases of:

- Phase I - Design
- Phase II - Implementation
- Phase III - Starting Operations

These are shown in Figure 22, Figure 23 and Figure 24 respectively.

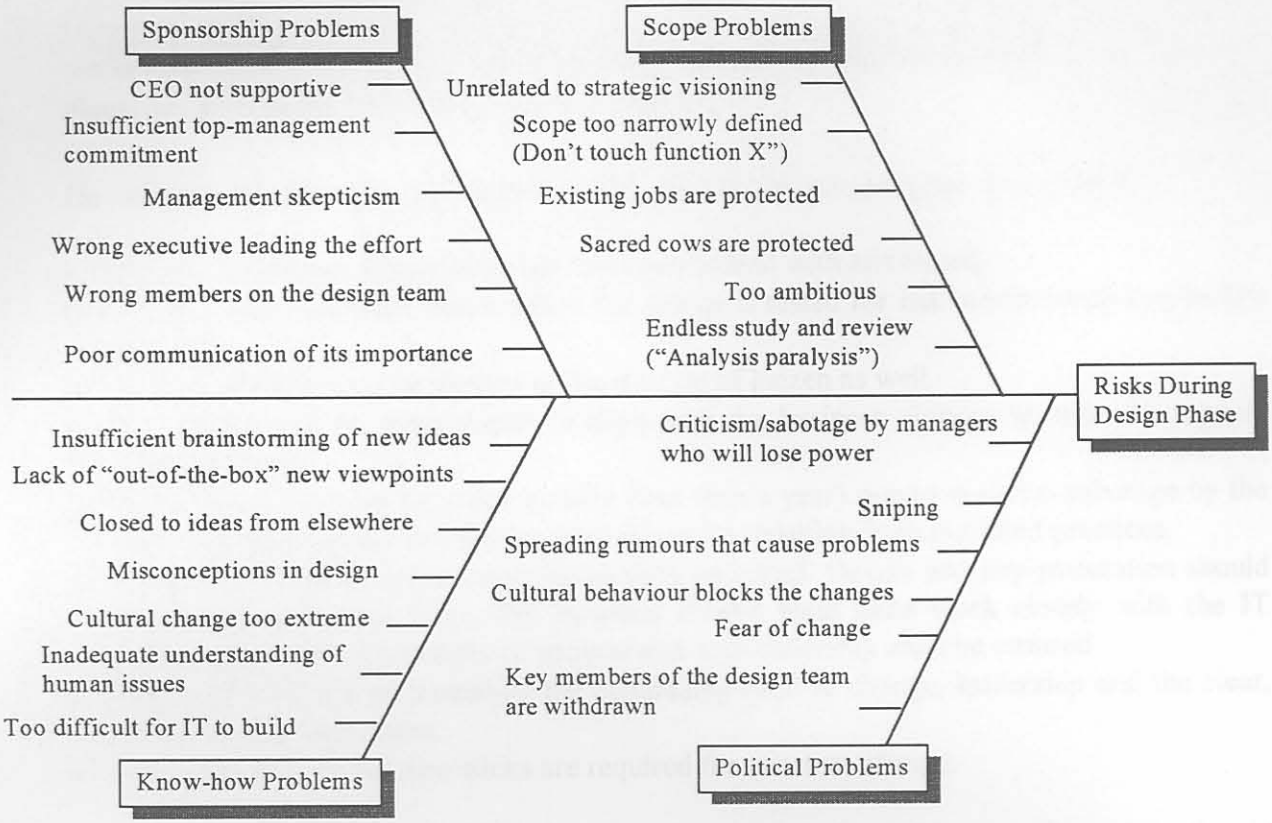


Figure 22 - Risks during BPR Design Phase

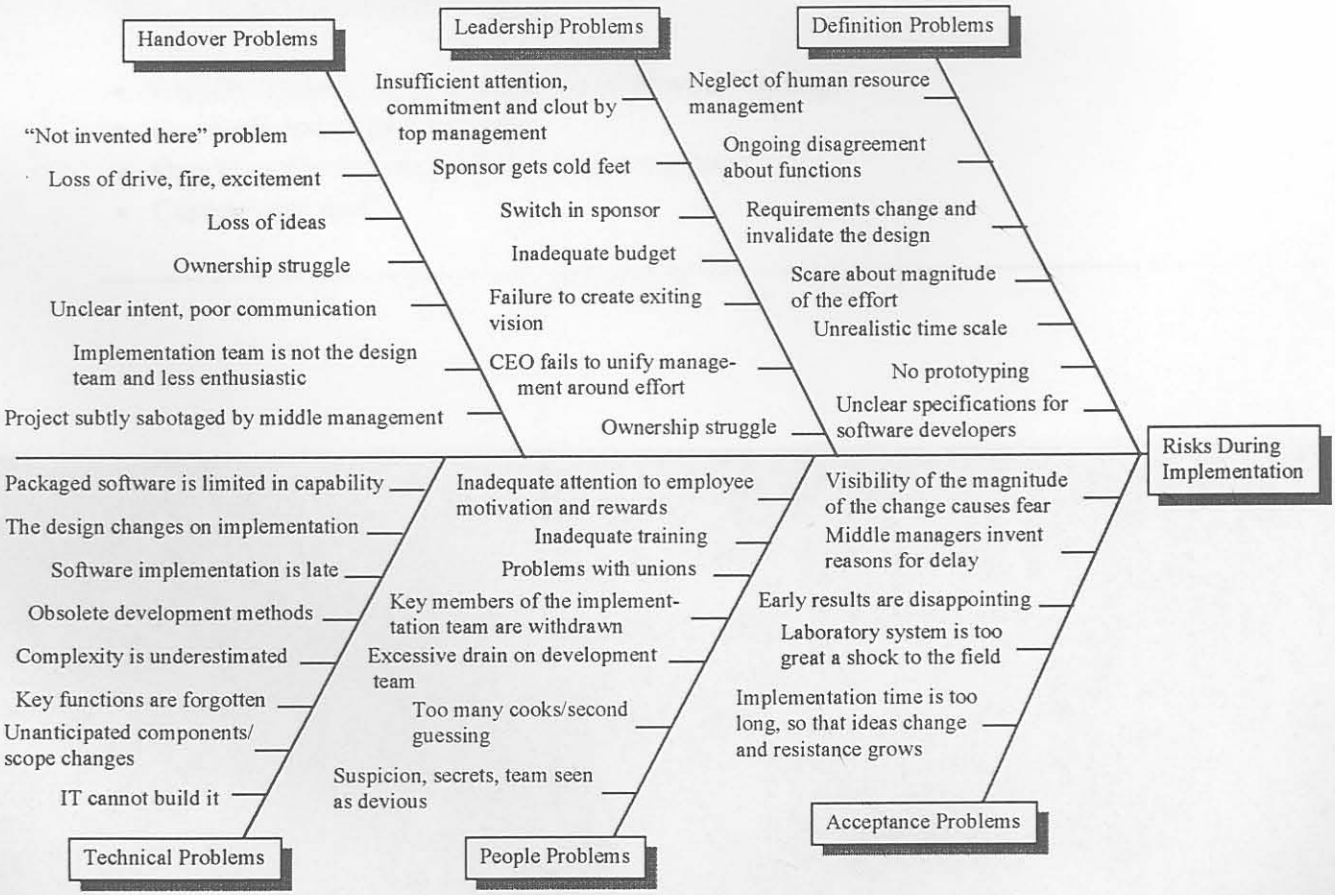


Figure 23 - Risks during BPR Implementation Phase

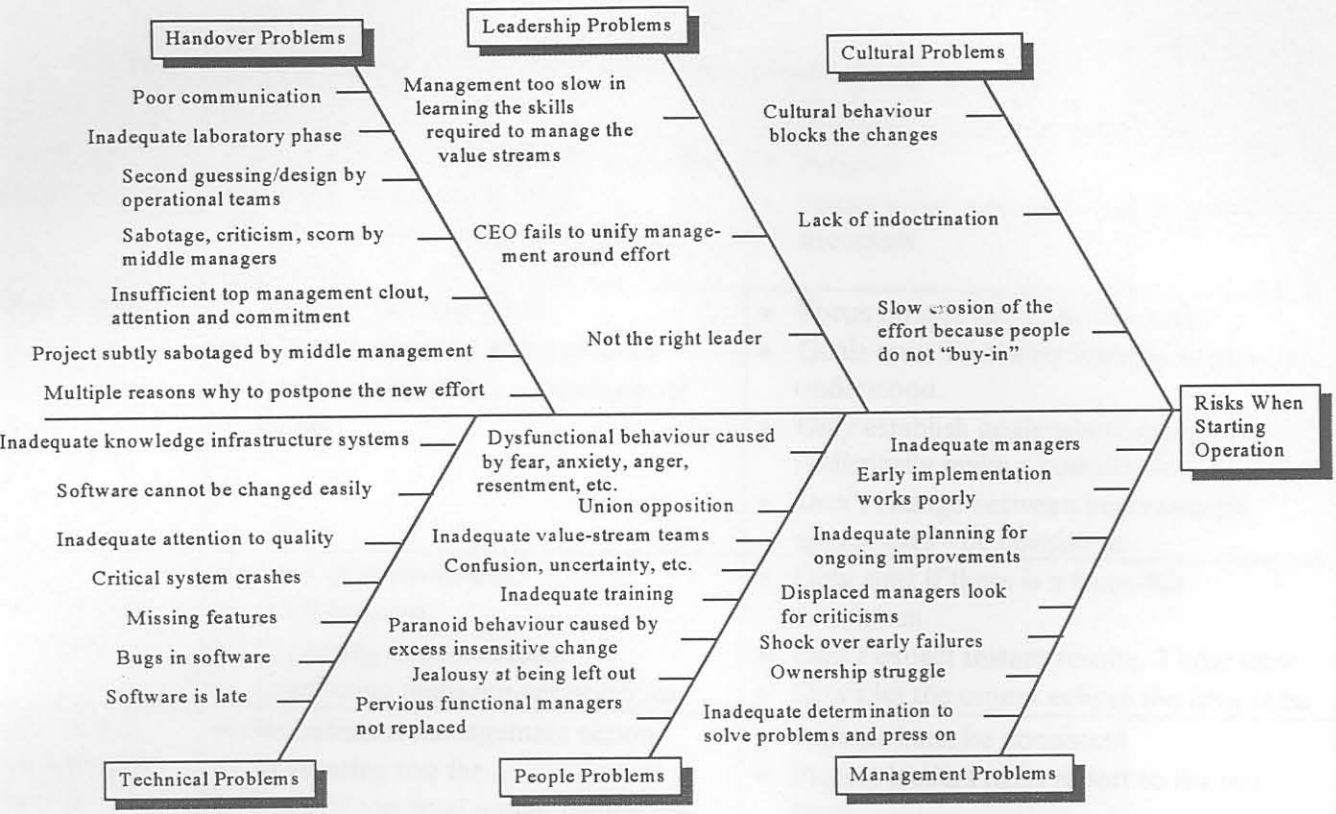


Figure 24 - Risks during BPR Operation Start-up Phase

He indicates the following techniques/success criteria for managing the risks in BPR:

- Use of a laboratory where ideas can be experimented with and tested.
- Use of a pilot operation phase where the design is tested for real-world conditions before going live.
- Start-up of BPR must be viewed as the start up of kaizen as well.
- IT systems must be redeveloped to align with the business changes in order to support these effectively.
- The BPR needs to be instituted quickly (less than a year) due to eventual sabotage by the non-committed people and the business dynamics resulting from outdated practices.
- Hand-overs between teams must be carefully executed. Design and implementation should be done by the same team. The business change team must work closely with the IT development team. Continuity of sponsorship and leadership must be ensured.
- Fears and RTC are addressed by the compelling need to change, leadership and the clear, relentless communication.
- Use of rewards rather than sticks are required for constant change.

He further indicates that the psychological comforts are facilitated in an environment of rapid change by means of the following:

- Careful coaching with attention to employees' feelings.
- Good education and training.
- Opportunities for practice with support groups.
- Carrots, not sticks.

- No punishment.
- Encouragement to overcome the shame associated with making errors.
- Encouragement of experimentation.
- Rewards for innovation.
- Esprit de corp.
- Clear team goals.
- Constant demonstration from management that innovation is important.
- A fully supportive environment.
- Full communication from management about business direction and reasons for actions.

3.2.2 Transforming company culture

Drennan [52] describes the inherent risks involved in implementing a change in culture. These risks, along with his recommendations for managing these are summarised in Table 13.

Table 13 - Drennan's Approach to Managing Risks in Transforming Company Culture

Risk	Description	Techniques for Managing Risks
Quick fix answers	The temptation of looking for quick-fix answers in the light that the transformation of corporate culture takes time.	• Patience • Foster early champions and publicise the successes.
Goal setting	• Setting too many goals. • Not actionable by all employees. • Lack of consistency - moving goal posts.	• Focus on one key goal, 3 at most. • Goals must be clearly communicated and understood. • Only establish goals where everyone can realistically make a contribution. • Don't change between improvement approaches - be consistent.
Top management problems	• Lack of commitment. • No follow-up. • Expecting instant results. • Conflicting management priorities.	• Only start if there is a heart-felt conviction. • Don't expect instant results, 3 year view. • Don't let the urgent eclipse the long term.
Lack of top management control	• Inconsistent management action. • Delegating too far. • Lack of top level power behind the programme.	• Actions must be consistent. • Project leaders must report to the top team. • A programme manager must have top management authority.
Middle management resistance	Middle management feel threatened by the change and adopt actions aimed at undermining the initiative.	Spell out the role of middle management and get then actively involved in the change process.
Employee resistance	Resistance stemming from the insecurity of the future.	• Address employees concerns directly. • Start with the more willing employees and build on early successes.
No change in structures	The old structures and mechanisms are not aligned with the new requirements - slip back into old behaviour patterns.	Consciously introduce structure shifts, i.e. changes in organisation, procedures, documentation, measures, etc.

Risk	Description	Techniques for Managing Risks
Training problems	• Skimping. • Poor planning. • No follow-up.	• Invest in training for long-term gains. • Plan systematically. • Follow up on training with post event action steps.
Company size	The older and larger the company, the more difficult to institute change.	• Have a clear goal. • Use common language. • Set challenges. • Transfer ownership. • Measure constantly. • Follow-up. • Assume wave of successes over the years. • Communicate constantly.
Lack of persistence	Not having perseverance through with the initiative due to internal or external influences.	Use vision and persistence.

Scott-Morgan [51] indicates that the largest risk in changing organisational behaviour lies in the misalignment between the written rules and the unwritten rules of the organisation. He proposes that behaviour is directly coupled to the methods required to achieve the perceived measures. The risks and techniques are described in more detail later.

3.2.3 Business transformation

This section evaluates the risks and management techniques purported in the literature to deal with business transformation in general.

(a) Kotter

Kotter [7, pp59-60] believes that there a two general lessons to be learned from the failures businesses have experienced in the past decade. He writes:

"The most general lesson to be learned from the more successful cases is that the change process goes through a series of phases that, in total, usually require a considerable length of time. Skipping steps creates the illusion of speed and never produces a satisfying result. A second very general lesson is that critical mistakes in any of the phases can have devastating impact, slowing momentum and negating hard-won gains."

He has summarised 8 general risks that need to be managed. These are shown in Table 14.

Table 14 - Kotter's Approach to Managing the Risks of Transformation Efforts

Risk	Description	Techniques for Managing Risks
No sense of urgency	No great sense of urgency established due to (1) under-estimation of effort needed to drive people out comfort zones (2) executives are too concerned about the down-sides (3) Too many managers are not leaders.	Establish a sense of urgency: • Examine market and competitive realities. • Identify crises, potential crises and opportunities. • Indicate that the status quo is worse than the future. • New leaders to lead whenever the change is to be enacted.
No powerful guiding coalition	The risk of not having a team with critical mass and enough weight in the organisation to make things happen.	Form a powerful Guiding Coalition: • Assemble a group with enough power to lead change. • Encourage the group to work together as a team. • Ensure management commitment
Lacking a vision	Not having a vision to drive action towards.	Create a vision: • Create a vision to help direct the change effort. • Develop strategies to achieve the vision.
Under-communicating the vision	Risk that cynicism or confusion creeps in due to the lack of information. Use of standard old communication approaches.	Communicate the vision: • Use every vehicle possible to communicate the new vision and strategies. • Teach new behaviours by example. • Institute frequent Q&A sessions.
Not removing obstacles to the new vision	Often people want to make the vision materialise. Barriers like their own personality, organisational structures, job descriptions, etc. can stand in the way.	Empower others to act on the vision: • Remove obstacles to change. • Change systems or structures that undermine the vision. • Encourage risk taking and non-traditional ideas, activities and actions.
Not systematically planning for and creating short-term wins	Transforming takes time, and a renewal initiative risks losing momentum if there are no short-term goals to meet and celebrate.	Planning for and creating short term wins: • Plan for visible performance improvements. • Create those improvements. • Recognise and reward involvement.
Declaring victory too soon	Celebrating a win is good for morale, declaring the war won is catastrophic. Until changes sink deeply into a company's culture, new approaches are fragile and subject to regression.	Consolidate improvements and produce more change: • Change systems, structures and policies that don't fit into the vision. • Hire, promote, develop employees who can implement the vision. • Reinvigorate the process with new projects, themes and change agents.
Not anchoring changes in the	Until new behaviours are rooted in social norms and shared	Institutionalise new approaches: • Articulate the connections between new

Risk	Description	Techniques for Managing Risks
corporation's culture.	values, they are subject to degradation as soon as the pressure for change is removed.	behaviours and corporate success. • Develop the means to ensure leadership development and succession.

The techniques to managing the risks provide the basis for his 8 step approach to transforming an organisation regardless of the management improvement initiative under consideration.

(b) Martin

Martin [55, pp487-489] puts forward that the different change types have different risk profiles. These have been consolidated into Table 15.

Table 15 - Risk Profiles of the 5 Change Types

Change Type	Risk Profile
Kaizen	Kaizen/TQM can be accomplished with little change to the organisation structure. A major change in culture and reward system is however required. Successful organisations focus primarily on bringing about a cultural change.
Procedural design	This approach avoids pervasive structural and cultural change. This in itself is an approach chosen when the risk of a BPR upheaval are too high. The change initiative is limited to a particular area of the enterprise.
Value-stream design	This involves a radical change in both structure and culture. It deliberately eliminates sacred cows. The team tends to be isolated, with radical thoughts, sometimes even for the sponsor. The design needs to be piloted in a laboratory and then eased into the organisation. The teams require significant cultural transition to support themselves.
Enterprise design	When the organisation faces changing its raison d'être a daunting cultural change is needed. The structured cultural transition is a huge task. Companies successful with these transitions tend to have competencies in these areas to derive competitive advantage. Building a new part of an organisation at a new site is often more desirable than attempting to change a strongly embedded resistive change.
Strategic vision	The cultural issues involve top management itself. The changes often go against their beliefs and external consultants are required. The change efforts at this level typically reverberate throughout the remainder of the organisation. Ideally the purpose is to produce an emerging effect that transforms culture from the top down.

The author summarises this relationship in Figure 25.

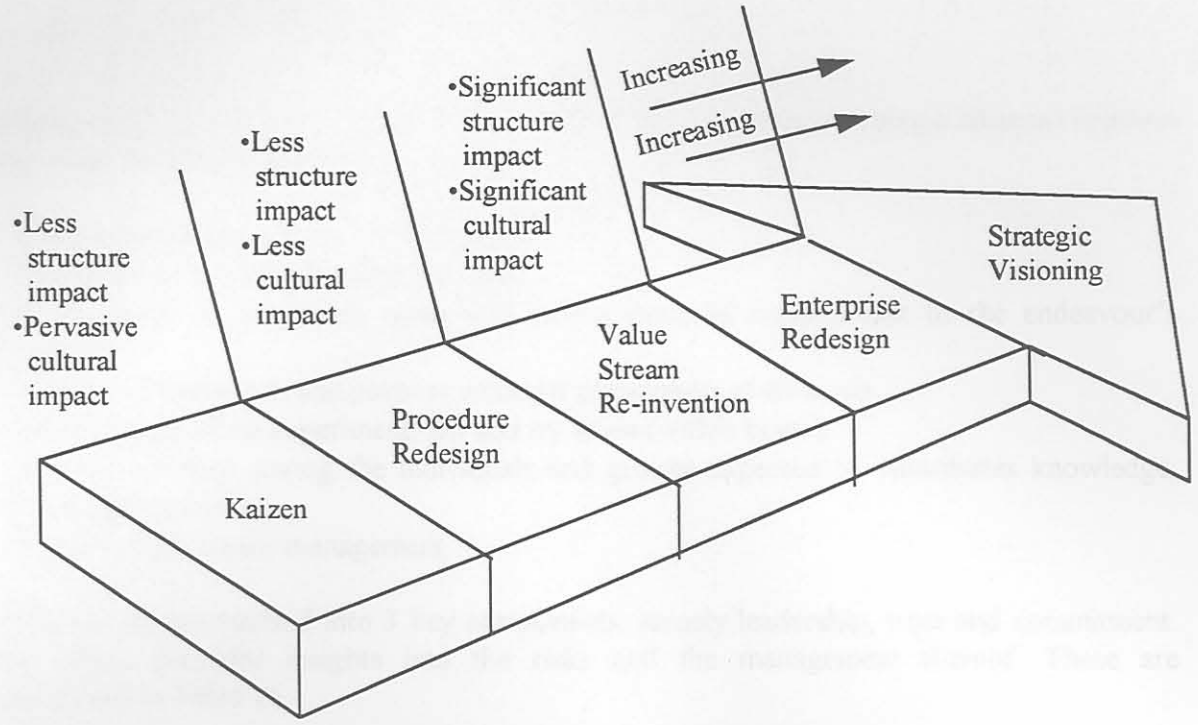


Figure 25 - Martin's Risks Associated with Different Change Methods

(c) Organisational risk propensity

The following describes research on risk propensity in organisational decision-making context. Walls [85] conducted a study into risk propensity to determine whether there where variances across management and functional designations. From his study he concluded[1] that:

- Lower level staff exhibit higher risk aversion levels than supervisory or managerial level employees.
- There is no statistical difference in risk propensity between supervisory and managerial designations.
- Lower level staff use their own outcomes (career) rather than business outcomes (ROI) as basis for decision-making.
- There is a significant risk propensity between disciplines in an organisation which may suggest failure by management to communicate a consistent organisational risk policy.
- He further felt that "*choice behaviours change when attention turns from the behaviour of isolated individuals to the behaviour of individuals within the organisational context.*"

He suggests the following approaches to risk management (taken in context of the above findings):

- Organisational risk management strategies should be implemented to assist effective and consistent decision-making.
- Compensation and incentive structures consistent with an environment for risky decision-making should be established as organisational motivators.

[1] While his test case was based on BP, he draws correlation with other studies.

- Managers should at least be partially evaluated on the basis of their outcomes[1].
- The above results in:
  - a need for more sophisticated personnel appraisal.
  - encouraging transparency and capturing of decision-making before their outcomes are known, and
  - encouraging group decision-making and shared responsibility.

March and Shapira [86] found that managerial risk taking, albeit complex, generally varies according to incentives and experience. It is tightly coupled to the individuals' career scenarios within the organisation.

Swalm [87] also observed that lower levels in an organisation have a lower risk propensity than higher levels. He further concludes that management generally take decisions suitable to their personal interests before organisational interests.

3.2.4 Strategic alliances

(a) Badaracco

Badaracco [88, p130] indicates that understanding how to manage strategic alliances involves examining the following factors:

- Clear sense of the project's objectives.
- Incentives to build knowledge and skills.
- A champion or leadership team with strong personal commitment to the endeavour's success.
- A sense of teamwork and purpose amongst participants at all levels.
- Encouragement, to experiment, fail and try again (within limits).
- A sense of trust among the individuals and groups expected to contributes knowledge, skills and resources.
- Support from senior management.

These can be summarised into 3 key components, namely leadership, trust and commitment. The author provides insights into the risks and the management thereof. These are summarised in Table 16.

[1] This disallows the outright vetoing of higher risk-return options.

Table 16 - Badaracco's Approach to Managing the Risks of Strategic Alliances.

Risks	Description	Techniques for Managing Risks
Haste to consummate a deal that fills an urgent need	In the haste to satisfy a need an alliance is negotiated. This may make sense for the individual deal, but holistically can cause strategic damage.	• Managers must have a clear, strategic understanding of their company's capabilities and the capabilities it will need in the future. • Specific risks are uncovered by analysing the expected half-life of the core capabilities of the company.
Selecting the incorrect structure	This involves risks around chasing the correct partner, mutual activities and form of relationship.	• Managers must consider a whole range of possibilities.
Incompatible values and culture	The prospective cultures are different, making the operational relationship difficult. For example, centralised vs. decentralised decision-making.	• Managers must scrutinise the values, commitment and capabilities of the prospective partners.
Partnering risks	• Risks of opportunism and self-interest. • Risks that knowledge and capabilities will flow in unintended and harmful ways.	• Managers must understand the risks of opportunism, knowledge leaks and obsolescence.
Alliance dependency	Organisation sustainability and independence is at risk if the alliance is tightly coupled with the core capabilities.	• Avoid undue dependence on alliances.
Operational risks	Day to day management of the operation with disparate systems, different staff, 2 bosses, etc.	• The alliance must be structured and managed as a separate company (ringfencing).
Inflexibility	Mistrust whatever its origins, breeds inflexibility.	• Trust must be established.
Misaligned organisational interfaces	Processes between organisations are not aligned to facilitate the ease of working between the companies.	• Change core operations and traditional organisations to be open to learning from alliances.
No direction and drive	No urgency, direction, inflexibility or commitment.	• Alliances must be led, not managed.

(b) Lorange et al

Lorange et al [89] approach the development of strategic alliances from a parental perspective, i.e. two legal entities giving birth to another where both have vested interests. They identify 10 major challenges that require attention [89, pp9-10] in order that a strategic alliance may be successfully established. These are:

- Autonomy of the new unit.
- Maintaining forward momentum.
- Focus on the external environment.
- Politicking amongst stakeholders.
- Change and innovation.

- Learning
- People - company, not just an individual effort.
- Black-box (hedging, ringfencing, etc.).
- Cultural alignment.
- Co-operative effort.

3.2.5 Total quality management

TQM is another of the new business improvement panaceas that have come under fire for not achieving what it was set out to do [59,90,91,92]. This section describes what relevant literature has cited as the risks of instituting TQM and the techniques used to manage this.

(a) Ackoff

Ackoff [59] indicates the need for TQM but highlights areas where risks lurk. He however suggests techniques for dealing with these. This has been disseminated and summarised into Table 17.

Table 17 - Ackoff's Approach to Managing the Risks of TQM/Continuous Improvement

Risk	Description	Techniques for Managing Risks
Focus is not on all stakeholders, esp. consumers	• The expectations of not all stakeholders are met. • There is a chain of customers ending up in consumers. They may have different needs, hence different perceptions of quality.	• Understand the needs of all stakeholders. • Use consumer idealised design (CID).
Focus on elimination of defects	Defect and deficiency removal provides no assurance of attaining something more desirable than what is left behind.	Continuos improvement programmes should be directed at getting what people want, not getting rid of what they don't want.
Focus only on continuous improvement	Continuous improvement is at best a way of trying to catch up, creative (dramatic) leaps are required to take the lead.	• Use continuous and dramatic improvement approaches as complementary to achieving the goal. • Use of creativity stimulation techniques [93].
Sub-optimal solutions	Defects are observed independently and therefore addressed separately.	• Systems approach. • Setting a common vision.
Deductive risk	TQM programmes focus on trying to go from where one is, to where one wants to go.	• Use the reverse (inductive). Work backwards from where one wants to be to where one is, i.e. vision, e.g. dynamic programming. • Scenario planning. • Contingency planning.
Implementing contemporary initiatives in a traditional framework.	TQM has its origin in SQC. Over time additional practices accumulated under its banner. Various components do not hang together as a cohesive whole. Traditional management and organisational approaches, hamper the change. This includes organisation, measures and styles.	• Use of the circular organisation [59, pp110-141] vs. the hierarchical organisation. • Use of the multi-dimensional organisation [59, pp168-196].

(b) Brown et al

Brown et al [90] have provided a comprehensive work on the risks of instituting TQM. They also provide lengthy measures and approaches aimed at managing the initiative in order that it may successfully be implemented. The authors describe three phases for implementing TQM, namely:

- Phase I: Start-up.
- Phase II: Alignment.
- Phase III: Integration.

Using this framework, they provide a way of dealing with the generic reasons for failure. This framework depicting the risks and coupled techniques has been summarised in Table 18, Table 19 and Table 20 according to phase.

Table 18 - Brown et al's Approach to Managing the Risks of TQM – Phase I

Risk	Description	Techniques for Managing Risks
Lack of management commitment	Executives are sometimes attracted to TQM for the wrong reasons. Even if they implement TQM for appropriate reasons, they often don't know how to support the effort.	• Commitment is a personal attribute - from within and cannot be imposed. Must be from the heart. • This commitment must then be demonstrated - leadership. The authors provide 8 ways to demonstrate commitment [90, pp7-17].
Poor timing and pacing	• Sometimes organisations must experience a financial crises before implementing TQM. Required resources for implementation are therefore limited. • Others fail because there is no compelling need identified to implement TQM. • Employees may be overwhelmed with overlapping, competing change efforts.	The following factors were identified in sequence of importance: • Establishing and communicating the threat of survival. • Establishing employee commitment. • Use of appropriate implementation strategy. • Focus is on achieving real progress in the implementation. • A 3-5 year plan is put into place detailing goals addressing predetermined success criteria.
Wasted education and training.	The education and training required is enormous. Funds are spent on the wrong training or it is implemented in the wrong way. Executives then abandon them for tangible returns.	• Focus the training on the needs of the organisation. • Ensure appropriate context and method.
Lack of short-term bottom-line results	TQM is a long term strategy. Organisations are led to focus on process and not results, when scare resources are poured into the initiative. When business get tight, TQM is dropped as a "nice-to-have"	• Measure results using appropriate indicators. • Focus on achieving results and not only behaviour. • Focus on process control. • Focus on the customer's needs. • Focus on long-term strategies with relevant measures.

Table 19 - Brown et al's Approach to Managing the Risks of TQM – Phase II

Risk	Description	Techniques for Managing Risks
Divergent strategies	Organisations consider TQM "another programme" and do not integrate it as inherent to the new way forward.	The following aim at not making TQM just "another programme": • Don't give it a slogan, esp. one that can be abbreviated. If required, make it consistent with the business vision. • Defocus on fan-faire, focus on achieving continuous improvement. • Either don't appoint a quality chief or make clear that this is a temporary position. • Don't build a separate TQM department. • Make quality issues part of daily operational practice – not special committees.
Inappropriate measures	The wrong measures are used to gauge the performance – usually easy-to-get measures. Measures are also used to punish, not to facilitate the learning process.	Indexes are created that measure the following variables: (1) customer satisfaction, (2) financial, (3) product/ service quality, (4) employee satisfaction, (5) operational (6) public responsibility. Measures must be based on issues that can be controlled.
Outdated appraisal methods	Traditional performance appraisal systems encourage competition instead of co-operation, they reinforce traditional management practices instead of empowerment and they focus on the manager's desires, not the customers'.	The authors believe the following principles should be employed [94]. • Merge planning and feedback into a team meeting. • Design the meeting around thought provoking questions. • Align the timing of the appraisal with work. • Eliminate individual ratings. • Provide individual and team feedback. • Incorporate data about customers and competitors. • Design a natural way to document results.
Inappropriate rewards.	Traditionally, compensation systems focus on individual and not team based performance. Now methods like gain-sharing, skill-based pay and executive compensation also have problems.	The following systems are recommended: • Incentive based pay for all employees. • Performance based compensation. • Bonuses tied to customer satisfaction. • Pay for service. • Pay at risk.

Table 20 - Brown et al's Approach to Managing the Risks of TQM – Phase III

Risk	Description	Techniques for Managing Risks
Failure to transfer true power to employees	Middle level managers feel threatened when employees are encouraged to take action with the recommendations they devise.	• Empower employees. • Make use of self-directed work teams.
Maintaining outmoded management practices.	Inconsistencies in behaviour from management - not "walking the talk".	Empower management with a new management style - from the traditional planning, organising, leading and controlling to coaching, consulting, cheer leading and co-ordinating [95].
Poor organisation and job design	Implementing a style that requires fluid organisation and employee empowerment conflicts where currently the organisation is hierarchical and decision-making is taken by and executed by management.	Design a flexible management organisation using the 8 S's [95], namely: strategy, skills, structure, systems, symbols, staff, style and shared values. Job design should be based on: • Organising to maximise customer satisfaction and quality. • Put interdependent people together. • Provide meaningful feedback and consequences. • Eliminate/distribute "bad jobs". • Team members should be multi-skilled and manage themselves.
Outdated business systems	Many "bespoke" systems have been tailored to suit outmoded business practices.	The systems developed for the traditional approach need to be replaced or redesigned to support the new processes and philosophies.
Failure to manage learning and innovation diffusion.	Innovative solutions are generated in pockets. Failures are kept under wraps. The learning is never assimilated into the rest of the organisation.	Develop and organisational learning culture.

The authors add an important factor which is similar to the risks and management techniques, of all the other business improvement initiatives. The problems incurred tend not to be mutually exclusive. They write [90, p3]:

"excessive training experiences can lead to the lack of bottom-line results, which can lead to the lack of executive commitment. However, with a focused plan and strategic use of training and executive time, organisations can achieve dramatic successes in phase I that will help fuel excitement for phase II."

(c) Bechtell

Bechtell [73, pp305-307] proposes the following 9 techniques to mange the successful implementation of a TQM initiative:

- Focus on the customer.
- Stream-line the processes.
- Use partnerships and teamwork to solve problems and reduce waste and costs.
- Create a system to achieve continuous improvements in quality.
- Provide constancy of purpose and urgency of action.
- Managers must work on the system.
- Invest in creating a learning organisation.
- Take the lead, walk the talk.
- Focus on the critical few, not the trivial many.

3.3 Market research: managing the risks of business change

This section describes the market research which combines the foregoing literature research with expert inputs into a set of propositions. It further describes the process, analysis and conclusions drawn from the market research.

3.3.1 Method

(a) The research question

The research problem lies in understanding the nature of the risks associated with the change of business practices in South Africa. In particular, the research aims to look at the varying forms of change that take place, the types of risks attributable to the particular forms of change, and the way that risks associated to these changes are managed in practice.

(b) The research propositions

Proposition 1:

> There are 6 types of changes that can be undertaken by a business to improve the bottom-line. These are continuous improvement, procedure redesign, value-stream reinvention, enterprise redesign, strategic visioning and financial optimisation. These changes are common to all industries.

Proposition 2:

> There are firstly, generic risks attributable to business change in general, secondly to the type of change under consideration, and thirdly, risks unique to the particular industry and or business.

Proposition 3:

Failure of business change initiatives are largely attributable to the lack of appropriate risk management.

Proposition 4:

The perceived benefits and problems associated with risk management will reflect those described in the literature and experience.

Proposition 5:

There is a growing use of and demand for risk management in business change initiatives.

Proposition 6:

Local businesses do not institute formal or sophisticated risk management practices.

(c) Research Methodology

(i) Selection of research method

The research method selected entailed the descriptive survey technique. The vehicle used to seed the analysis entailed the mailing of questionnaires to a selected target group within the population of the chosen database. This approach is motivated by virtue of the exploratory nature of the research conducted. To satisfy the exploratory requirements of the research, a broad cross-section of the business environment was selected even though the elected database is in itself a sample of the larger population.

(ii) Population

The database population under consideration comprised of approximately 700 organisations in South Africa covering a wide spectrum of companies. The database used was made available by Paras[1] which included large corporations down to medium sized enterprises. Another database was made available which included in excess of 2000 top European process industry contacts. This was however decided against firstly for practical engagement reasons and secondly because the focus on the South African industry was felt to be more appropriate for this particular study.

This database did however have duplications per company due to more than one targeted person in some companies. It was felt that in order for an objective response to be provided, the top official in each organisation, where possible should be targeted. This generally involved the general manager or managing director. With this approach as rationale, along

[1] Paras is an international management consultancy focusing on business, information and technology strategy. It head office is based in the UK, but most of the work was done via the South African office.

with the elimination of several records having incomplete information, a final database of 414 potential respondents was established.

(iii) Sample

A 10% response rate is considered reasonable in research involving questionnaire based surveys [96]. The target number of responses is in the region of 40 which necessitates a potential respondent population size of 400. This is achieved if the entire final population of 414 as described above is employed.

(iv) Questionnaire administration

The questionnaire was drafted in order to test the research propositions and objectives adequately. This was then piloted on a small sample for the purposes of eliminating inconsistencies and errors that may detract from the quality of the final analysis. Feedback from a captive audience was procured and used to improve the quality of the questionnaire [97].

A covering letter which accompanied the questionnaire was written which indicated the importance of the study [98]. These were mailed to the potential respondents along with a pre-paid reply envelope. The covering letter and the questionnaire is shown in appendix I.

Of the 414 questionnaires mailed out, 44 replies were received, of which only 42 were useable. This implies a response rate of 10.1% which satisfies the reasonable return requirements described earlier.

(v) The research objectives

The research objectives were formulated as follows:

Objective 1:

To investigate the nature of the different types of business change in the different industries in South Africa.

Objective 2:

To investigate the nature of the risks associated with the different types of business change in the different industries in South Africa.

Objective 3:

To determine the impact a lack of thorough risk management has on the success of business change initiatives.

Objective 4:

To investigate the benefits and problems associated with risk management in initiating and managing change.

Objective 5:

To investigate the use and need for risk management in instituting business change.

Objective 6:

To investigate the extent of usage and sophistication of risk management methods and tools used in the activities related to the successful change of business.

(d) Questionnaire format

The questionnaire has the following format:

Section 1: Information regarding the respondent

Section 2: Demographic information

Section 3: Organisation's experience with business change

Section 4: Organisation's approach to risk management

Section 5: Respondent's opinions regarding risk management in business change

Where possible, closed-ended questions were employed to eliminate ambiguity and hence inconsistency or lack of replies. Opportunity for feedback via open-ended questions was also provided in order to provide insights beyond those provided by the literature study.

(e) Approach to data analysis

Section 1 (questions A, B and C) reflect on the respondent and the organisation replying to the questionnaire. This was to serve primarily as reference in the case of a need for clarification from the respondent and also to ascertain the perspective of the respondent within the organisation.

The following section (questions 1 and 2) relates to the demographic characteristics of the respondent. In both cases pie charts are employed to illustrate the respective sample distributions.

Section 3 (questions 3 to 7) endeavours to understand the organisations' experience in respect of business change. The "recentness" of change undergone by an organisation is depicted via a pie chart as well as the organisation's rating of the respective success of this change. In each case percentages and limited descriptive statistics are established. Question 5 looks at the frequencies of the types of change initiatives that were undertaken. This is illustrated by

means of a histogram along with the following question which explores those individual initiatives currently being undertaken. Question 7 aims to determine the significant risks that an organisation experiences or can face during the change initiative. This is achieved by means of factor analysis using a 5 point Lickert scale.

Use of a Lickert scale in the questionnaire does not necessarily imply that the input data will be interval [99]. A rescaling is therefore required by means of correspondence analysis [100]. This is achieved as follows:

- A contingency table is established which indicates the frequency of each response per question statement.
- Use is made of the NCSS [101] correspondence analysis utility which produces a two axis solution placing the data on two interval scaled axes.
- Rescaling is achieved using the simple linear transform of $y = a + bx$.
- The transformation is applied to the original data to convert it to interval scale.

It is now possible to use descriptive analysis techniques (e.g. mean, standard deviation) to interpret the response to the question. This information is now available to be used as input into the factor analysis which aims to extricate the primary factors in the respondents opinions as being the major risk factors in undergoing a business change. Factor analysis serves three functions [102], namely:

- Minimising the number of variables while maximising the amount of information in the analysis.
- To search the data for quantitative as well as qualitative distinctions when data is large and difficulty comprehensible.
- Tests hypotheses regarding quantitative and qualitative distinctions within the data set.

Section 4 (questions 8 through 15) focuses on the organisation's approach to risk management as a facilitator in the business change process(es). Question 8 is key in that it splits the respondents into two groups by virtue of their exploitation (or lack thereof) of risk management in the analysis and execution of business change. A pie chart is used to describe the sample split as well as questions 9 and 10. Question 11 draws out the business change life cycle and aims to map onto this the current and perceived perspectives of an organisation in respect of this. This is analysed by means of a histogram and the standard descriptive statistics.

Question 12 explores the current and perceived factors in the management of risks. This is facilitated by means of a histogram. The next question explores the techniques currently being used by respondents in their risk management activities. This is achieved by means of a frequency count coupled to a 5 point Lickert scale to measure their perceived effectiveness. Factor analysis cannot be employed here as respondents are not required to answer each statement - only the valid ones. Analysis is however facilitated by means of a contingency table which provides for a weighted answer based on the Lickert rankings. This serves as a vehicle to merely prioritise the factors as perceived to be important.

The same approach is used for question 14 where causality is evaluated by making use of contingency tables. Question 15 provides for a qualitative response, the essence of which is summarised.

Section 5 deals with the respondent's opinion of risk management as an approach to securing success in business change initiatives. Question 16 and 17 as described using pie charts. Questions 18 and 19 aim to explore the key benefits and disadvantages associated with a formal risk management approach. These frequencies are described by means of histograms and their associated descriptive statistics. The next question aims to solicit opinion on whether a generic approach can indeed be employed. This is illustrated by means of a pie chart.

The last question provides the opportunity for the respondent to provide qualitative information regarding the questionnaire that can add value to the question under discussion. This is summarised accordingly.

The relationships between the research objectives, propositions and questions are shown in Table 21.

Table 21 - Link between Objectives, Propositions and Questions

No.	Research Objective	Proposition	Question
1	To investigate the nature of the different types of business change in the different industries in South Africa.	There are 6 types of changes that can be undertaken by a business to improve performance. These changes are common to all industries.	2,3,5,6
2	To investigate the nature of the risks associated with the different types of business change in the different industries in South Africa.	There are firstly, generic risks attributable to business change in general, secondly to the type of change under consideration, and thirdly, risks unique to the particular industry.	2,4,5,7
3	To determine the impact a lack of thorough risk management has on the success of business change initiatives.	Failure of business change initiatives are largely attributable to the lack of appropriate risk management.	4,8,9,17
4	To investigate the benefits and problems associated with risk management in initiating and managing change.	The perceived benefits and problems associated with risk management will reflect those described in the literature and experience.	12,18,19, 20
5	To investigate the use and demand of risk management in instituting business change.	There is a growing use of and demand for risk management in business change initiatives.	9,10,11
6	To investigate the extent of usage and sophistication of risk management methods and tools used in the activities related to the successful change of business.	Local businesses do not institute formal and sophisticated risk management practices.	13,14,15, 16,17

The approach employed to process the results is summarised in Table 22.

Table 22 - Approach to Analysing Data per Question

Question	Processing of results
1	Descriptive statistics. Is represented via a pie chart.
2	Descriptive statistics. Is represented via a pie chart.
3	Descriptive statistics. Is represented via a pie chart.
4	Descriptive statistics. Is represented via a pie chart.
5	Descriptive statistics. Is represented via a histogram.
6	Descriptive statistics. Is represented via a histogram.
7	A 5 point Lickert scale is used for (A). Factor analysis is used to develop a theoretical profile for risks from the responses.
8	Descriptive statistics. Is represented via a histogram.
9	Descriptive statistics. Is represented via a histogram.
10	Descriptive statistics. Is represented via a histogram.
11	Histogram. The relationship between current and perceived is displayed on the same chart.
12	Descriptive statistics. Is represented via a histogram. Use is made of contingency tables.
13	Descriptive statistics. Is represented via a histogram. Use is made of contingency tables.
14	Histograms. Causality is analysed using contingency tables.
15	Qualitative - information is summarised.
16	Descriptive statistics. Is represented via a pie chart.
17	Descriptive statistics. Is represented via a pie chart.
18	Descriptive statistics. Histogram. Use is made of a contingency table.
19	Descriptive statistics. Histogram. Use is made of a contingency table.
20	Descriptive statistics. Is represented via a pie chart.
21	Qualitative - information is summarised.

(f) Reliability

Reliability is concerned with the accuracy of the measuring tool, i.e. is what is intended to be measured, being measured [98]. The instrument employed in this part of the research is the questionnaire which aims to satisfy the research objectives described in Table 21. The questionnaire employs various techniques including:

- Closed-ended questions (yes, no, unsure).
- Opinion solicitation (e.g. via Lickert scales).
- Qualitative information.

In certain instances (Lickert scales) data is rescaled in order to achieve interval scale. This input provides for greater reliability in the execution of the other techniques.

The research was conducted using standard methods and measurement reliability should be acceptable.

(g) Validity

Leedy [98] lists the following six validity criteria:

- **Face validity** - Does the instrument measure what is intended? Is the sample representative of the behaviour being investigated?
- **Criterion validity** - Is there a standard against which the results of the instrument processes can be compared?
- **Content validity** - The accuracy with which an instrument measures the factors or situations being investigated.
- **Construct validity** - The degree to which the construct[1] is actually measured.
- **Internal validity** - The freedom from bias in forming conclusions in view of the data.
- **External validity** - Concerned with the generalisation of conclusions.

This research was constructed in a structured manner using scientific principles. The objectives were constructed based on the literature review and conclusions drawn from experience. Propositions were formulated pertaining to the objectives and questions constructed in order to investigate and test the propositions.

Closed-ended questions are used where possible in order to eliminate possible bias that can arise from subjectivity or questionnaire construction. The latter was further put to pilot testing which further aimed to iron out inconsistencies and provide clarity to the prospective respondents. International standards have been used where possible to assist in the validation of the results (e.g. Carr and Johannsson). Some areas are however exploratory and this is has not been possible. Use has been made of proven research techniques and methods where similar studies have been conducted have been employed where possible.

Issues concerning external validity are discussed in paragraph 3.3.3.

(h) Scope and limitations

This research is conducted into the management of risks in business change in South Africa. The literature review that seeded the research was drawn predominantly from the international arena. The "generalisability" of the results is dependent on the external validity of the study.

The database selected while constituent of large and small organisations, does not necessarily reflect the true business population. Opinions of all organisation sizes and types may therefore not necessarily be reflected. This does not however detract from the purpose of the market research, that being to extricate dominant factors on which to synthesise an integrated risk management framework.

The target persons in the organisations are the managing director or general manager functionary. The purpose behind this was to derive a holistic view. This level of functionary

[1] A construct is any concept that cannot be directly observed or isolated.

does not however necessary experience the intimate pains of business change - rather the results or lack thereof.

3.3.2 Analysis of results

This section analyses the data set comprising the 42 responses received. It serves the purpose of primary data analysis. Interpretation is however undertaken in 3.3.3. Only graphics and relevant statistics are provided here. Detailed descriptive statistics are provided in appendix J.

Statistical manipulation was facilitated by means of NCSS [101] and the Microsoft Office[1] suite of products (particularly Excel).

(a) Respondent findings

Of the 414 questionnaires mailed, 44 returned. Of these, two could not be used and were left out of the analysis. This provided for a sample size of 10.1% which satisfies the criteria described in [96]. Of the 44 returned, 33 (or 75%) provided their complete individual and organisational information.

(b) Demographic findings

(i) Number of employees in the organisation (Question 1)

The number of employees in the organisation is shown in the pie chart illustrated as Figure 26. The largest single category is organisations between 1000 and 5000 employees which amounts to 36% of the returned questionnaires.

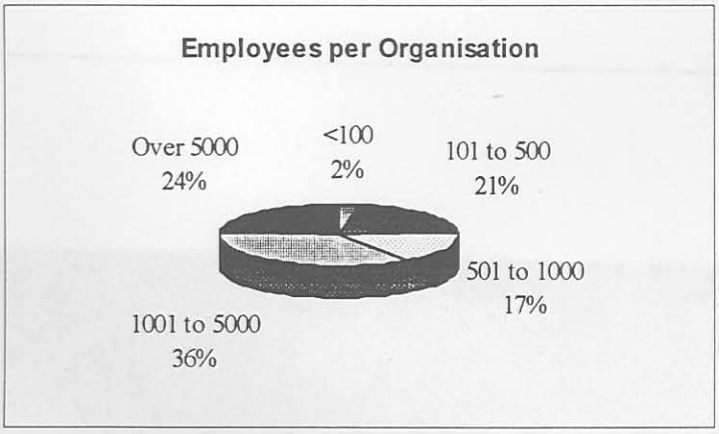


Figure 26 - Number of Employees in Organisation

(ii) Primary nature of the business (Question 2)

[1] © Microsoft Corporation, USA

A significant cross-section of industries were mailed to and provided input into the dataset. The distribution is illustrated by means of the pie chart shown in Figure 27. From the figure, manufacturing (40%) is clearly the largest sector followed by "other" (17%) and financial services (14%). Respondents in the "other" category included parcel services, tertiary education, control board, municipality, shipping, employee benefits and catering services.

In some questionnaires the respondents indicated that they were involved in various sectors. The primary sector of endeavour was however selected in these instances. This was achieved by means of a phone call or stock exchange listing descriptions.

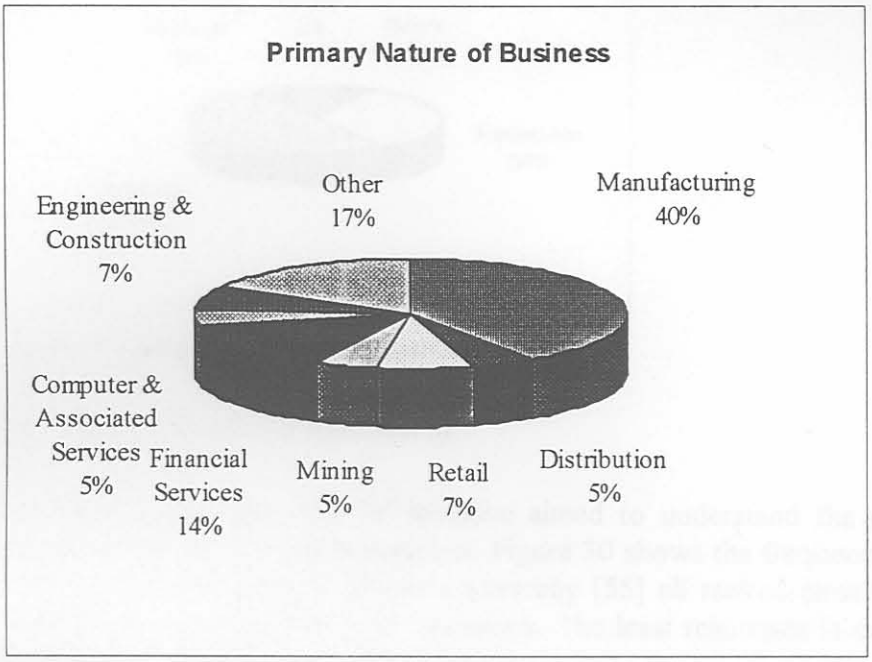


Figure 27 - Primary Nature of the Business

(c) Organisation's experience with business change findings

(i) Recentness of change initiative(s) (Question 3)

Most organisations indicated that they had completed a significant business change initiative within the last 2 years (Figure 28). The most significant frequency is in the "less than 6 months ago" interval which indicated a 34% response figure, followed by 26% and 21% for "less than 1 year" and "less than 2 years" respectively.

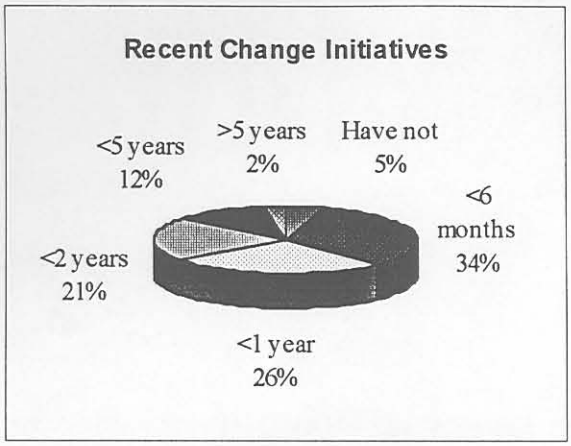


Figure 28 - Recentness of Change Initiative

(ii) Success of change initiative(s) (Question 4)

In reviewing the success of the change initiatives (Figure 29), the most significant interval indicated that the business change had been successful (49%). The next significant interval however, indicated that the results had been less than sought after (34%). Of the total, 10% of respondents believed that the change had been a resounding success while a group of similar size (7%) felt that the exercise had been a failure. None felt that they had ended up with a disaster as a result of the change.

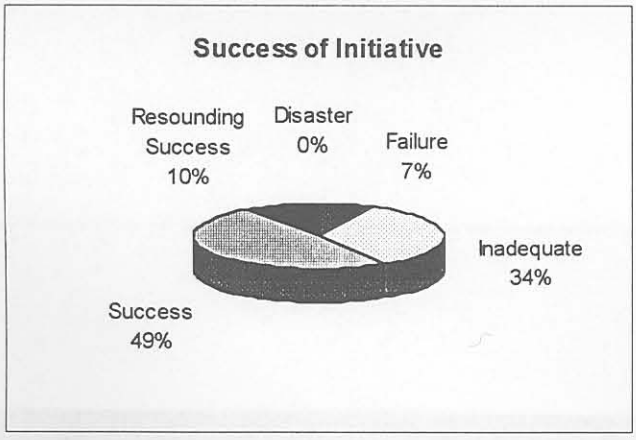


Figure 29 - Success of Change Initiative(s)

(iii) Type of initiative(s) (Question 5)

Investigation into the type of initiative aimed to understand the categorisation of change initiatives currently being undertaken. Figure 30 shows the frequency of the results. The first 5 categories according to Martin's hierarchy [55] all ranked closely, although value-stream reinvention did record the most responses. The least responses in descending order were for financial optimisation and "other". Other entailed:

- New markets and maintained existing.
- Cultural change.
- Change of account numbers.

- New technology.
- 100% growth per year.
- Cost of procurement.
- Sales.
- Relationship building.

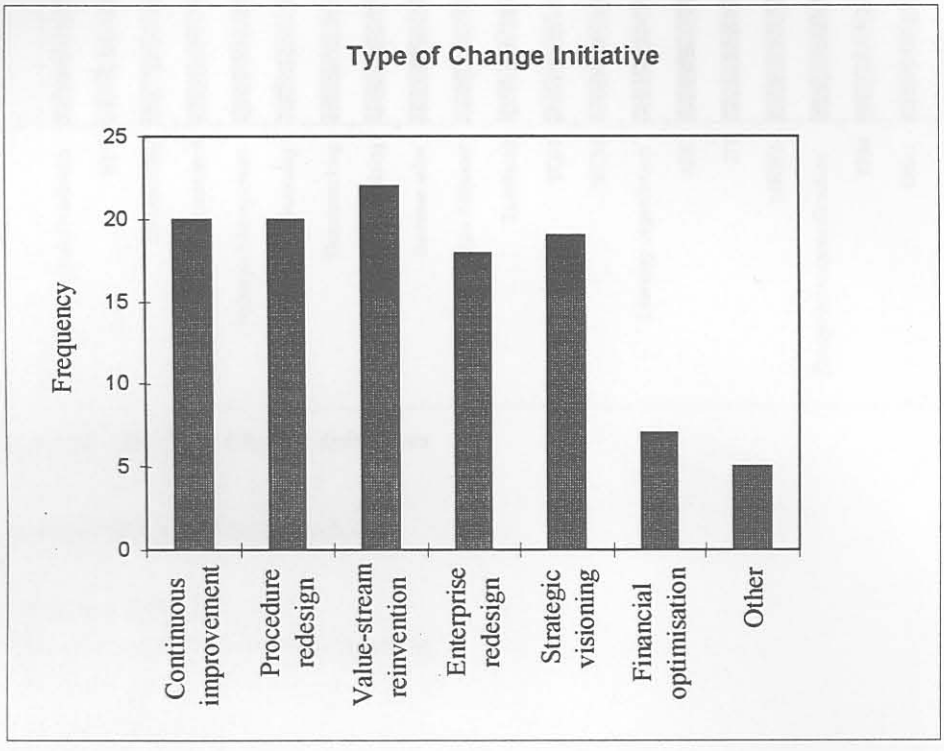


Figure 30 - Type of Change Initiative

(iv) Current initiative(s) (Question 6)

Current initiatives focused on the business change techniques currently being used by the respondent organisations. From the results (Figure 31) three groupings of the technique emerged, namely high, medium and low frequencies.

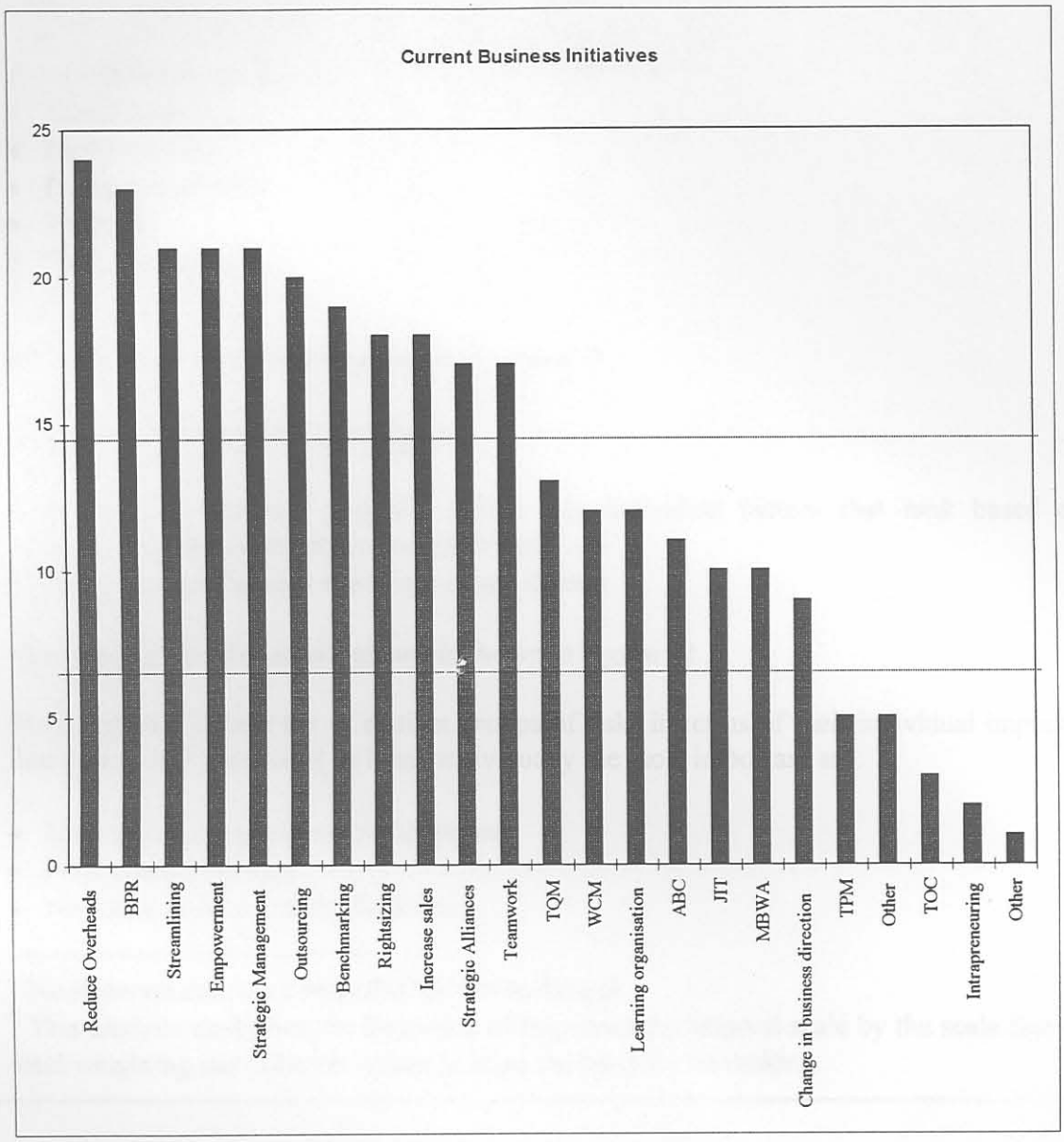


Figure 31 - Business Change Initiatives

The high frequencies included:

- Reduce overheads.
- Business process re-engineering.
- Stream-lining.
- Empowerment.
- Strategic management.
- Outsourcing.
- Benchmarking.
- Rightsizing.
- Increase sales.
- Strategic alliances.
- Teamwork.

The medium frequencies were grouped as follows:

- Total quality management.
- World class manufacturing.
- Learning organisation.
- Activity based costing.
- Just-in-time.
- Management by walking around.
- Change in business direction.

The grouping of low frequencies entailed:

- Other.
- Total productive maintenance.
- Theory of constraints.
- Intrapreneuring.
- One minute managing.[1]

Other involved:

- Concurrent engineering.
- Transformation.
- Restructuring.
- Product leadership.
- ISO9000.
- New Technologies.

(v) Risks faced during business change (Question 7)

This question is analysed in two parts:

- A weighted analysis[2] provides insight into individual factors that rank based on the respective responses (individual rankings).
- Factor analysis groups these into major themes.

The result of the individual ranking is shown in Figure 32.

From Figure 32 there are 4 distinct groups of risks in terms of their individual impacts. The first group of 7 risks rated as being individually the most important are:

- Lack of top management commitment.
- Poor communication.
- No focus on financial implications.

[1] No observations were recorded for this technique.
[2] This analysis multiplies the frequency of responses per interval scale by the scale factor. The total weighting per criterion is then used as the basis for its ranking.

- Lack of customer focus.
- Poor vision.
- Ignore employee concerns.
- Poor change management attention.

The next 8 factors grouped together in lesser importance:

- Implement without testing.
- Mis-alignment with strategy.
- Not anchoring changes in culture.
- Failure to appreciate risks.
- Not anticipating effort and energy.
- Inappropriate implementation method.
- No sense of urgency.
- Not consider holistic issues.
- Poor attention to innovation.

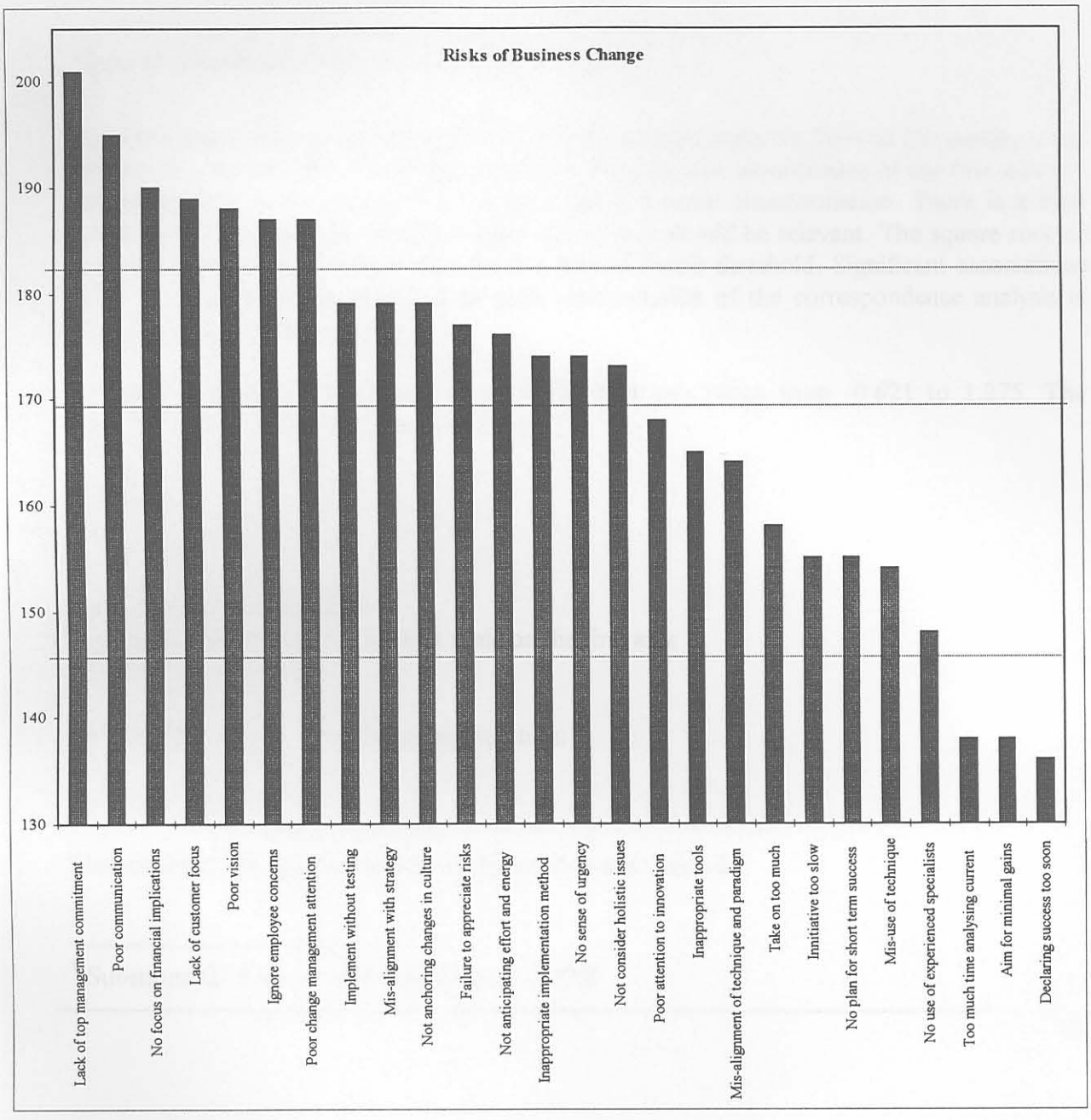


Figure 32 - Risks of Business Change (Individual Rankings)

The following three factors ranked significantly last:

- Too much time analysing current.
- Aim for minimal gains.
- Declaring success too soon.

The major themes were analysed using factor analysis. In order to use factor analysis, the data needs to be interval scale, or at least assumed to be interval scale. In this question a Lickert scale was used which under normal circumstances cannot be assumed to be interval (i.e. the difference between agree and neutral is the same as the difference between neutral and disagree). In order to proceed, rescaling is required.

The first step in the rescaling process is to establish a contingency table from the original survey data. This was done using NCSS. The results are shown as appendix K. This table is then analysed using the same tool by means of correspondence analysis. The results are included as appendix L. From Figure 33, the points exhibit the Guttman effect [99].

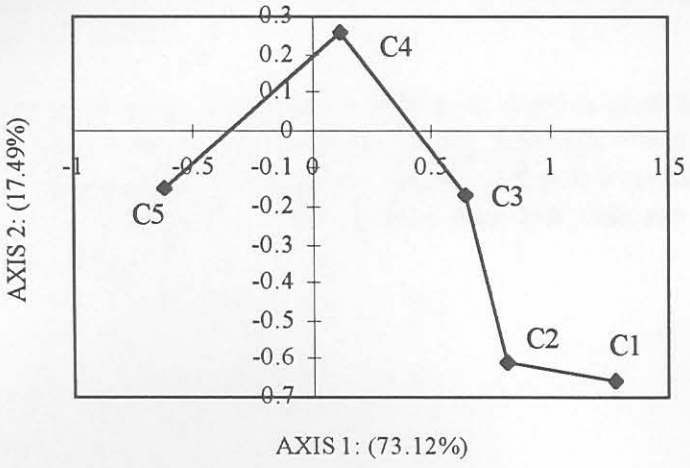


Figure 33 - French Plot of Lickert Scale Ratings

From the eigenvalue report (appendix L), the first axis accounts for 73% of the inertia, while the second accounts for 17% of the inertia. In rescaling, the co-ordinates of the first axis are converted back to an interval 5 point scale using a linear transformation. There is a high retention on the first scale which indicates this scaling should be relevant. The square root of the trace is significantly larger than the 0.2 rule of thumb threshold. Significant associations exist in the contingency table and as such, interpretation of the correspondence analysis is likely to be worthwhile.

The co-ordinates of the Lickert scale on the first axis range from -0.621 to 1.275. The rescaling is done using the linear transform:

Equation 3

$$y = a + bx$$

where a and b are constants
x is the co-ordinates of the Lickert scale on the first axis
y is the rescaled values.

Solving this[1] results in the following equation:

$$y = 3.690 - 2.110x$$

The results of the rescaled Lickert scale are shown in Table 23.

[1] Substitute ① $5 = a - 0.621b$ and ② $1 = a + 1.275b$

Table 23 - Rescaled Lickert Scale

Scale Item	Co-ordinate	Rescaled Value	Scale Difference	Original
	x	*y*		
i	1.275	1.000		1
ii	0.815	1.970	0.970	2
iii	0.644	2.331	0.361	3
iv	0.117	3.443	1.112	4
v	-0.621	5.000	1.557	5

The survey data was then modified accordingly using the transformation utility of NCSS which provides it in a form suitable for factor analysis. The descriptive statistics for this are included as appendix M.

Factor analysis was undertaken using the varimax rotation facility in NCSS. The results of this are included as appendix M. Varimax rotation is a procedure aimed at producing high loadings on some axes, with near to zero loadings on others while the new axes retain as much of the common variance as accounted for by the unrotated loading matrix [103]. This facilitates the interpretation of factor analysis results.

A four factor solution was chosen on account of the scree plot technique (as shown in Figure 34) which accounts for 48% of the total variation within the data set. The scree plot is constructed by plotting the eigenvalue of each factor against the number of the factor. The number of factors are then selected by virtue of the significant change in the slope or the "knee" as shown in Figure 34.

The four factors with the statements that load on them are listed in Table 24, Table 25, Table 26 and Table 27.

A factor loading with a value of |0.5| or more is generally seen to load heavily enough to be considered as part of the factor [104], although 0.6 is sometimes used [105]. The analysis will be based on two intervals, namely 0.4 to 0.6 to indicate a moderate contribution to the factor interpretation, while greater than 0.6 indicates a major contribution to the factor interpretation.

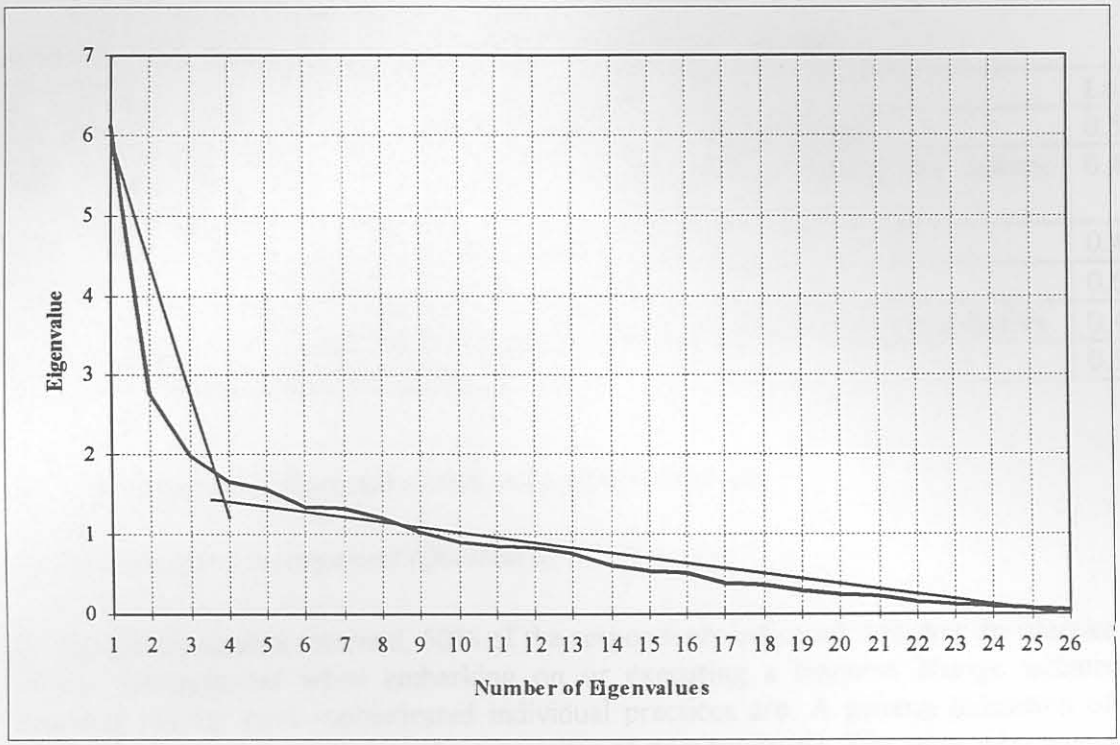


Figure 34 - Scree Plot: Eigenvalues for Factor Analysis

Table 24 - Risks During Change Initiative - Statements Loading in Factor 1

#	Statement	Loading
7.6	Implement solution without proper testing	0.6785
7.9	Use an inappropriate implementation method	0.7792
7.10	Use inappropriate tools	0.7443
7.12	Do not take the financial implications of the initiative into account up-front	0.4777*[1]
7.14	Activities/initiatives are mis-aligned with strategy	0.5154
7.16	Not using experienced specialists	0.5542
7.18	Failure to appreciate the risks	0.7535
7.19	Failure to anticipate the energy and the resources required by the initiative	0.4499*
7.22	Insufficient change management attention	0.4365*

[1] * - Loading of between |0.4| and |0.5|.

Table 25 - Risks During Change Initiative - Statements Loading in Factor 2

#	Statement	Loading
7.7	Undertake the initiative too slowly	0.6715
7.8	Limit the scope of the change initiative without taking the holistic consequences into account	0.4138*
7.11	Ignore the concerns of the employees	0.4167*
7.21	No or poor communication	0.5187
7.23	No sense of urgency	0.8618
7.24	Not planning for short term success	0.6053

Table 26 - Risks During Change Initiative - Statements Loading in Factor 3

#	Statement	Loading
7.3	No or inadequate top management commitment and action	0.6827
7.12	Do not take the financial implications of the initiative into account up-front	0.4059*
7.13	No, lack or unsuitable vision	0.7075
7.22	Insufficient change management attention	0.5316
7.26	Not anchoring changes in corporate culture	0.6962

Table 27 - Risks During Change Initiative - Statements Loading in Factor 4

#	Statement	Loading
7.2	Too much time is spent on understanding the current system	0.5881
7.8	Limit the scope of the change initiative without taking the holistic consequences into account	0.4919*
7.11	Ignore the concerns of the employees	0.4273*
7.15	Not focusing on the needs of the customer	0.6377
7.19	Failure to anticipate the energy and the resources required by the initiative	0.4044*
7.25	Declaring success too soon	0.5152

(d) Organisation's approach to risk management findings

(i) Practice of risk management (Question 8)

Of the questionnaires returned, 60% of the respondents indicated that they do practice a form of risk management when embarking on or executing a business change initiative. It is however unclear how sophisticated individual practices are. A general indication of sample profile is however provided in the remainder of paragraph (d). The 40% who answered no, answered the following question (question 9) and question 16 and subsequent questions.

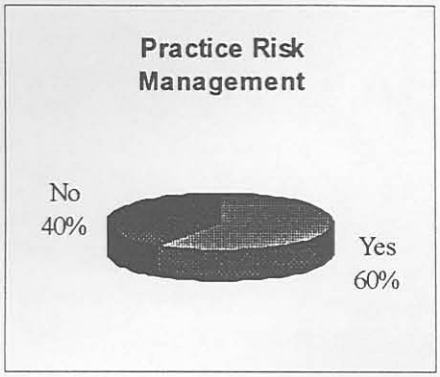


Figure 35 - Practice of Risk Management

(ii) Intention with risk management (Question 9)

Of the respondents who indicated that they did not practice risk management (40% in Figure 35), 53% of them indicated they would consider implementing a risk management practice in the foreseeable future, as shown in Figure 36. The union of organisations who would be practising risk management in business change in the foreseeable future would therefore be 81%[1].

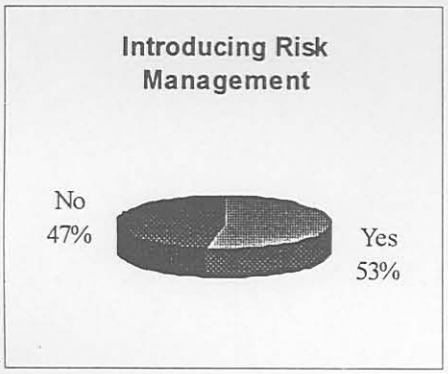


Figure 36 - Intention of Introducing Risk Management

(iii) Risk management responsibility (Question 10)

Organisations that indicated they did indeed practice a form of risk management responded as shown in Figure 37 regarding the allocation of responsibility to an individual. Of the total, 56% indicated that specific individuals had been made responsible for risk management activities during business change, while the remainder indicated that no individual was responsible for this.

[1] This is calculated by (current organisations practising risk management + (current organisations not practising x current organisations who intend to be practising)). Numerically, this translates to 100 x (0.6 + (0.4 x 0.53)) = 81.2%.

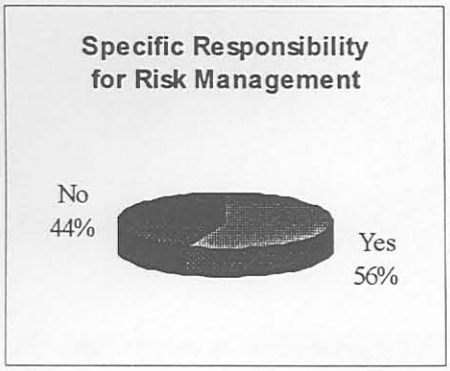


Figure 37 - Nominated Responsibility for Risk Management

(iv) Risk management application to business change life-cycles (Question 11)

This question divided a business solution up into a life cycle, taking it through the various phases, from problem identification, through to the phasing out of the solution. The objective was to determine the importance that respondents placed on managing risks during each phase of the life cycle. The respondents answered as follows - if they currently focused on risk management during the phase, they indicated "*Yes*", if they indicated "*No*", then they further had to qualify whether they "*Should*" however be placing an emphasis on this.

The results of this question are shown in Figure 38. Most of the respondents indicated that they did look at risk management during the traditional risk analysis phases namely, assess alternatives, select solution and develop solution. Areas where they felt they should be providing attention, included need for improvement, provide contingencies, implement the solution, operate the solution and most significantly, phase-out.

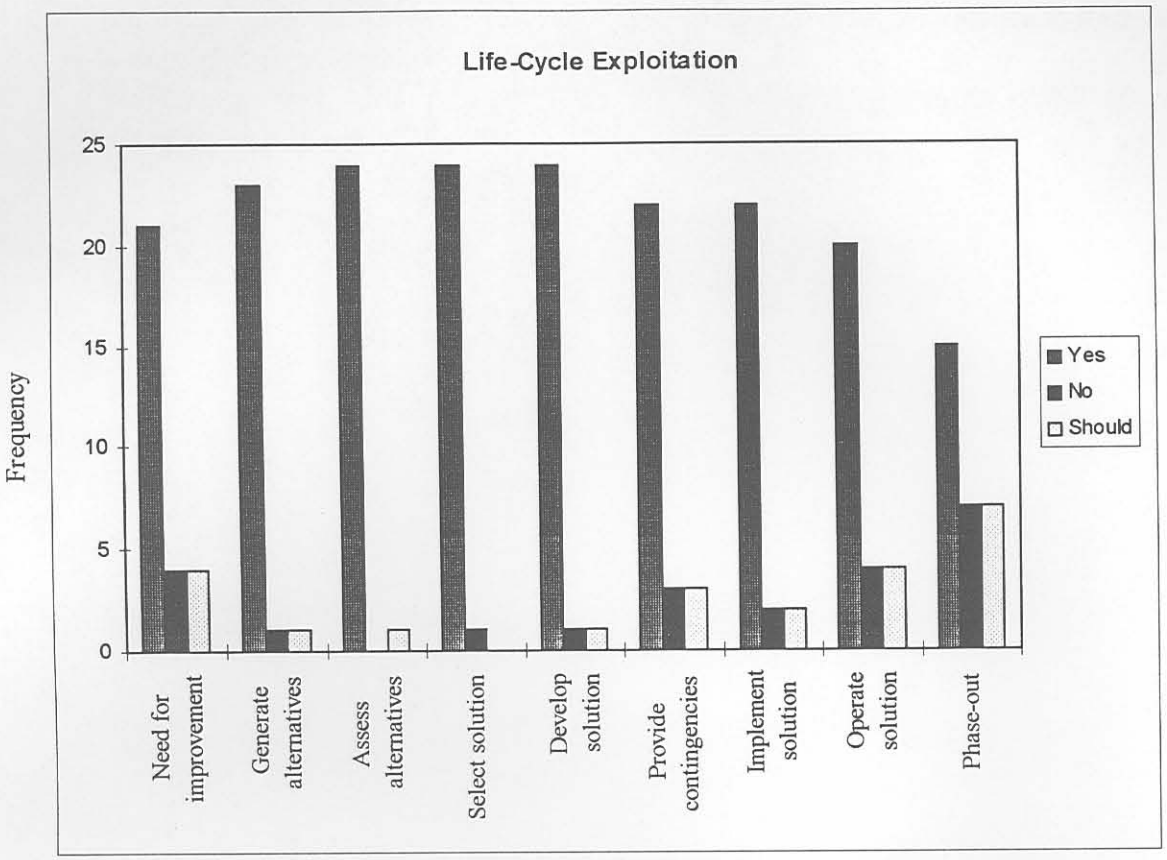


Figure 38 - Life-cycle Exploitation

(v) Importance of risk management factors (Question 12)

This question aimed to draw the respondents opinion on various statements regarding risk management that had been drawn from literature and/or inferred in practice. The task of the respondent was firstly to indicate whether they were currently heeding attention to this factor, or, if this was not the case, whether they believed they should be considering doing so. The results of the current focus is shown in Figure 39 and the required focus in Figure 40. The combined view is included as Figure 41.

There was no significant distinction between allocation of importance between the statements from a current perspective, as shown in Figure 39. The two factors receiving most support are:

- Use is made of carefully selected qualitative and quantitative techniques.
- Sufficient resources for implementation and contingencies exist.

while the following enjoyed the least current attention:

- Benefits and risks are known and quantified before the change solution is selected and implementation commences.

The reply in respect of where the respondents believed the focus should be placed (whether it was currently placed here or not) is more significant between highest and lowest as illustrated

in the bar chart shown in Figure 40. The most significant statements perceived by the respondents included:

- Use is made of carefully selected qualitative and quantitative techniques, to manage the risks of business change.
- Sufficient resources for implementation and contingencies exist.
- Implementation of the change is managed, with the benefits and risks being reviewed regularly.
- Formal clear implementation plans exist and are accepted.
- Risk analysis is done in parallel with business change analysis.
- Post implementation risk management plans are drawn up.

The following three factors were perceived to be less significant (Figure 40):

- A contingency plan clearly mapped to the implementation plan exists and is accepted.
- Benefits and risks are known and quantified before the change solution is selected and implementation commences.
- Benefits and risks are made known to all being affected indirectly or directly by the execution of the change.

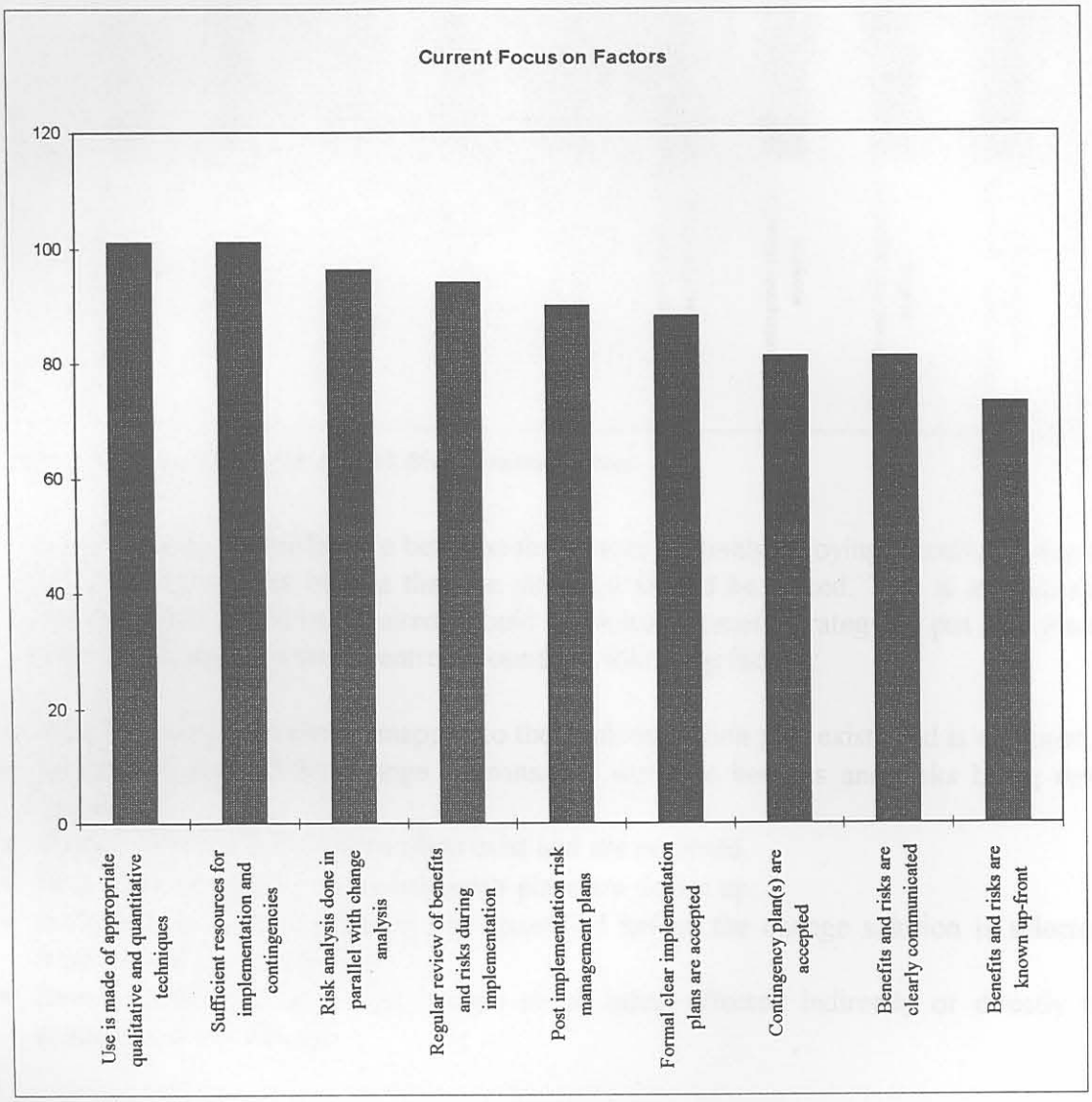


Figure 39 - Current Focus on Risk Management Factors

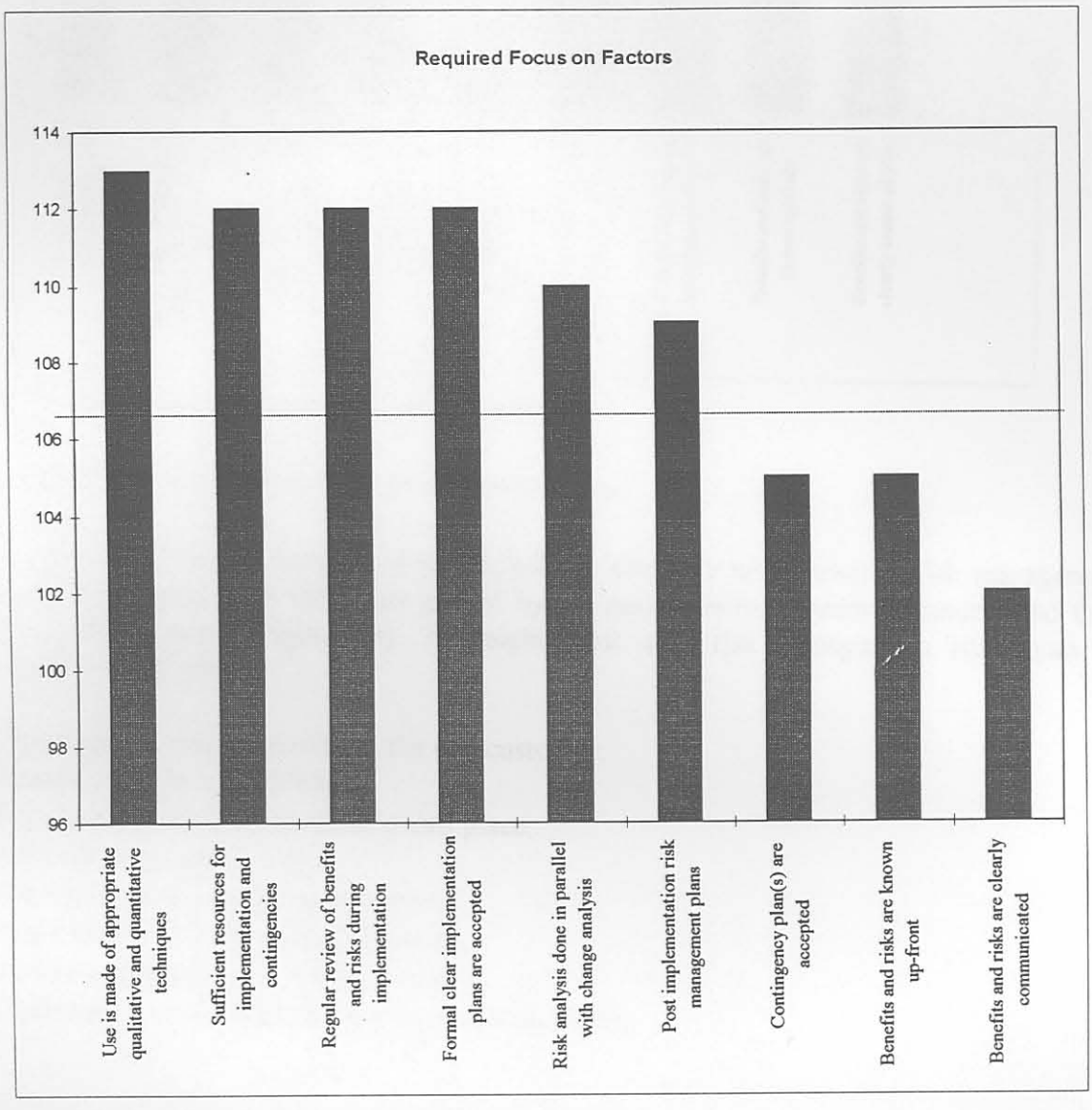


Figure 40 - Required Focus on Risk Management Factors

Figure 41 shows the difference between the factors currently enjoying attention compared to where the respondents believe that the attention should be placed. This is an indication of where the effort would be required, should a risk management strategy be put into place. The 6 most significant gaps were centred around the following factors:

- A contingency plan clearly mapped to the implementation plan exists and is accepted.
- Implementation of the change is managed, with the benefits and risks being reviewed regularly.
- Formal clear implementation plans exist and are accepted.
- Post implementation risk management plans are drawn up.
- Benefits and risks are known and quantified before the change solution is selected and implementation commences.
- Benefits and risks are made known to all being affected indirectly or directly by the execution of the change.

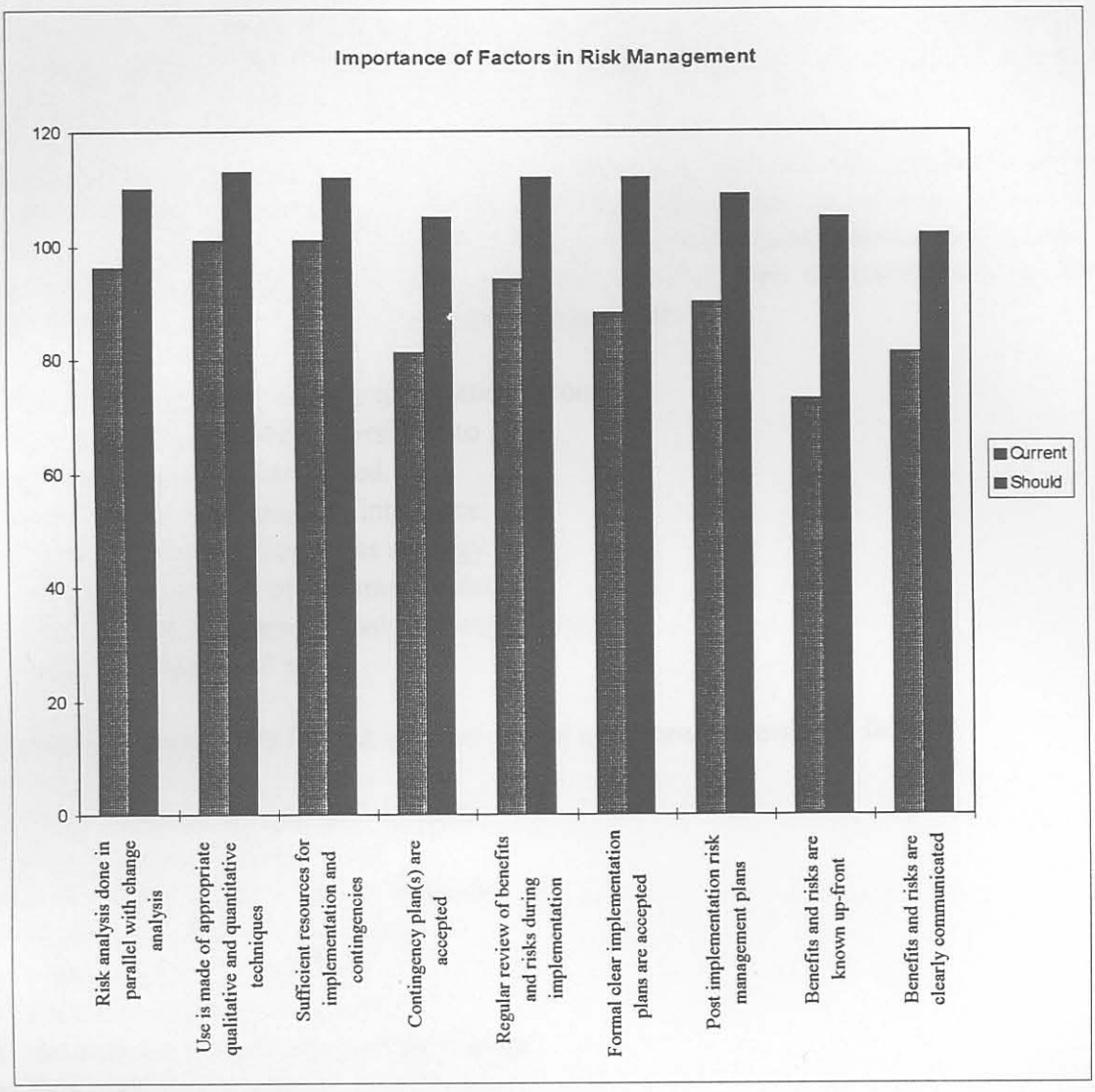


Figure 41 - Importance of Factors in Risk Management

(vi) Techniques used in risk management (Question 13)

This question aimed to understand the techniques currently being used in risk management (Figure 42). These were then also graded by the respondents in order to understand their relative effectiveness (Figure 43). The eight most used risk management techniques, in descending order are:

- Focus on delivering benefits to the end customer.
- Ensure a vision is established.
- Put strong committed leadership into place.
- Address employees' needs.
- Put performance measures into place.
- Align initiative with business strategy.
- Ensure a high level of communication.
- Undertake a cost benefit analysis exercise up-front.

There is not a significant difference between the techniques ranked 8th and 9th. The 12 criteria following the 8th are however grouped closely together. These are:

- Train resources in the required skills.
- Empower employees.
- Plan for change management.
- Ensure the technique/approach is fully understood by all.
- Use suitable implementation methods.
- Change management paradigms.
- Understand risks and develop contingencies.
- Focus on changing behaviour.
- Nurture and use leadership.
- Use experienced consultants.
- Articulate a compelling need for change.
- Encourage creativity.

The two groupings described above indicate the top 20 techniques used by organisations in the management of risk. The following nine techniques enjoyed increasingly less use, with "preventing scope creep" ranking significantly last.

The evaluation of the effectiveness provides an interesting picture in that although a technique may be used more frequently, it does not necessarily indicate that the technique is more useful as shown in Figure 43. The first significant grouping of techniques does however comprise of the first 8 frequently used techniques as described above. Their effectiveness does however rank differently, as described below in descending order:

- Focus on delivering benefits to the end customer.
- Put strong committed leadership into place.
- Ensure a vision is established.
- Put performance measures into place.
- Align initiative with business strategy.
- Ensure a high level of communication.
- Undertake a cost benefit analysis exercise up-front.
- Address employees' needs.

The next 13 techniques formed a cluster, listed in descending order as follows:

- Train resources in the required skills.
- Plan for change management.
- Use suitable implementation methods.
- Change management paradigms.
- Nurture and use leadership.
- Focus on changing behaviour.
- Articulate a compelling need for change.
- Empower employees.
- Understand risks and develop contingencies.
- Ensure the technique/approach is fully understood by all.

- Use experienced consultants.
- Encourage creativity.
- Test solutions before implementation.

Although their effectiveness ranked in different order when compared to their use, the top 20 techniques comprised of the same 20 techniques. "Prevent scope creep" also ranked significantly last in terms of risk management technique effectiveness.

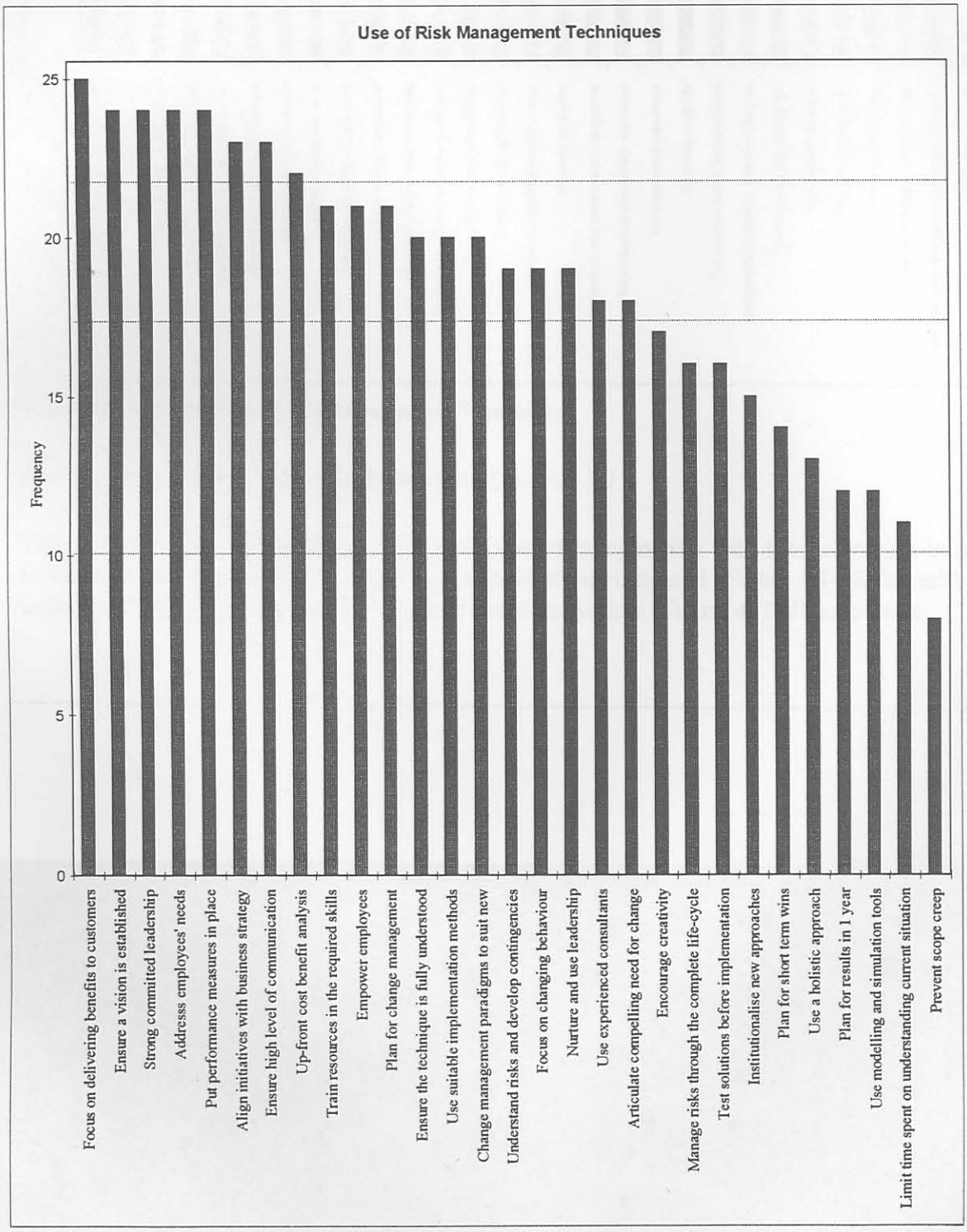


Figure 42 - Use of Risk Management Techniques

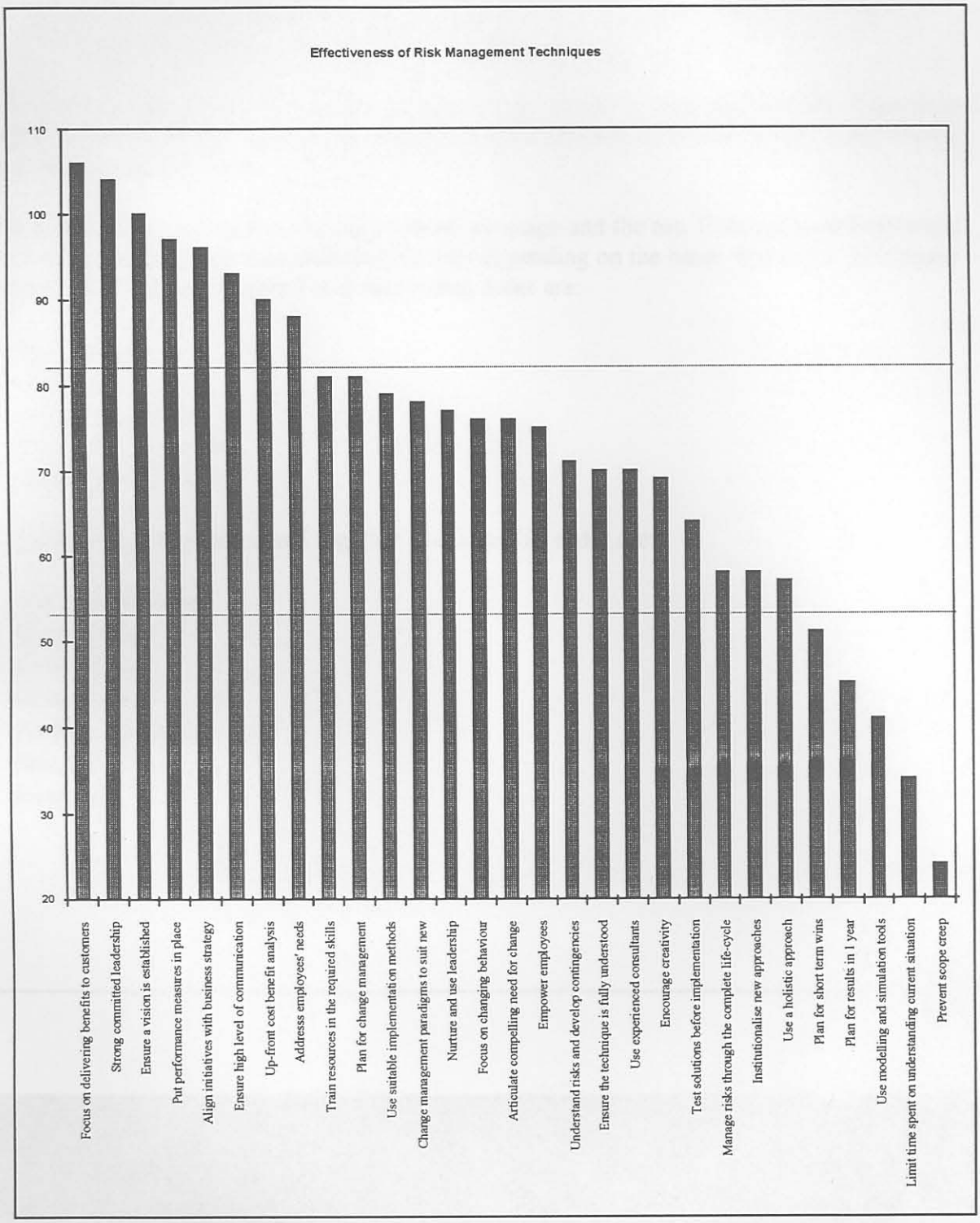


Figure 43 - Effectiveness of Risk Management Techniques

(vii) Tools used to facilitate risk management (Question 14)

This question aimed to understand the tools used in conjunction with the techniques in order to manage this risks. Firstly, the use of the tools are investigated (Figure 44), followed by an understanding of the respondents rating of the effectiveness (Figure 45) of these tools.

From Figure 44, two thirds of the respondents (who practise risk management) indicated that they used the following four tools:

- Forecasting.
- Market research.
- Scenario planning.
- Return on investment (in its various forms).

The next category of between one third and two thirds of the respondents, indicated the following group of tools as ranked in descending order:

- Return on net assets.
- Net present value.
- Outsourcing.
- Internal rate of return.
- Simulation.
- Contracting.
- Insurance.
- Portfolio management.

These two groups of tools account for the top 12 tools used by organisations who responded to the market research. None of the respondents indicated that they made use of utility theory as a risk management tool.

It is worth noting that again, the top 12 based on usage and the top 12 based on effectiveness were unity, even though they ranked differently depending on the basis. The top 5 tools based on their effectiveness (Figure 45) in descending order are:

- Market research.
- Forecasting.
- Scenario planning.
- Return on investment.
- Return on net assets.

The following 7 tools clustered together in descending order are:

- Net present value.
- Outsourcing.
- Contracting.
- Internal rate of return.
- Portfolio management.
- Simulation.
- Insurance.

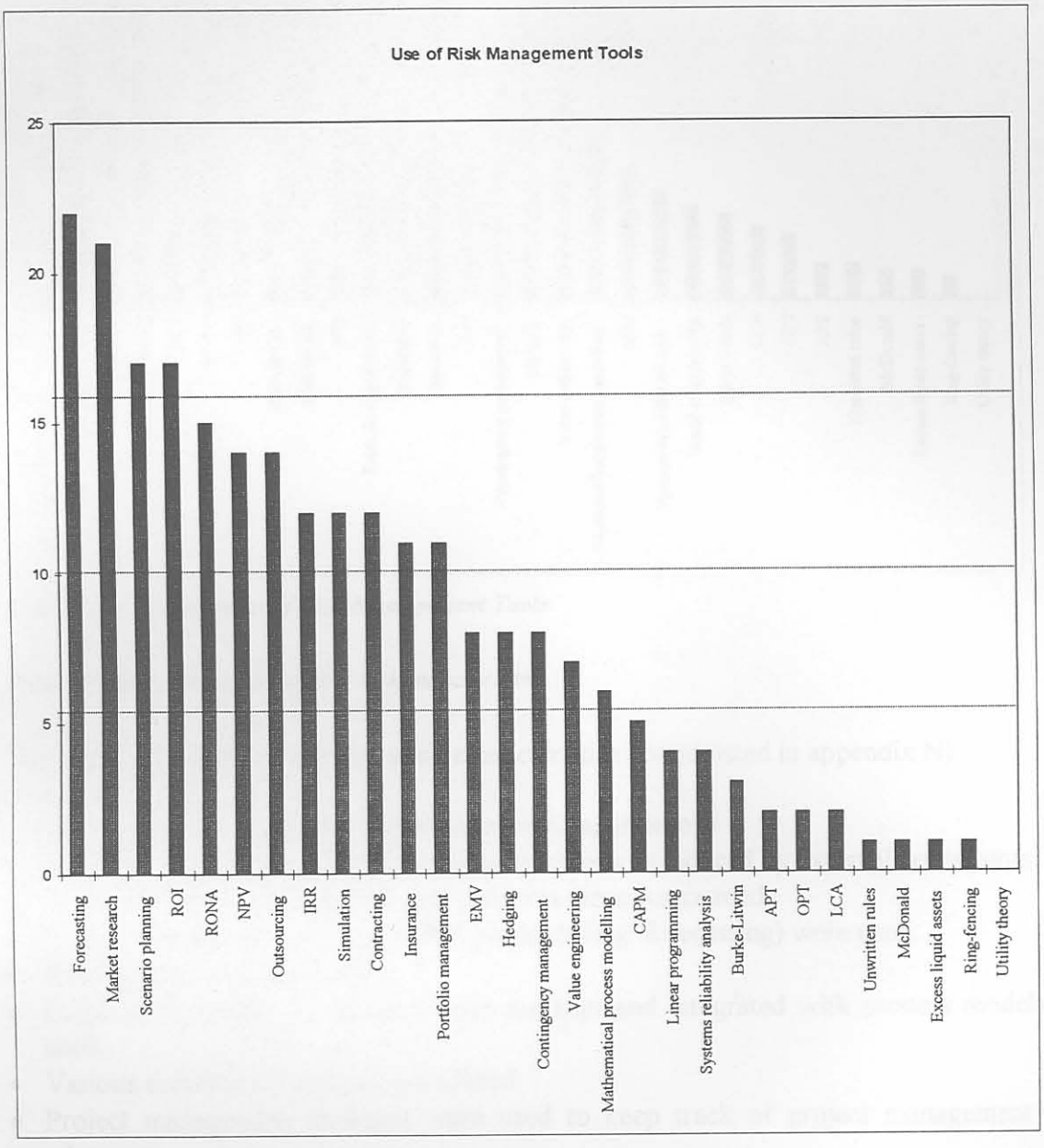


Figure 44 - Use of Risk Management Tools

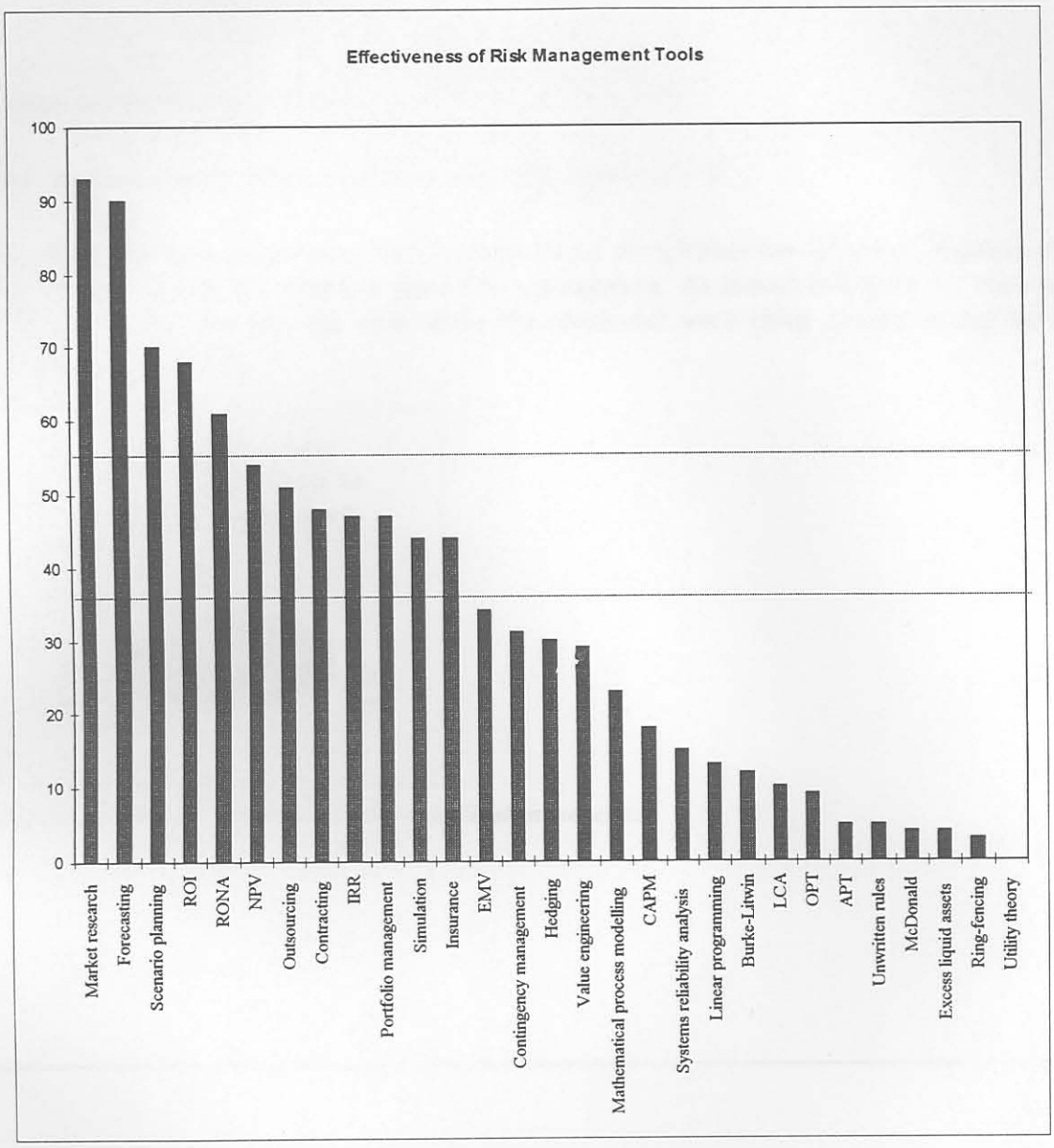


Figure 45 - Effectiveness of Risk Management Tools

(viii) Products used to support risk management

The products listed had the following characteristics (detail listed in appendix N):

- Mostly were internally developed for specific applications.
- Various tools were based on or used for methods introduced by external consultants.
- Some services and hence tools and products were outsourced.
- Some of the functionality from ERP products (e.g. forecasting) were used.
- Spreadsheets were used often.
- CASE tools where the business rules are kept and integrated with process models were used.
- Various simulation packages were listed.
- Project management packages were used to keep track of project management issues where necessary.

(e) Respondent's opinion of risk management in business change findings

(i) Modern-day change initiatives and behaviour (Question 16)

This question aimed to understand the respondents opinions on whether modern change initiatives where predominantly focused on inducing a change in behaviour of people. Of the total, the majority or 54% indicated that they felt this was indeed the case, 29% felt this was not the case, while a reasonable proportion (17%) were unsure. This is shown in Figure 46.

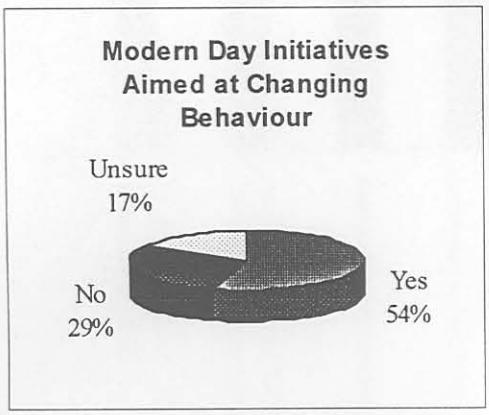


Figure 46 - Modern Day Initiatives Aimed at Changing Behaviour

(ii) Business change failure and risk management (Question 17)

Respondents were asked what their opinions were on whether the failure of business change initiatives could be attributed to poor risk management. As shown in Figure 47, the majority (62%) felt that this was the case, while the remainder were either unsure or replied in the negative (19% each).

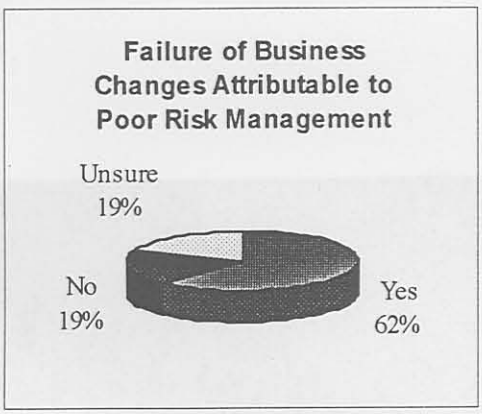


Figure 47 - Failure of Business Change and Risk management

(iii) Benefits of risk management (Question 18)

Respondents were questioned on their opinions regarding the benefits of institutionalising a formal risk management approach as part of their business change initiatives. These benefits are ranked in order as shown in Figure 48.

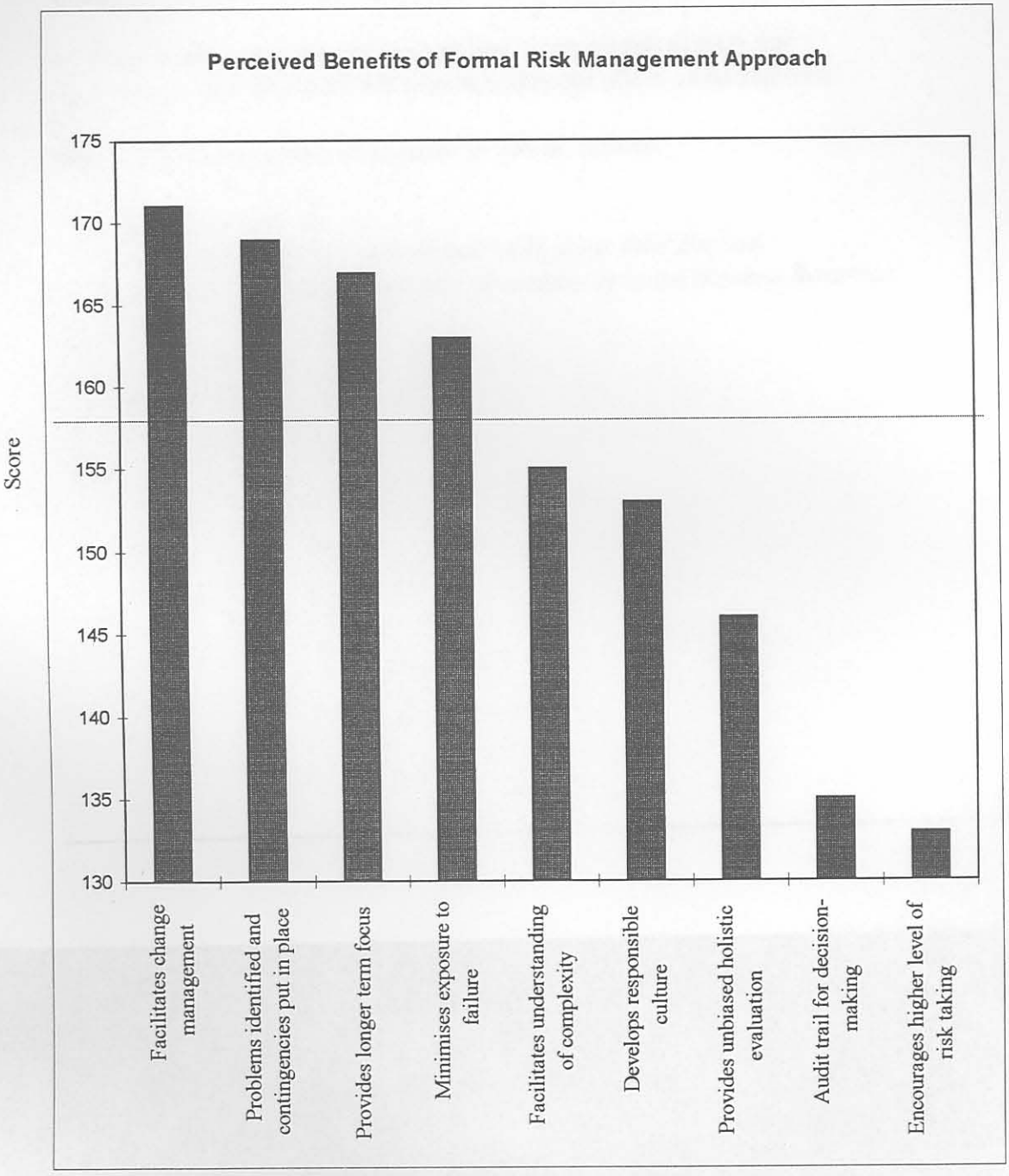


Figure 48 - Perceived Benefits of a Formal Risk Management Approach

From Figure 48 three groupings of benefits are evident. These are listed below.

Biggest benefits:

- Facilitates change management.
- Problems identified and contingencies put in place.
- Provides longer term focus.
- Minimises exposure to failure.

Medium benefits:

- Facilitates understanding of complexity.
- Develops responsible culture.
- Provides unbiased holistic evaluation.

Minimal benefits:

- Audit trail for decision-making.
- Encourages higher level of risk taking.

(iv) Disadvantages of risk management (Question 19)

Similarly, respondents were asked what they felt the disadvantages of institutionalising a formal risk management approach would be. As shown in Figure 49, there are two distinct groupings regarding the disadvantages. The two largest disadvantages are (in descending order):

- Some useful solutions may be lost due to the perceived high risk.
- A new formal approach will require additional effort, skills and time.

Disadvantages perceived to be lesser in nature, include:

- It may limit creativity.
- No suitable integrated methods and tools are at their disposal.
- It provides for another dimension of complexity in the business dynamics.

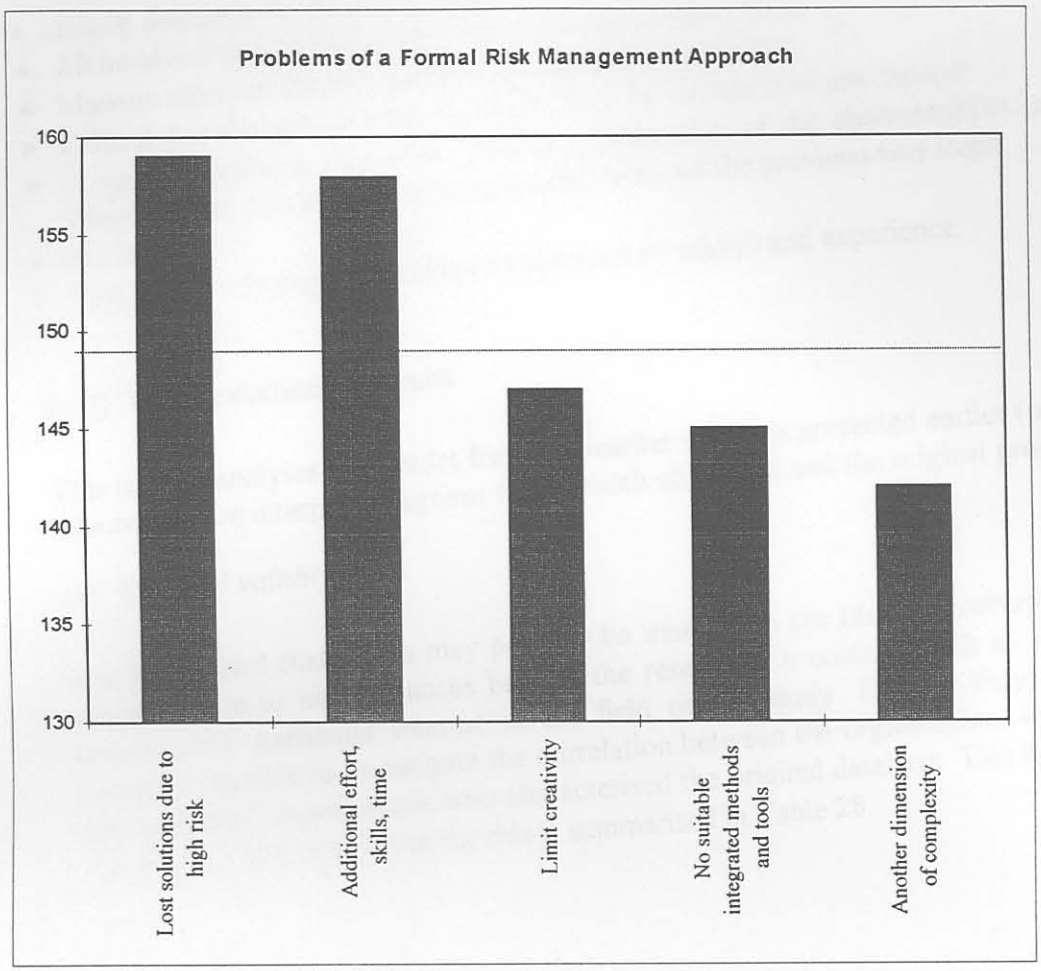


Figure 49 - Perceived Disadvantages of a Formal Risk Management Approach

(v) Opinion of generic approach to risk management (Question 20)

Respondents were questioned on whether they felt that a generic approach for managing the various types of risk in business change could be employed. The majority (50%) felt that this was possible, 31% felt that it was not, while 19% indicated that they were unsure regarding this.

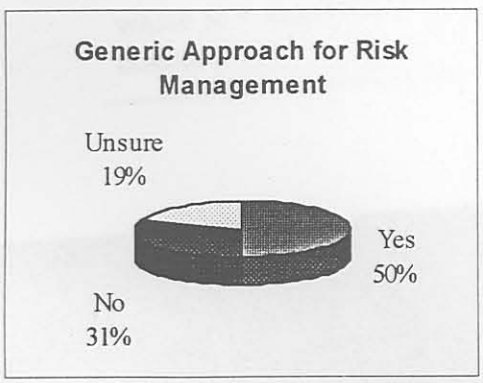


Figure 50 - Generic Approach to Risk Management

(vi) Other important factors (Question 21)

Respondents were able to provide any other comments they felt were pertinent or would add value to the research. The following comments were provided:

- Differences in business in terms of local versus international.
- Expectations.
- Political influences.
- Establishment of a change steering committee under chairmanship of CEO.
- Involvement of HR function in change process.
- Commitment to on-going communication to all levels in the organisation.
- Understanding behaviour.
- Adjust solutions to enterprise culture.
- All involved should understand and contribute to the vision.
- Manage stress of change agents and targets of the change.
- Critical that the sponsors are more active in the change than anyone else.
- A generic business algorithm. Then a classification of the characteristics on importance. Then a failure mode and criticality model based on the previous two steps.
- Flexibility.
- Selection of the right people involved based on talents and experience.

3.3.3 Interpretation of results

This section analyses the results from the market research presented earlier (paragraph 3.3.2). The results are interpreted against the research objectives and the original propositions.

(a) External validity

It is recognised that a bias may possibly be inherent in the results received from the market research, due to circumstances beyond the researcher's control, such as a particular set of respondents' particular interest in the field of the study. Despite these constraints, it is however possible to investigate the correlation between the organisations who replied and the percentage of organisations who characterised the original database. This is done be means of the χ^2 test[1]. The calculation for this is summarised in Table 28.

[1] This is given by

$$\chi^2 = \sum_{i=1}^{r}\sum_{j=1}^{c}\frac{(fo_{ij} - fe_{ij})^2}{fe_{ij}}$$

where *fe* = expected, *fo* = observed, $(r\text{-}1)(c\text{-}1)$ = degrees of freedom and r = rows and c = columns.

Table 28 - External Validity Calculation

Sector	fo	fe	$\chi 2$
Manufacturing	40.5	36.1	0.52
Distribution	4.8	8.4	1.59
Retail	7.1	10.6	1.15
Mining	4.8	9.7	2.48
Financial Services	14.3	13.4	0.06
Computer & Associated Services	4.8	5.7	0.15
Engineering & Construction	7.1	6.2	0.15
Other	16.7	9.9	4.62
TOTAL	100	100	10.72

For 7 degrees of freedom χ^2 at 90% significance is 12.02. In this case 10.72 < 12.02, so the null hypothesis is accepted as the responses can be considered representative of the sample.

The analysis of the results of the questionnaire follows. This is done against the respective objectives.

(b) Objective 1

(i) Proposition 1

There are 6 types of changes that can be undertaken by a business to improve performance. These changes are common to all industries.

(ii) Analyses of responses

This analysis is based on the responses to question 2, 3, 5 and 6. The two largest homogenous sectors that responded represent the manufacturing and mining sectors, in descending order. While the analysis can be applied to the population targeted, the financial and particularly manufacturing sectors would be well characterised due to their relative loading (54% of total respondents).

The majority of business have been through a business change of sorts recently as shown in Figure 51.

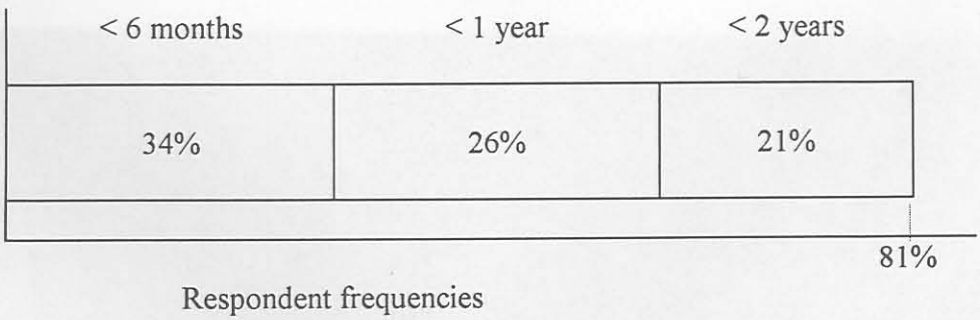


Figure 51 - Most Recent Change Initiatives

These intervals indicate that 81% of all the businesses have been through a change initiative in the last 2 years. This would suggest either that there is a coincidence that these diverse entities changed in the last two years or that business change is a frequent phenomena brought about by internal and external processes. With the likelihood of the former being very low, it appears reasonable that the latter holds true.

The responses to the types of change initiatives recorded by the respondents were similar when viewed against Martin's 5 level hierarchy. Table 29 shows the frequency and percentage distributions of industry respondent type against change type. This is based on the analysis between the results of question 2 and question 5.

Table 29 - Change Types by Industry Sector[1]

	Frequency								Percentage							
	Manufacturing	Distribution	Retail	Mining	Financial	Computers	Engineering	Other	Manufacturing	Distribution	Retail	Mining	Financial	Computers	Engineering	Other
CI	6	1	1	2	4	1	2	4	21	14	10	33	14	17	29	31
PR	6	2	1	2	5	1	2	1	21	29	10	33	18	17	29	8
VSR	7	2	2	1	5	2	2	2	24	29	20	17	18	33	29	15
ER	4	1	2	1	6	1	1	2	14	14	20	17	21	17	14	15
SV	4	1	3	0	6	0	0	4	14	14	30	0	21	0	0	31
FO	2	0	1	0	2	1	0	0	7	0	10	0	7	17	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Question 6 relates to specific initiatives currently being undertaken in the respondents' organisations. The purpose of this question is to focus on the use of specific initiatives being executed by organisations as opposed to the types of initiatives. The results of the analysis indicate the existence of three distinct levels of initiative. These initiatives cut across all change types as shown in the matrix presented as Table 30[2].

Table 30 further indicates the distribution of the use of the initiatives across the various sectors. A test for similarity in use between sectors is not possible as the respondents' sample size in the smaller sectors is too small to make a meaningful percentage-wise comparison between themselves and other sectors. There is however no need for accuracy in this regard. Illustration of commonality in use in general as well as the lack of use across the sectors is sufficient.

[1] CI = continuous improvement, PR = procedure redesign, VSR = value stream reinvention, ER = enterprise redesign, SV = strategic visioning, FO = financial optimisation.

[2] Table 30 is achieved by means of a cross tabulation between question 5 and question 6 and question 2 and question 6. This was facilitated by means of NCSS and Excel.

Table 30 - Relationship between Initiatives, Types of Initiative and Sectors

Initiative	Change Type							Sector							
	Continuous improvement	Procedure redesign	Value-stream reinvention	Enterprise redesign	Strategic visioning	Financial optimisation		Manufacturing	Distribution	Retail	Mining	Financial	Computers	Engineering	Other
Reduce overheads	X					X		7	8	8	11	7	8	15	8
BPR		X	X					7	0	8	11	9	17	0	7
Streamlining	X		X					6	8	4	0	7	8	15	8
Empowerment	X							5	8	8	11	9	8	8	7
Strategic Management					X			6	0	0	11	9	17	8	8
Outsourcing				X				7	8	8	0	7	0	0	7
Benchmarking	X	X	X		X			6	8	8	11	9	0	0	5
Rightsizing	X	X	X			X		7	0	8	0	4	0	8	5
Increase sales	X							6	0	8	0	4	8	15	5
Strategic Alliances				X	X			4	0	8	0	4	8	15	7
Teamwork	X	X						4	8	8	0	9	0	0	7
TQM	X	X						5	8	0	11	0	8	0	5
WCM	X	X						7	8	0	0	2	0	0	2
Learning organisation	X	X						4	8	4	0	7	0	0	3
ABC	X					X		3	8	4	0	2	0	0	7
JIT	X	X						5	8	8	0	0	0	0	0
MBWA	X							4	0	4	11	2	0	0	2
Change in business direction				X	X			1	0	0	11	7	8	8	3
Other	X	X	X	X	X	X		0	0	0	0	4	0	8	5
TPM	X	X						3	8	0	0	0	0	0	0
TOC	X	X						1	0	0	11	0	8	0	0
Intrapreneuring	X							1	0	0	0	0	0	0	2
One-minute managing	X							0	0	0	0	0	0	0	0

(iii) Conclusions

It is possible to draw the following conclusions from the data analysis and discussions:

- The conclusions will best fit the manufacturing and financial sectors respectively. They can however also be inferred in other sections.
- Business change is a frequent phenomena, any particular form of which, taking place generally at least less than every 2 years.
- The types of business change initiatives undertaken by an organisation are:
    - Continuous improvement

- Procedure redesign
- Value-stream reinvention
- Enterprise redesign
- Strategic visioning
- Financial optimisation

- There are three classes of change initiatives in use. Initiatives used most often include:
  - Reduce overheads
  - Business process re-engineering
  - Stream-lining
  - Empowerment
  - Strategic management
  - Outsourcing
  - Benchmarking
  - Rightsizing
  - Increase sales
  - Strategic alliances
  - Teamwork

  These initiatives inflict change at all 6 business levels and are used by all sectors in general.

(c) Objective 2

(i) Proposition 2

There are firstly, generic risks attributable to business change in general, secondly to the type of change under consideration, and thirdly, risks unique to the particular industry.

(ii) Analyses of responses

This analysis is based on the responses to question 2,4,5 and 7.

Question 4 aimed to understand the degrees of success and failure currently being achieved by the respondents. If we define success as achieving one's goals either fully or beyond expectations, then 59% of respondents felt their initiatives were successful. This indicates that the remaining 41% felt that their organisation's efforts had been unsuccessful. None felt irrecoverable damage had been done however.

In doing a cross tabulation between the success/failure experienced and type of change initiative on the one hand and sectors on the other, the picture shown in Table 31 is achieved[1].

[1] The cross tabulation between success/failure and change type must be clearly understood. In question 2, respondents were asked of their opinion of success of the change initiatives in general. It can therefore be argued that this is their general assessment (weighted average) of the success of the various change types that their organisations have been through. With this argument as basis, the trends shown in Table 31 hold true, given the limitations of sample size.

Table 31 - Success/Failure of a Change Initiative based on Type and Sector

Degree of Success	Change Type							Sector							
	Continuous improvement	Procedure redesign	Value-stream reinvention	Enterprise redesign	Strategic visioning	Financial optimisation		Manufacturing	Distribution	Retail	Mining	Financial	Computers	Engineering	Other
Disaster	0	0	0	0	0	0		0	0	0	0	0	0	0	0
Failure	5	5	4.5	11	5.3	14		18	0	0	0	0	0	0	0
Inadequate	35	50	45	17	26	29		18	50	0	50	17	100	67	66
Success	55	45	50	56	58	57		59	50	67	50	83	0	0	17
Resounding success	5	0	0	17	11	0		6	0	33	0	0	0	33	17

The individual sample sizes of change types and sectors are too small to do χ^2 comparative tests. It is however possible to derive hypotheses based on the inspection of the trends.

From the inspection, failures and successes are evenly distributed across the 6 business change types. Enterprise redesign and strategic vision do however seem to be more successful (73% and 69% respectively).

A similar distribution is true across the sectors as well. It is worth noting though that the only outright failures occurred in the manufacturing sector.

In order to understand the various types of risks in a business, risks experienced are identified, weighted and factored for common themes. This was provided by the factor analysis of question 7. This analysis provides two views, namely:

- Identification of individual risks deemed to be important.
- Establishment of risk themes or categories that are important.

The value of the former lies in understanding the individual risks with bigger impact. There are 4 distinct groupings as shown in Figure 32 The first group of major risks are:

- Lack of top management commitment.
- Poor communication.
- No focus on financial implications.
- Lack of customer focus.
- Poor vision.
- Ignore employee concerns.
- Poor change management attention.

The next 8 important individual factors are:

- Implement without testing.
- Mis-alignment with strategy.
- Not anchoring changes in culture.
- Failure to appreciate risks.
- Not anticipating effort and energy.
- Inappropriate implementation method.
- No sense of urgency.
- Not consider holistic issues.
- Poor attention to innovation.

In order to provide meaningful framework constructs later however, the risk themes are more important. These provide a more fundamental understanding of the major risk drivers. The factor analysis indicates that 4 major factors are present. The risks that loaded onto these are shown in Table 24, Table 25, Table 26 and Table 27 respectively.

The themes from these factors are synthesised as follows:

The statements on each factor are analysed in terms of their affinity. This is determined by establishing the key underlying themes - generally two. The first is usually due to the heavily loaded statements while the second provides a qualifier due to the supporting statements, i.e. those with loading of between |0.4| and |0.6|.

Using this rationale, the following factors are constructed:

- **Factor 1**: (method, impact)
  No reliable methods and tools which are accentuated by the lack of understanding regarding the impact of the change on the business.
- **Factor 2**: (results, involvement)
  Lack of focus on short term business and people orientated results manifested in poor greater organisational involvement.
- **Factor 3**: (leadership, life cycle)
  Poor leadership throughout the complete change life cycle.
- **Factor 4**: (stakeholders, empathy)
  Not having empathy for or focusing on the stakeholders' needs.

The rationale behind the factor constructs follows:

- **Factor 1** - The statements with the heaviest loading focus on the use of proper methods, tools and testing. The appreciation of risk is a facet of proper method. The use of experienced specialists ties in with this theme. The supporting statements focus mostly on the organisational impact, including financial implications, alignment with strategy and energy and resource impacts. Change management also focuses on resource impacts.
- **Factor 2** - The statements with heavy loading bring the strong results orientated focus through very clearly. The supporting statements do however bring the strong results driven focus back into the reality of organisational context with the issues of holistic consequences, poor communications and ignoring employee concerns.

- **Factor 3** - The heavily loaded statements clearly indicate a strong leadership theme. The supporting statements qualify this further, indicating that this business guidance is required throughout the business change life cycle.
- **Factor 4** - The last factor can sometimes be difficult to synthesise into common themes. The key factors in this case are inclined towards addressing the stakeholders' needs and having empathy with this. Too much time spent on analysing the current situation is focusing on the past and not the present needs. Declaring success too soon indicates a lack of empathy by creating expectations that cannot be fulfilled yet. Holistic consequences takes on the stakeholder theme again. Failure to anticipate energy and effort has a very low loading. It does however hint towards empathy for impact on stakeholders.

In order to understand the nature per sector and per business change type, a randomised block design [106] is used[1]. The following "analysis of variance" table (Table 32) is used.

Table 32 - Analysis of Variance Table

Source of variation	Degrees of freedom	Sum of squares	Mean square	F_{Calc}
Treatments	$a-1$	*SS(Tr)*	$MS(Tr)=\frac{SS(Tr)}{a-1}$	$F_{Tr}=\frac{MS(Tr)}{MSE}$
Blocks	$b-1$	*SS(Bl)*	$MS(Bl)=\frac{SS(Bl)}{b-1}$	$F_{Bl}=\frac{MS(Bl)}{MSE}$
Error	$(a-1)(b-1)$	*SSE*	$MSE=\frac{SSE}{(a-1)(b-1)}$	
Total	$ab-1$	*SST*		

The results of the analysis of variance tables of the risk per sector and the risks per business change are shown in Table 33 and
Table 34.

Table 33 - Analysis of Variance Table for Risks per Sector

Source of variation	Degrees of freedom	Sum of squares	Mean square	F_{Calc}	$F_{0.01}$
Treatments	25	38	1.51	8.19	1.88
Blocks	7	11	1.57	8.47	2.74
Error	175	32	0.18		
Total	207	81			

[1] A table is constructed from a cross tabulation between question 7 and question 2 and question 5 respectively. The results are loaded with the scaled weighting. The results obtained per block are averaged to provide a common basis for evaluating block (column, i.e. sections and change types) on block. This table is then used for analysis. The 2 tables are included as appendix O.

Table 34 - Analysis of Variance Table for Risks per Business Change Type

Source of variation	Degrees of freedom	Sum of squares	Mean square	F_{Calc}	$F_{0.01}$
Treatments	25	30	1.21	35.06	1.93
Blocks	5	1	0.16	4.52	3.17
Error	125	4	0.03		
Total	155	35			

The tests for significance for differences in risks in the sectors is as follows:

1. *Null hypothesis*: $\alpha_1 = \alpha_2 = \alpha_3 = \alpha_{26} = 0$
   $\beta_1 = \beta_2 = \beta_3 = \beta_8 = 0$
   Alternative hypothesis: The α's are not equal to zero.
   The β's are not equal to zero.
2. *Level of significance*: $\alpha = 0.01$
3. *Criteria*: Reject null hypothesis: $\alpha \Rightarrow F_{0.01} > 1.88$
   Reject null hypothesis: $\beta \Rightarrow F_{0.01} > 2.74$
4. *Calculations*: See Table 33.
5. *Decision*: Since $F_{Tr} > F_{0.01}$ the risks are significantly different which confirms the results of Figure 32.
   Similarly $F_{Bl} > F_{0.01}$ which indicates that the sectors are significantly different regarding the experience of risks in these sectors.

The tests for significance for differences in risks in the business change types is as follows:

1. *Null hypothesis*: $\alpha_1 = \alpha_2 = \alpha_3 = \alpha_{26} = 0$
   $\beta_1 = \beta_2 = \beta_3 = \beta_6 = 0$
   Alternative hypothesis: The α's are not equal to zero.
   The β's are not equal to zero.
2. *Level of significance*: $\alpha = 0.01$
3. *Criteria*: Reject null hypothesis: $\alpha \Rightarrow F_{0.01} > 1.93$
   Reject null hypothesis: $\beta \Rightarrow F_{0.01} > 3.17$
4. *Calculations*: See
5. Table 34.
6. *Decision*: Since $F_{Tr} > F_{0.01}$ the risks are significantly different again confirming the results of Figure 32.
   Similarly $F_{Bl} > F_{0.01}$ which indicates that the business change types do experience the risks in different ways.

(iii) Conclusions

It is possible to draw the following conclusions from the discussions and analysis:

- The successes and failures of business change initiatives follow a similar trend across industry sectors. It can be noted however that the only failures were recorded in the manufacturing sector.
- The success of failures of the types of business change follow similar distributions for each of the 6 business change types. Table 31 does however infer that enterprise redesign and strategic visioning tend to be more successful (73% and 69% respectively).
- In general, the most important individual business risks are:
    - Lack of top management commitment.
    - Poor communication.
    - No focus on financial implications.
    - Lack of customer focus.
    - Poor vision.
    - Ignore employee concerns.
    - Poor change management attention.
- The factor analysis indicated there are 4 general trends that impact negatively on business change, these being:
    - *No reliable methods and tools which are propagated by the lack of understanding regarding the impact of the change on the business.*
    - *Lack of focus on achieving business results manifested in poor greater organisational involvement.*
    - *Poor leadership throughout the complete change life cycle.*
    - *Not having empathy for the stakeholders' needs.*
- The different sectors do experience the risks in varying degrees.
- The different business change types do experience the risks in varying degrees.

(d) Objective 3

(i) Proposition 3

Failure of business change initiatives are largely attributable to the lack of appropriate risk management.

(ii) Analyses of responses

The purpose of this analysis is to determine whether the failure of business change initiatives can be attributed to the lack of risk management. This was achieved as follows:

- Determined the impact that the lack of risk management has on the success of change initiatives.
- Evaluated the respondents' thoughts on whether business change initiatives fail due to the lack of risk management.

The former was analysed by means of a cross tabulation of the levels of success or failure against the organisations' application of risk management practice, i.e. question 4 on question 8. The cross tabulation is illustrated in the graph shown as Figure 52.

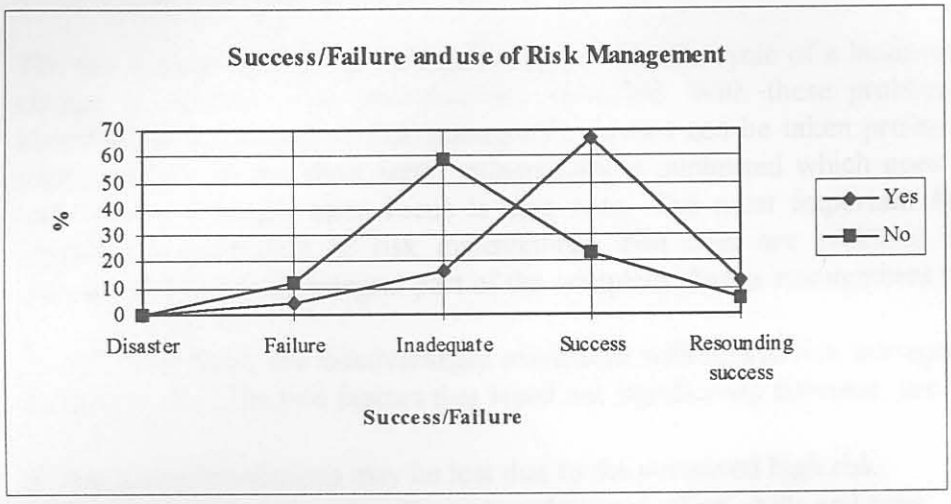


Figure 52 - Success/Failure and Use of Risk Management

Inspection of the graph indicates that there is clearly a significant difference between the success of organisations exploiting formal risk management practices and those who do not[1]. Organisations that use formal risk management practice are therefore more inclined to be successful with their business change initiatives.

It may be argued that some organisations who do not currently use risk management practices believe that merit does indeed lie in doing so. This is supported by Figure 36 where 53% of the organisations who do not currently practice risk management intend to do so. It was also previously determined that 81% of all organisations intend using formal risk management practices.

Question 17 aimed to discover whether respondents felt there was a direct relationship between business change success and risk management practice. From the analysis, the majority (62%) felt that this was the case, while the minority groups were equally sure that this was not the case as compared to those who were unsure.

(iii) Conclusions

The following conclusions can be drawn from the preceding analysis and discussion:

- Organisations that use a formal approach to risk management are more successful with business change efforts.
- Most organisations believe they should be using a formal risk management approach to managing business change.
- Business change failures can be largely attributed to poor attention to the risks associated therewith.

[1] Statistical tests are therefore not done.

(e) Objective 4

(i) Proposition 4

The perceived benefits and problems associated with risk management will reflect those described in the literature and experience.

(ii) Analyses of responses

The purpose of this analysis is to understand the benefits and problems associated with the use of risk management methods in business change initiatives. This is analysed with the assistance of questions 12, 18, 19 and 20.

The benefits associated with risk management are described in paragraph (iii). The most important of these are the following:

- Facilitates change management.
- Problems identified and contingencies put in place.
- Provides longer term focus.
- Minimises exposure to failure.

The top 4 facets appear to include a view on the life cycle of a business change. Before the change is instituted, the problems are identified. With these problem areas having been identified, it is recognised that manageable actions can be taken pro-actively in the form of contingencies. In the short term, vulnerability is minimised which goes through to the long term where a longer term focus is also seen. The most important factor recognised the proactive contribution of risk management. Not only are problems identified, but risk management forms an integral part of the complete change management requirements.

On the other hand, the disadvantages associated with formal risk management are described in paragraph (iv). The two factors that stand out significantly however, are:

- Some useful solutions may be lost due to the perceived high risk.
- A new formal approach will require additional effort, skills and time.

The two most significant disadvantages that need to be taken into consideration when devising a risk management framework focus on two different areas. The first major concern deals with the possible limitation on innovation. This ties in with one of the risks identified in business change, where innovation is not sought after. The other concern is understandable, taking the current management load into consideration. Much needed effort and resources, although limited are being poured into inflicting the change. Focus on too formal a process would drain more of the already constrained resources.

Taking these limitations into account, it is clear however that organisations who practice risk management, albeit in its various forms, are generally more successful with their business change initiatives (Figure 52).

In addition to this factor, most respondents (50%) believe that a generic approach to risk management was possible (Figure 50). Conversely 31% felt that this was not possible. It must be noted that it was not possible to question all respondents who replied in the negative as to whether they felt that their opinion was based on the macro level or on the finer techniques. It may be reasonable to assume that more positive replies would be solicited if asked about the macro level in particular.

Question 12 aimed to draw a correlation between important factors described in the literature which have been combined by those factors precipitating from business change practice. While no major differences stood out regarding the current focus on risk management factors, the following 2 ranked the highest:

- Use is made of appropriate qualitative and quantitative techniques.
- Sufficient resources and contingencies for implementation exists.

When contrasted with the respondents' thoughts on where risk management attention should be placed, the following 6 factors clearly emerged:

- Use is made of carefully selected qualitative and quantitative techniques, to manage the risks of business change.
- Sufficient resources for implementation and contingencies exist.
- Implementation of the change is managed, with the benefits and risks being reviewed regularly.
- Formal clear implementation plans exist and are accepted.
- Risk analysis is done in parallel with business change analysis.
- Post implementation risk management plans are drawn up.

The gap analysis between the current and required provides important insights for constructs as it establishes and understanding of where leverage can most be achieved. The areas where the largest gaps are as follows:

- A contingency plan clearly mapped to the implementation plan exists and is accepted.
- Implementation of the change is managed, with the benefits and risks being reviewed regularly.
- Formal clear implementation plans exist and are accepted.
- Post implementation risk management plans are drawn up.
- Benefits and risks are known and quantified before the change solution is selected and implementation commences.
- Benefits and risks are made known to all being affected indirectly or directly by the execution of the change.

(iii) Conclusions

The following conclusions are drawn from the preceding analysis and discussions:

- The questionnaire was constructed from the theory as well as experience. The benefits and disadvantages listed in the questionnaires were supported by the respondents and therefore reflect literature as well as experience.
- The most important factors in the literature as identified by the respondents align with the four themes disseminated and collated from the factor analysis on question 7.
- It is possible to use a generic approach in the management of risks in business change.

(f) Objective 5

(i) Proposition 5

There is a growing use of and demand for risk management in business change initiatives.

(ii) Analyses of responses

The validity of the above mentioned proposition is analysed by means of responses to questions 8, 9, 10 and 11.

The majority of respondents (60%) indicated that they used risk management practices in its various forms to support their business change initiatives. Of those who indicated they did not practice risk management, 53% indicated that they did intend to institute risk management methods in the future.

The majority of the organisations who do practice risk management indicated that a person or function in their organisation had been tasked with the specific responsibility for risk management. This would indicate that in general, responsibility for its management has been well defined and assigned. Where this is not the case, two possibilities exist, namely, either all relevant persons are expected to manage risk on a daily basis, or the possibility exists that some respondents may be the only persons in their respective organisations who believe in the importance of risk management. With the external validity hypothesis test, it would appear that the probability of the latter event is significantly small.

Question 11 aimed to understand the use of risk management practices throughout the complete business change initiative life-cycle. From Figure 38, the following can be seen from organisations who presently undertake risk management practices during their business change initiative:

- The traditional areas where risk management has been practised, do currently receive the most attention. These include (1) assess alternatives, (2) select solution, and develop solution.
- Areas, where risk management have traditionally not been practised, tend to be most supported in terms of where respondents feel focus should be provided in the future. These areas in particular are (1) identification of need for improvement, (2) provide contingencies, (3) implement solution, (4) operate solution and most significantly (5) phase-out.

(iii) Conclusions

The following conclusions may be drawn from the preceding discussion:

- There are currently organisations who use risk management practices as part of their business change initiatives.
- There is a growing recognition of the need to institute risk management.
- There is a recognition of the need to apply risk management in areas of the business change life-cycle not traditionally applied.
- Most organisations have assigned risk management responsibility to an individual or function. Those who have not most likely employ it on an as required basis.

(g) Objective 6

(i) Proposition 6

Local businesses do not institute formal and sophisticated risk management practices.

(ii) Analyses of responses

The following analysis is based in the responses to questions 13 through 16.

The use of techniques to manage risk in business change provides an interesting picture as shown in Figure 42 and Figure 43 respectively. The top 8 and top 20 techniques respectively out of 31 in terms of use and effectiveness are identical, just their ranking based on either criteria differs, as shown in Table 35 where only the top 8 are listed. The implication of this is that a strong relationship between use and perceived effectiveness exists.

Table 35 - Ranking of Use and Effectiveness of Techniques

Use Ranking	Effectiveness Ranking	Technique
1	1	Focus on delivering benefits to the end customer.
2	3	Ensure a vision is established.
3	2	Put strong committed leadership into place.
4	8	Address employees' needs.
5	4	Put performance measures into place.
6	5	Align initiative with business strategy.
7	6	Ensure a high level of communication.
8	7	Undertake a cost benefit analysis exercise up-front.

The use and effectiveness of tools use to support the risk management activities follow a similar pattern. The top 4 and 12 tools respectively of 31 are constituent of the same components although the ranking of use and effectiveness differs. The top 4 are shown in Table 36. Similarly it may be argued that a strong relationship exists between the use and effectiveness of risk management tools.

Table 36 - Ranking of Use and Effectiveness of Tools

Use Ranking	Effectiveness Ranking	Tool
1	2	Forecasting
2	1	Market research
3	3	Scenario planning
4	4	Return on investment (in its various forms)

The products used to assist in the management of risk are described in paragraph (viii) and appendix N. The following facets are however outstanding regarding the use of products:

- Most software based products are developed in house.
- Some tools are outsourced.
- No integrated risk management software particularly developed for the risk management of business change was encountered.

Question 16 aimed to understand the respondents' opinions regarding the nature of modern change initiatives. Most business change initiatives encountered in the literature as well as experience indicated the predominance of behavioural change focus. This was confirmed by the respondents' where 54% indicated that this was indeed the case. Of the total, 29% indicated the negative, where the remaining 17% felt unsure.

(iii) Conclusions

The following conclusions can be drawn from the preceding analysis:

- There is a strong relationship between the use and effectiveness of techniques to manage business change initiatives.
- There is a strong relationship between the use and effectiveness of tools to manage business change initiatives.
- There is a clear grouping of the top tools and techniques. These are indicated in Table 35 and Table 36 respectively.
- No formal integrated risk management methods and tools are in place that support the management of risks in business change.
- No integrated software package is being used to support the risk management environment.
- Most modern change initiatives are aimed at changing human behaviour.

3.3.4 Conclusions

This section aims to summarise all the preceding conclusions by means of evaluation of how the research objectives have been met. This is discussed as follows:

- **Proposition 1** - Objective 1 was to investigate the nature of the different change types in the different industries in South Africa. There are 6 levels of business change that can be undertaken by a business to improve business performance. The analysis did indicate that these changes are common to all industry types. Proposition 1 does therefore hold true.

- **Proposition 2** - The purpose of objective 2 was to understand the nature of the risks associated with the different types of business change and the industries in South Africa. It appears that there are generic risks that can be ascribed to business change in general. These risks can be summarised into 4 general risk themes. The various types of change that a business can undergo are prone to varying degrees of risk and therefore have different risk profiles. Similarly, various industries have different risk profiles and experiences. Proposition 2 therefore holds true.
- **Proposition 3** - Objective 3 aimed to understand the impact that risk management has in terms of the success of business change. Proposition 3 is upheld as from the analysis, organisations that use a formal approach to risk management are more successful with their business change efforts.
- **Proposition 4** - The purpose of objective 4 was to investigate the benefits and problems of risk management as an instrument in ensuring success. The benchmark for this is how the research reflects against the literature and practice. The benefits and disadvantages listed in the questionnaires were supported by the respondents and therefore reflect literature as well as experience. Proposition 4 therefore holds true.
- **Proposition 5** - Objective 5 aimed to determine whether a growing need for risk management in business change is being manifested. There are currently organisations who use risk management practices as part of their business change initiatives. There is a growing recognition of the need to institute risk management. Proposition 5 holds true.
- **Proposition 6** - Objective 6 aimed to investigate the level of sophistication in terms of the usage and availability of relevant risk management methods. Proposition 6 holds true as local organisations do not use formal or sophisticated risk management practices.

3.4 Critique: literature study and market research

3.4.1 Literature study

The following section aims to evaluate the availability and quality of literature as pertaining to this study. The major points are summarised in the following list:

- A wealth of literature is available in various media in areas ancillary and auxiliary to the field of study. There is however, a very limited amount which pertains directly to the field of study as expressed in this document[1]. The most valuable direct literature contributions included:

    - Charette [10, 65, 66]
    - Martin [55]
    - Carr and Johansson [82]
    - Brown et al [90]
    - Schumacher [54]
    - EIU [143]

    As could be ascertained, a limited amount of literature based their theories on quantitative data or any form of scientific method. Much of the literature is however

[1] As was known at the time of the literature study.

based on the experience of either academics or practitioners. This cannot therefore be discounted. It is the task, inter alia, of the literature study to test the most significant propositions.

- The researcher experienced more literature becoming available the longer the study continued, i.e. more people and organisations are finding the field more important and are expressing this more in the public domain. At the time of the literature study it was still evident that much work is required in the field if it could be said that a fair correlation exists between the knowledge in a field and the amount of material available on the subject.
- Some of the material that is very influential in the business world does not necessarily have appropriate theoretical foundation. It is possible that "off-the-cuff" theory may have more influence in practice than material that is scientifically sound. For example, the Harvard Business Review is a very popular business journal although it is not considered a scientifically accredited publication. This brings the old debate to the fore though - does scientific rigour aid or limit innovation and contribution to the commercial field, in contrast with bold, yet unproven theory?

3.4.2 Market research

The following list evaluates and clarifies limitations in terms of the market research undertaken:

- The research was conducted towards the end of 1995. The sample and the population was at a particular level of maturity. It is reasonable to assume that with experience the population will gain experience in terms of the questions proposed. Most of the experiences will however remain consistent. The most important results of the research did however indicate the following:
    - There is a growing need to understand and manage risk in business change. In terms of the level of maturity in this field, it is reasonable to expect that another 5 to 10 years of work will be required directly in this field of endeavour.
    - The four major factors that are needed to deal with risk are generic enough to be valid in the foreseeable future.
- The research is limited to the South African business environment. The implications of this limitation are:
    - At the time of the research South Africa was coming out of a cocoon imposed by sanctions lifted a few years previously and hence had limited multi-national experience.
    - Many multi-nationals were present in the region in South Africa in the sectors targeted and hence a significant level of change was being experienced.
    - While technology and markets are similar between South Africa and other economies, the labour situation is perhaps a little different. In general however, there was no significant difference between the findings of the research and research done elsewhere in the world.
- The market research achieved its stated objectives and is useful for inclusion in the greater study.

3.5 Assessment of risk management approaches in other fields

The concepts of risk and uncertainty are explored in areas other than where business change is traditionally analysed. The purpose of this is to determine whether common threads exist and to pursue synergy arising from cross-functional pollination. These have been summarised as follows:

3.5.1 Financial

This section explores the risks and risk management techniques employed in the financial investment field. An organisation with surplus funds has the option of investing either in capital projects or the financial markets. Standard approaches used are NPV and IRR to assess the present value of cash flows and the related discount rate.

These methods do not however account for the riskiness of the investment. To facilitate understanding of the total investment risks of the options to invest in the financial markets or a capital project, two types of risks are defined, namely systematic and unsystematic risks. Ross et al [107] define:

- **Systematic risk** - a risk that influences a large number of assets. This is also termed as the market risk.
- **Unsystematic risk** - a risk that affects at most a small number of assets. This is also termed unique or asset specific risk.

Table 37 summarises these risks and the typical management techniques employed.

Table 37 - Financial Investment Risks and Techniques

Risk	Example	Techniques for Managing Risk
Systematic/market risk	Uncertainties about general economic conditions like GDP, interest rates, inflation, etc.	• Beta coefficient • CAPM • APT • OPT
Unsystematic/unique/ asset specific risks	Labour strike, unanticipated law suites, industrial accidents, etc.	• Portfolio management • Diversification

Dimson [108] evaluates the different approaches to assessing the cost of capital[1]. This is summarised in Table 38.

[1] He indicates that "the cost of capital is an opportunity cost. It is the return which could be obtained in the stock market from an investment that is similar in risk and maturity to the capital tied up in the project."

Table 38 - Evaluation of Approaches Determining the Cost of Capital

Approach	Method	Description/Evaluation
Financial economics	Capital asset pricing model (CAPM)	Standard approach to estimating the cost of capital.
	Arbitrage pricing theory (APT)	It is an extended version of CAPM with multiple sources of risk and return. Tends to be used by utilities in the USA.
	Option pricing theory (OPT)	Applied to valuing projects having capital projects with option-like characteristics. Tends to be used for valuing natural resource investments such as mines.
	Constant growth model	Its drawback is it assumes a dividend growth-rate that can be indefinitely sustained. It also ignores the riskiness of the investment.
Accounting based[1]	Dividend yield	It understates the cost of capital because it ignores the capital gains anticipated by the investor.
	P:E ratio/ earnings yield	It ignores expected growth in the company's earnings.
	Return on capital	A low accounting rate of return **does not** imply a low cost of capital.
	Return on marginal project	Project are ranked from most to least attractive and accept those of highest return. This is circular as projects cannot be ranked correctly unless the cost of capital is known.
	Funding cost	Using the interest rate payable by the company, the discount rate does not affect the full riskiness of the investment.
	Past return on company shares	This implies that poorly performing companies have the lowest cost of capital.

3.5.2 Banking

The banking sector deals with various forms of risk on a day to day basis from focused specialised areas, through to macro-economic level. These risks have been summarised in Table 39.

[1] Dimson views these approaches as flawed. The reasons for this are indicated in the description/evaluation column of the table.

Table 39 - Summary of Risk Management in Banking

Risk	Description	Techniques for Managing Risks
Credit risk	The risk that loans cannot be repaid by a debtor on time or otherwise.	• Actuarial principle of risk diversification [109] - portfolio of population groups, geographic areas, products, purposes and debt smoothing (balance between short and long-term). • Prudent lending [110] to ensure that losses < (total loan charges of whole loan portfolio - loan costs - margin). • In the event of risks realising, options include [109]: conversion of debt to equity, agreeing on a period where only interest is settled, lowering the interest rate or lengthening the loan payback period.
Interest rate risk	Balancing the book between long-term fixed lending rates and short-term financing (borrowing) rates, i.e. different periods of maturity between assets and liabilities.	• Balance borrowing short and lending long against short-term rates [110]. • Align maturities between assets and liabilities [111]. • Methods of analysis include [111]: maturity structure, balance sheet projection, gap exposure, net interest income projection, interest sensitivity. • Strategies for managing risk include [111]: engaging a new pricing strategy, adjusting mix of assets and liabilities (volume strategy), selling the risk to a party willing to absorb this (hedging strategy).
Liquidity risk	Abnormal demands for cash, transfers or term loans and not being able to redeem these commitments on demand.	• Hold excess statutory liquid assets [110]. • Borrow through money market to meet cash drains [112]. • Cash flow management [113]. • Short-term maturity structure of loans [112]. • Turn long-term assets involving low credit risk (e.g. 20 year government stock) into cash [112]. • Turn certain short-term "liquid" assets into cash [112]. • Manage the portfolio (mix and term structure) of liabilities and assets [112]. • Decentralised decision-making on the asset side and centralised monetary and control on the liability side [112].
Currency risk	The gap between forex receivables and payables and interest payable on	• Forecasting. • Manage risks in foreign markets by creating a mismatch between its spot (cash) and forward

Risk	Description	Techniques for Managing Risks
	these. Currency risk is constituent of transactional, economic and translation risks.[1]	books by means of (1) natural business, (2) doing forward swaps on the market or (3) interest rate arbitrage [114]. • Hedging currency risk exposure [114].
Investment risk	Impact of changes in interest rates, shares and property value on marketable securities and fixed assets other than by default or late payment.	• Expected rise [110] - shorten maturity structure of the fixed-interest securities portfolio or sell related shares. Expected fall - selected sales of such assets. • Structure on optimum assets mix (portfolio) [115]. • Hedging [115].
Capital risk	The risk of a bank's own capital resources being impacted on by external influences. This risk is common to other organisations.	• Maintain adequate capital resources to protect depositors against operating losses and investment losses [110]. • Scenario planning [116]. • Optimisation of capital structure using linear programming techniques [116].

[1] Note: These are the same risks typically experienced by any other organisation dealing with forex, only degrees differ.

While the table summarises management approaches that can be used to deal with each of the risks, it is important to note that this cannot be done in isolation. For example, in order to increase profits a bank may borrow short-term and lend these funds long term [109]. Interest rate exposure will be improved but at the cost of decreased bank liquidity. This is an important principle that needs to be taken into account when managing the risks related to business transformation.

3.5.3 Technological

Technology more than ever before is becoming a key resource that can significantly impact on a company's competitive advantage, and accordingly affect its competitive environment. As many academics and practitioners have pointed out, the rewards are high, but so can the risks be [10,55,117,118, etc.]. The concept of the management of technology (MOT) has progressed considerably since the 1950's and 60's. Many organisations nowadays link their R&D initiatives into their business strategy. Various companies have yet to move to 4th generation R&D [119], where competitive advantage is driven through via advanced technology and innovation acquisition and deployment actions.

Schon [120,p12] relates the difference between uncertainty and risk in respect of MOT as follows:

"*Men involved in technical innovation in a corporation confront a situation in which the need for action is clear but the action itself is not. So long as this situation exists, the corporation cannot function effectively, because it is not designed for uncertainty in a situation in which there are no clear objectives to reach, no measures of accomplishments and no proper concept of control. A corporation cannot operate in uncertainty, but it is beautifully equipped to handle risk. It is precisely an organisation designed to uncover, analyse, evaluate and operate on risks.*"

While the assertion that the corporation is beautifully equipped to handle risks poses questions, it nevertheless indicates that while it cannot reduce all uncertainties, it can attempt to manage risks. Roussel et al [118] suggest the use of scenarios rather than explicit forecasts of the future. They propose the relationship between risk and reward as shown in Figure 53.

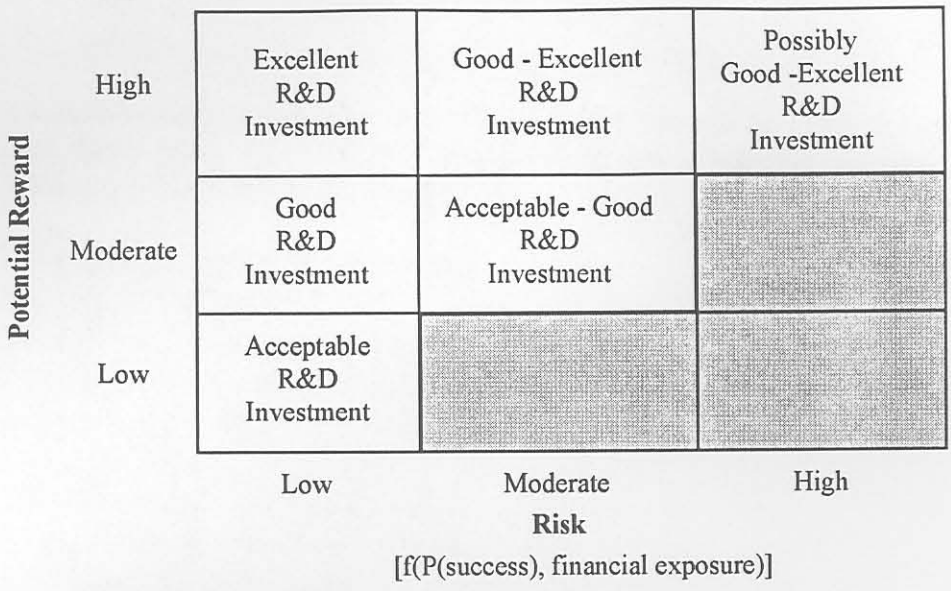


Figure 53 - The Desired Relationship between Risk and Reward in R&D Investments

They add that there are no rigorous definitions of "low", "moderate" or "high" risk or potential reward. Each is influenced by company culture, strategies, its operating industries and competitive conditions.

Most literature describes the three types of R&D or innovation that can be undertaken, namely incremental, radical or fundamental. These three types also relate directly to the probability of success and hence the risk-reward relationship. Roussel et al [118, pp54-57] describe the characteristics of these types in Table 40.

Table 40 - Characteristics of the Three Types of R&D

Type	Description	P(technical success)	Time to Completion	Competitive Potential	Durability of Competitive Advantage
Incremental	Clever exploitation of existing knowledge in new ways. Characterised by low risk and modest reward.	Very high, typically 40 to 80%.	Short, typically 6 to 24 months.	Modest but necessary.	Short, can be imitated by competitors.
Radical	Creation of knowledge new to the company, possibly the world to achieve a specific objective. Characterised by higher risk and higher reward.	In early days modest, typically 20 to 40%.	Mid-term, typically 2 to 7 years.	Large	Long, often protected by patents.
Fundamental	Creation of knowledge probably new to the world to deepen the understanding of a scientific/engineering area. Characterised by high risk and uncertain application to business needs.	In early stages, difficult to assess, depends on R&D concept.	Long, typically 4 to 10 years or more.	Large	Long, often protected by patents.

Literature and practice offer various techniques that can be employed to manage these risks that R&D pose. The following list, although not exhaustive provides the more common techniques that assist in this regard:

- Scenario planning [118,121,122].
- Trend extrapolation [121].
- Precursor trends - curve matching [121,122].
- Technological substitution [121].
- Delphi [121,122].
- Relevance trees [121,122].
- Technological monitoring [121].
- Cross-impact analysis [121,122].
- Analogy methods [122].
- Morphological research [122].
- Catastrophe theory [122].
- Systems dynamics [122].

As described previously, analysis is one component of management. The following describes approaches aimed at the remainder of the components of managing the risks in business change due to technological change or investment therein.

- Managing the R&D portfolio [117, 118].
- Establishing a strong business focus [123].

- Encouraging organisational adaptability [123].
- Encouraging organisational cohesion[1] [118, 123].
- Engineering and entrepreneurial culture[2] [118, 123].
- Nurturing a high sense of integrity [118, 123].
- Hands on top management [123].
- A well planned, realistic course of development [118].
- Continual re-evaluation of the projects, their priorities and requirements [118].
- Creating a sense of importance and urgency [118].
- Willingness to terminate projects [118].

Roussel et al [118, pp151-161] describe 7 practices that align the objectives of MOT and the practices that must be instituted to ensure success. These incorporate many of the concepts described above. This relationship is shown in Figure 54.

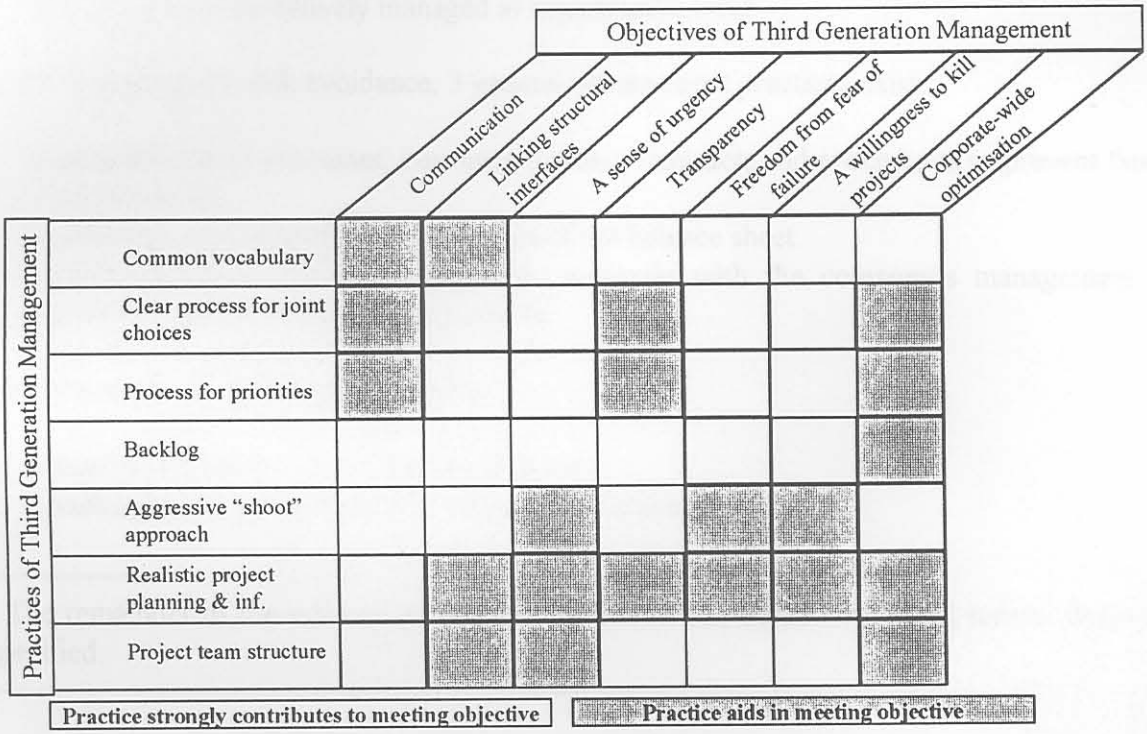


Figure 54 - Roussel et al's Linkage between Objectives and Practice in R&D Management

3.5.4 Insurance

The insurance industry was possibly the first to "embrace" risks and channel this into business opportunity. Accordingly, this industry has a range of risks unique to it, but also has unique ways of dealing with this.

[1] This is achieved via good communication, job rotation, integration of roles and encouragement of long term employment.

[2] This includes entrepreneurial characteristics, variety of funding channels, tolerance of failure and the opportunity to pursue outside projects.

The role of insurers in industry is described as follows [124][1]:

"market participants seek the services of insurers because of their ability to provide actuarial risk pooling through their major product lines of life, property/casualty and health insurance, pension products, annuities and other financial instruments. At the same time, they are major providers of funds to the capital market - particularly to the fixed income sectors. In performing these roles they generally act as a principle in the transaction. As such, they use their own balance sheet to facilitate the transactions and absorb the risks associated with them"

It is in this context that the insurance industry needs to manage its risks.

The rationale for risk aversion in this industry can be categorised as follows:

- Managerial self interest.
- Non-linearity of taxes.
- Cost of financial distress.
- Existence of capital market imperfections.

According to Babbel and Santomero, the insurance industry will eliminate or mitigate risk by means of proper business practice or transfer this to a third party by means of a combination of reinsurance, pricing or product design. It is only the risks which cannot be dealt with in this way that should be left to the company to manage for its own account.

"It should accept only those risks that are uniquely a part of the insurer's array of services."

Oldfield and Santomero [125] indicate that there are 3 general categories of risk facing all financial institutions (including insurers):

- Risks that can be eliminated or avoided by means of standard business practice.
- Risks that can be transferred to other parties.
- Risks that must be actively managed at organisation level.

In the first category, risk avoidance, 3 general management practices exist:

- Standardisation of processes, insurance policies, contracts and procedures to prevent faults or inefficiencies.
- Establishment of portfolios on both sides of the balance sheet.
- Implementation of incentive compatible contracts with the company's management to require that personnel is held accountable.

Techniques of transferring risk include:

- Actuarial risk can be transferred to reinsurers.
- Catastrophe risk can be offset by catastrophe futures or bonds.

[1] The remainder of the sub-section is based on Babbel and Santomero [124] unless otherwise specified.

- Interest rate risk can be hedged or transferred through interest rate products like swaps, caps, floors, futures or other derivative products.
- Insurance policies can be altered to affect a change in duration and convexity.
- Equity market risk can be reduced with an appropriate futures position in equity.
- Financial risks can be transferred to the purchaser or transferred by means of defined contribution pension plans or variable universal life policies.
- The insurer can buy or sell financial claims and reinsurance to diversify or concentrate risk that results from servicing its client base.

There are two classes of risk that need to be managed at organisational level, i.e. those risks that cannot be eliminated, avoided or transferred, namely:

- Actuarial exposures where the nature of the embedded risk may be difficult to transfer to another party.
- Risks that are central to the raison d'être of the business, i.e. those areas where competitive advantage is derived.

In order to analyse risk, define procedures to manage these risks, limit exposures to acceptable levels and encourage decision-makers to align action with corporate intent regarding two classes of risk, the following practices are recommended [124, pp7-9]:

- Standards and reports.
- Underwriting authority and limits.
- Investment guidelines or strategies.
- Incentive contracts and compensation.

From the range of risk management principles and techniques in the insurance environment, the following would appear to be useful in the business change environment:

- **Principles**:
  - Only manage risks at organisational level that cannot be eliminated, avoided or transferred to another party.
  - Become excellent in managing those risks that are coupled to the raison d'être of the business.

- **Methods**:
  - Insurance
  - Hedging
  - Portfolios
  - Sound business practice pertaining specifically to:
    - Clear standards and appropriate reports.
    - Clear lines of accountability and responsibility with limits well defined.
    - Investment guidelines, objectives, strategies and philosophies in place.
    - Performance contracting coupled to risk management.

3.5.5 Environmental

Environmental issues are becoming more of a reality with pressure being applied internationally as well as in South Africa. The Kyoto Protocol for example has ensured that all the world's industrialised nations have agreed to firm targets for reducing six different greenhouse gasses[1] [126].

Mines have to develop strict rehabilitation plans, chemical producers are required to manage their effluent in a more strict manner, setting up plants requires more control. Examples of the latter include the moving of the Saldanha Steel site and the termination of the St Lucia mining project. The threat of these strict external drivers can however be turned into opportunity. Changes in technology and or product to become "environmentally friendly" can be a significant source of competitive advantage (until the competition responds accordingly). Examples of this include:

- Wisaforest Oy Ab (Finland) transformed its process to totally chlorine free paper and pulp processing.
- Sappi (South Africa) have employed ozone technology.

There are however significant risks associated with the territory. In the environmental field, there are two primary areas where risks need to be managed:

- On the operational level where the risks of impacting on the environment from day to day activities must be managed, e.g. prevention and management of effluent leakages.
- On the strategic level where decisions regarding the longer term operations like the investment in new technology are made.

The former tends to be dictated by the MOSH act in South Africa. Other tools for managing this include HAZOP/HAZAN processes, TQM, public health assessments and other environmental auditing and management systems (e.g. ISO14000). The latter does however provide more relevance to this study.

Table 41 provides a summary of the types of strategic risks an organisation may deal with [127][2].

[1] The treaty requires that:
- Developed countries cut emissions of CO_2 and five other gases by an average of 5.2% by 2012.
- Cuts in developing countries are voluntary.
- Emissions trading would permit countries that beat their targets to sell excess reductions to those that fall short.
- Forested countries will get a break on their quotas because of CO_2 absorption.
- Penalties for violating countries are still to be determined.

[2] This has been summarised from work done by Moilanen et al [127].

Table 41 - Summary of Risk Management in the Environmental Field

Risk	Description	Techniques for Managing risks
Research and Development risks	Three general types of risks incurred are technical project progress or target oriented risks.	• Lower the perception of risk. • Have a good understanding of what the costs are and what the impact is on changing scenarios. • Life cycle assessments.
Product design risks	This arises from changes in consumer requirements and the regulatory environment.	• Close co-operation with customers in product design. • Close monitoring of the regulatory environment.
Production process risks	Three general risks include technical, legislative changes and liabilities.	• Life cycle assessments. • Insuring environmental liabilities. • HAZAN/HAZOP studies. • Provision of financial buffers for eventualities.
Marketing and marketability of products	The risks include [128]: • demands for environmentally friendly products do not materialise as expected, • consumer is not ready for the product, • pressure on cost due to environmental investments, • environmental performance is not adequate on its own for the product's competitiveness, • internal opposition for new products or processes (RTC), • regulatory environment is unclear and distribution channels are not interested in the product.	• Close monitoring of the regulatory environment. • Thorough market research (e.g. conjoint analysis). • Hedging. • Phasing in of production. • Insuring. • Communication.
Corporate image risk	Risks include negative perceptions and false interpretation.	• Measure corporate image and determine the effects that various actions have on this. • Measure the financial implication of the image and treat accordingly. • Use of eco-balances (document describing how the organisation is interacting with the environment).

Moilanen et al [127] proposes the expected monetary value (EMV) technique to be used in the appraisal of the investment projects as it makes provision for risk inclusion as each parameter is assigned a probability.

A second key assessment technique supported by the author is the use of life cycle analysis (LCA) for evaluating the impact of the product on the environment. The author further

provides a methodology for the financial evaluation of the environmental investments which incorporates the above-mentioned concepts. This is shown in Figure 55.

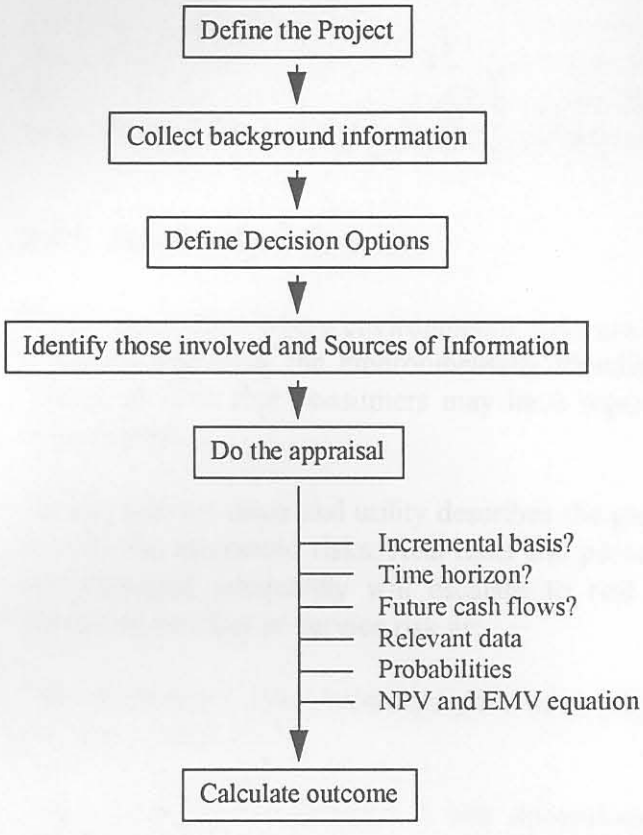


Figure 55 - Moilanen et als' Environmental Investment Evaluation Methodology

3.5.6 Business investment risks

Businesses invariably have to make an investment of some form with the expectation that a satisfactory return will result. As the investment consumes equity[1], concern arises whether the desired level of returns will indeed be realised. One way of addressing this concern is to identify the relevant risks and manage these accordingly.

The return on an investment can be viewed having various dimensions, namely:

- Size of the return (future value).
- Size of return (current value).
- Period (how long before the return is realised).
- Frequency of returns.
- Format of returns (currency, assets, etc.).
- Effort involved in achieving returns.
- Likelihood of returns.

[1] Equity has traditionally been equated with capital. There is however a growing desire in the business community to include other aspects such as intellectual equity. This does however, complicate the accounting practice behind this.

The last mentioned dimension deals with the uncertainty and riskiness of the investment. All these dimensions interact and have an effect on the "desirability profile" of the investment. Typical financial instruments include net present value (NPV), internal rate of return (IRR), return on investment (ROI) and return on net assets (RONA). Risk however affects the attainment of these, providing another criterion to take into consideration. Expected monetary value (EMV) does however make provision for the inclusion of risk in the calculation.

A means of dealing with risk is being able to select one project amongst many. Utility theory [129] provides a theoretical framework for comparing various uncertain outcomes. Hull [130] however points out that different people have different utilities for different outcomes in a certain situation and can be analogous to subjective probabilities. Every person has different levels of risk aversion depending on the different impacting factors.

Another way of managing risks is by not keeping the eggs in one basket. This then provides a probability distribution where the mean and variance are favourable to the risk profile of the investor. On "average" the risks will be minimised or accounted for by the weighted favourable returns. Hull suggests that two areas of conflict can exist here however. Having the security base of the portfolio, the investor may consider an investment a low risk, while conversely the manager whose job is on the line if the investment fails may regard the risk huge and may take a meaningful set of proactive steps.

3.5.7 Perceived product risks

Under the section where environmental risks are described, product risk features as one of the concerns regarding the environmentally friendliness of products. This section looks at the perceived risks that consumers may have regarding the product or service offerings of an organisation.

The section on value and utility describes the gap between real and perceived value. This ties in with the associated risks. Real risks and perceived risks. Like real risks, perceived risks, if not managed adequately will escalate to real risks. Schiffman and Kanuk [131] define perceived product or service risk as:

"the uncertainty that consumers face when they cannot foresee the consequences of their purchase decisions"

The authors further describe 6 risk dimensions that a consumer can perceive. These are summarised in Table 42.

Table 42 - Risks Consumers Face

Risk	Description	Type of Uncertainty
Functional risk	The product will not perform as expected.	• Will it do as it is supposed to do? • Will it last? • Will it work as well as or better than competitive products?
Physical risk	Safety and health aspects.	• Is it safe to use? • Does it pose any physical threat to others? • Does it pose any environmental threats?
Financial risk	Risk that the value exchange (money for product) is not equitable.	• Is it the best use of limited funds? • Is it worth the money it costs? • Is it the best price?
Social risk	Poor product choice could result in social embarrassment.	• Will the immediate environment approve? • Will it please those whose opinions are important? • Is it similar to products used by groups of similar identity?
Psychological risk	The risk that a poor choice will bruise the consumer's ego.	• It is deserved? • It is impressive? • Does using it feel good?
Time risk	Time spent on product search if product does not perform as expected.	• Is return or exchange required? • Will the selection process be required again?

The authors further categorise risk management strategies most often used by consumers in product/service selection which address all or most of the risks. These are:

- Information seeking.
- Brand loyalty.
- Major brand image.
- Vendor image.
- Most expensive model.
- Reassurances, e.g. guarantees, warrantees, government approvals, etc.

3.5.8 Engineering projects

Frigenti and Kitching [62, p34] provide for general approaches in treating risk. This is illustrated in Table 43.

Table 43 - Approaches to Treating Risk in Engineering Projects

Approach to treatment	Avoidance	Abatement	Retention	Transfer
Description	The identified risk can be avoided	The combination of loss prevention and reduction to lower the likelihood of occurrence and diminish the severity of loss.	The risks are not changed by external influence even though they have been identified. Status quo strategy.	The risk is shifted from one party or element to another via structured means like contracting or insuring.

3.5.9 Systems reliability engineering

The concept of systems reliability engineering is a field of study used increasingly by engineers over the last 30 to 40 years to effectively design systems. The systems originally envisaged, involved electrical and mechanical systems where discrete components of a system could cause the whole system to fail. It allowed design to move to the position where failure is a given, and then design a system where the configuration of components allowed for a favourable or at least planned failure condition.

This approach has various benefits, including:

- A goal of desired functionality is established up-front.
- The components of the system are analysed using the principles of general systems theory (described earlier).
- Failures and their frequencies are understood.
- Contingencies are established to support the evaluation of these failures.
- A resulting expected economic impact can be evaluated.
- The desired cost-effectiveness of the system can be achieved by sensitivity analysis supported by the mathematical models.

These attributes point towards an intuitive relationship between reliability and risk. Frankel [132, p11] describes the relationship between reliability and risk of failure as complementary concepts. He states that:

"the reliability of a system is the probability that the system will not fail during a specified time period under given operating conditions, while risk of failure is the probability that the system will fail during that period and operating conditions ... Most systems interact with and are affected by other systems which may induce conditions or factors which increase the risk of or actually cause failure of the system."

In systems reliability engineering context, the probability of success can be equated with the reliability of the system under consideration. The probability of failure is

Equation 4

$$P(failure) = hazard\ rate = 1 - P(success) = risk$$

Two major methods are employed in reliability modelling of complex systems[133], namely[1]:

- Systems reliability evaluation using probability distributions.
- Markovian modelling.

The former technique (probability distribution) although applicable to repairable and non-repairable systems [133, p206], in the case of repairable systems the repair process must be instantaneous or negligible when compared with the operating time. This technique is therefore invalidated if the assumption cannot be held true. The Markovian approach addresses this shortcoming.

3.6 Appropriate Risk Management Techniques

Frigenti and Kitching [62, p32] provide the cyclical model of risk management shown in Figure 56.

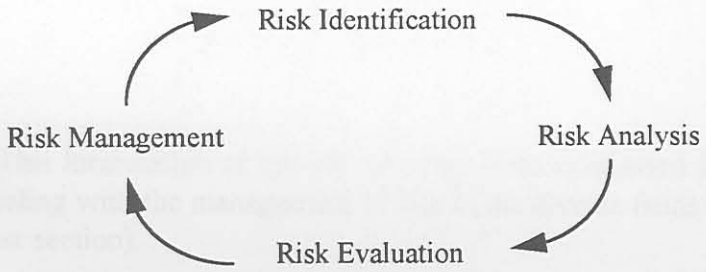


Figure 56 - Frigenti and Kitching's Risk Management Cycle

There are two types of components in this model. Firstly understanding what these risks are and secondly dealing with these risks during the execution of the relevant actions. Boehm [134] provides a risk management model similar to this. His framework, constituent of two phases, firstly a risk assessment which is followed by risk control in execution. As discussed earlier in the text, Charette views the process a little differently (see Figure 20). He raises analysis out of the management process which pertains to:

- Risk identification.
- Risk estimation.

[1] Techniques employed in simpler systems include [133] (1) conditional probability, (2) cut set method, (3) tie set method, (4) connection matrix techniques, (5) event trees, (6) fault trees and (7) multi-failure modes.

- Risk evaluation.

while he ascribes management to that set of implementation orientated actions that pertain to:

- Planning.
- Resourcing.
- Controlling.
- Monitoring.

Schwartz [135] experienced with Shell that assessing a solution and developing scenarios alone was not enough to be successful. An active effort has to be unleashed to change the current paradigms in order for firstly the realisation to take place and secondly for the appropriate contingencies to be set in place.

The model of risk management purported by Charette earlier requires a more encompassing approach. The four traditional management components are planning, organising, leading and controlling. Figure 57 illustrates the typical division of management time to these dimensions through the traditional business improvement initiative life cycle[1].

[1] This formulation of the life cycle has been condensed from the assessment of the literature dealing with the management of risk in the diverse fields of study (evaluated in the preceding text section).

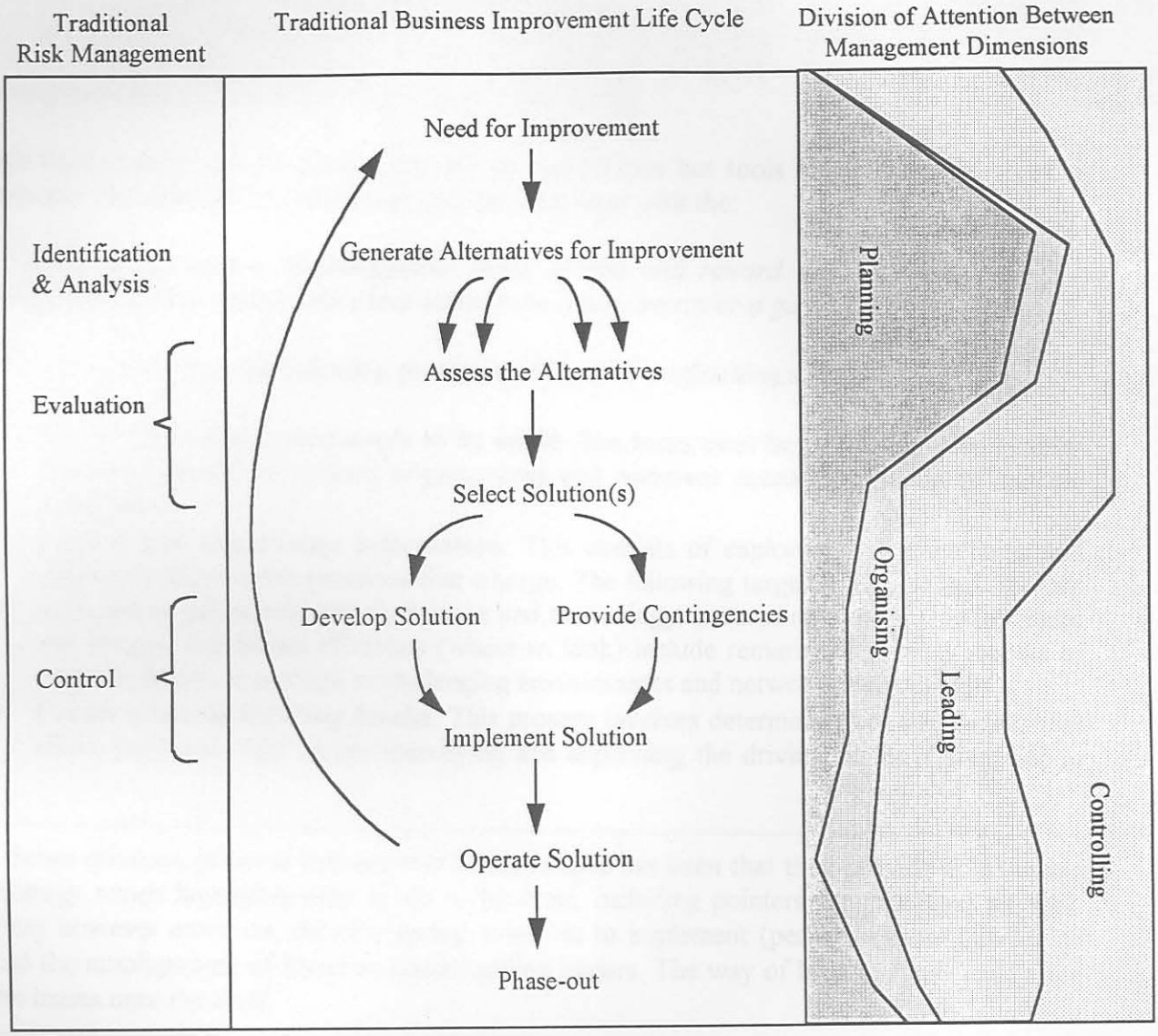


Figure 57 - Traditional Business Improvement Life Cycle

From Figure 57, risk management is traditionally viewed important in the phases after the identification of the need for improvement or service, until and including implementation. It may be argued that reasons for this are:

- Risk management has generally been employed in fields where concern has primarily been on providing a solution with the least pain.[1]
- The environment has generally been forgiving enough on post-implementation effects.[2]
- The functional view on responsibilities and delivery allowed for the "passing of the buck" types of situation to occur.[1]

[1] In the case of a construction project the focus is on delivering a solution with the least pain and most profit. It is then handed over. Other than the safety implications, the contractor is not concerned with the remainder of the life cycle risks (e.g. environmental impact, maintenance, removal, etc.).

[2] For example, until recently mine rehabilitation never entered into the up-front investment assessments.

With the competitive environment and other additional external drivers (e.g. the green movement) today, risks need to be managed throughout the complete life cycle, including operation and phase-out. This need was echoed in the market research.

(a) Scenarios

One of the only certain facts of life is that the future is uncertain. Sometimes this is dealt with by pre-concluding in absolute terms that a system will or cannot reside in a certain state. How many times have brave assumptions been dismissed by reality proving the contrary. When this "impossible" state does occur, then the persons involved are caught with plans lacking and failure looming. It is therefore prudent to speculate on the possible formats of the future, validate the assumptions and plan for eventualities. A very useful tool in achieving this is scenario planning.

Schwartz [135, pp4-7] defines scenarios as:

"a tool for ordering one's perceptions about alternative future environments in which one's decisions might be played out. Alternatively: a set of organised ways for us to dream effectively about our own future. Concretely they resemble a set of stories, either written out or often spoken. However, these stories are built around carefully constructed "plots" that make the significant elements of the world scene stand out boldly. This approach is more a disciplined way of thinking than a formal methodology."

He further advocates that scenarios are not predictions but tools to facilitate the learning process. He indicates that scenarios provide a manager with the:

"ability to act with a knowledgeable sense of risk and reward that separates both the business executive and the wise individual from a bureaucrat or a gambler."

The author provides the following process guidelines to establishing scenarios:

- **Isolate the decision that needs to be made**. The focus must be refined between broader scenarios general to various organisations and narrower scenarios relating to specific situations.
- **Gather and disseminate information**. This consists of exploring and researching and constantly refining the questions that emerge. The following targets (what to look for) are provided as guidelines, namely science and technology, perception shaping events, music and fringes. Guidelines of tactics (where to look) include remarkable people, sources of surprise, filters, immersion in challenging environments and networked sensibilities.
- **Create scenario building blocks**. This process involves determining the key factors that affect decisions. This entails identifying and explaining the driving forces. Categories to

[1] Some criticism of some management consultancies has been that they provide an excellent strategy which highlights what needs to be done, including pointers for managing pit falls. They however move on, the next group comes in to implement (perhaps other consultants) and the misalignment of focus or understanding occurs. The way of least resistance is to put the issues onto the shelf.

initiate this include society, technology, economics, politics and the environment. Next, the "predetermined elements" and the critical uncertainties" are established.

- **Determine the plots**. The authors described the following common types of plots which may be constructed in scenario development. These include winners and losers, challenge and response, evolution, revolution, cycles, infinite possibility, the lone ranger and my generation. The first three are most used. Various plots will intersect in a scenario.
- **Rehearse the future**. When scenarios are devised, their realisation is unclear, but as the future starts unfolding, clues will be made available regarding direction. Having prepared for all will allow for quick action when called upon.

A step-by step guide to developing scenarios is provided in appendix F.

This process is iterative. In general, three types of scenarios unfold, namely:

- More of the same fundamentals, but better.
- Worse (decay and depression).
- Different, but better (fundamentals change.

Scenario planning, while providing a tool for understanding the drivers shaping the future, and hence the likelihood of execution is poised at the strategic level and should be included into a framework for dealing with risks and uncertainty at this level. With the emphasis on enacting the full management cycle, scenarios must be used and managed in a way where behaviour is influenced. It serves not merely for information purposes.

(b) System dynamics

The field of system dynamics evolved from the application of feedback control principles to socio-economic systems [136]. In essence the approach recasts feedback control theory in a numerical analysis framework [137]. In system dynamics there is a heavy reliance on diagramming. Conventions vary (e.g. compare [137] versus [138]), but the popular approaches include the causal loop and stock and flow diagrams [138]. These are described as follows:

- The causal loop diagram illustrates causality between variables.
- Stock and flow diagrams contain more information on structure than causal loop diagrams and are a common step towards building a simulation model because they help define types of variables that are important in inducing behaviour. Stocks are fundamental to generating behaviour in a system, while flows cause stocks to change.

An example of a corporate growth model is shown in Figure 58.

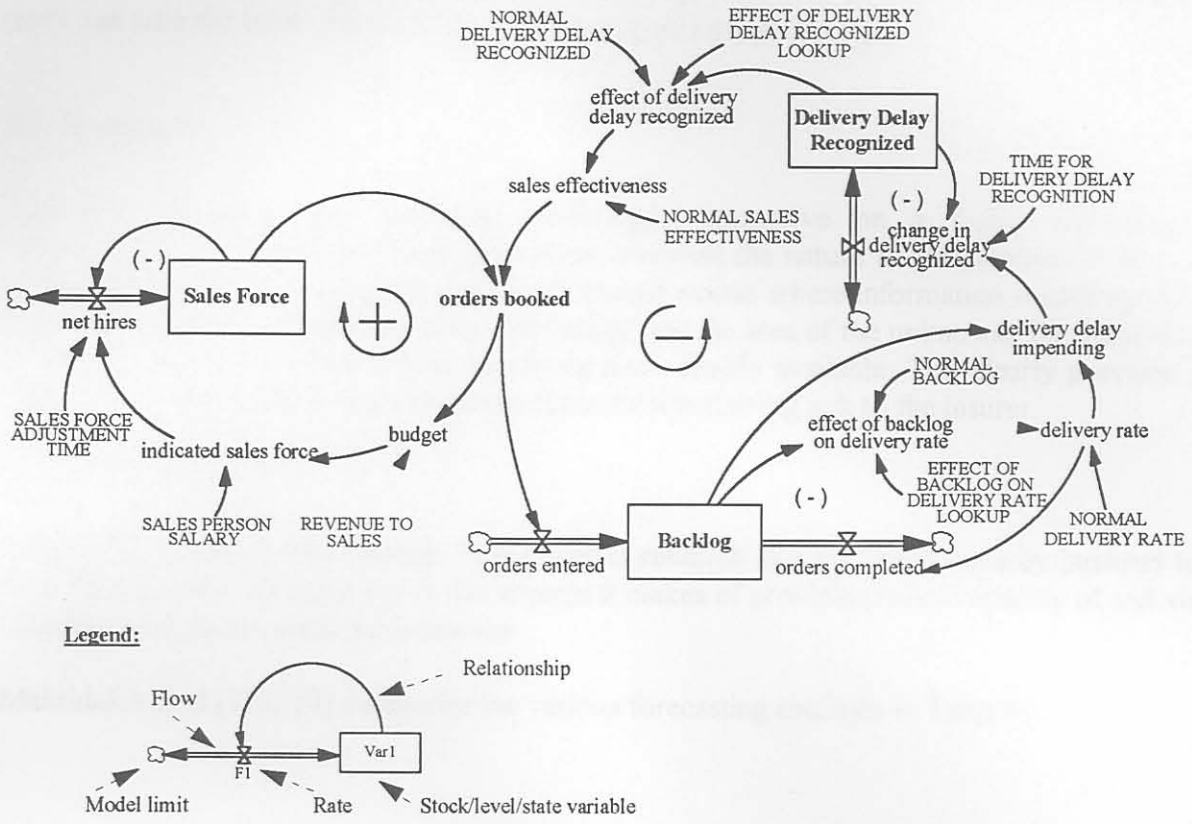


Figure 58 - Corporate Growth Model

Over the years with the extensive level of modelling been undertaken, it has become apparent that certain sets of relationships recur. The most common structures or archetypes are [139]:

- Accidental adversaries.
- Balancing loop.
- Drifting goals.
- Escalation.
- Fixes that fail.
- Growth and underinvestment.
- Limits to success.
- Re-inforcing loop.
- Shifting the burden.
- Success to the successful.
- Tragedy of the commons.

The archetypes are described in detail by the source [139].

Ventana Systems summarise the benefits of systems dynamics as follows [138, p vii]:

"System dynamics has the major benefit of making explicit all assumptions about how things are connected. In a business setting, for example, we know that morale can have a significant influence on productivity. Neither morale nor its influence on productivity can be directly measured, but leaving it out is certainly wrong and it is, therefore, often included in

models. A methodology for inclusion of these soft variables has been developed in system dynamics. This methodology can be applied to typically non-quantitative fields such as history and literature to explicate and investigate the nature of relationships".

(c) Hedging

Hedging is a technique which emerged in the financial areas of endeavour as core to many risk management actions. A financial definition of hedging is:

"The process of protecting the value of an investment from the risk of loss in case of price fluctuations. Hedging is generally accomplished by the protection of one transaction by means of another. A long position in an underlying instrument can be hedged or protected with an offsetting short or short equivalent position in a related underlying instrument"[1]

One of the most popular uses is the provision of forward cover in the face of exchange rate dips or where bond rates are expected to decline.

While it is possible that these may have a limited bearing on business change risk, it is possible to take the hedging concept and apply it to the benefit of business change risk in general.

Hedging in this case then is an instrument whereby the negative impact of a risk occurring is limited by virtue of the transfer of risk ownership beyond a ceiling to a third party. The third party can take the form of an action or object such as a person or market.

(d) Insurance

Insurance companies are becoming increasingly innovative on a highly competitive environment. One of the key innovative areas concerns the nature of the product. Where in the past, products were generally orientated around events where information regarding their behaviour has been well defined, they are moving into the area of the unknown. The insurance of some business initiatives is now becoming more readily available. This clearly provides a management intervention option with the focus on transferring risk to the insurer.

(e) Forecasting

Forecasting emerged very strongly in the market research as a technique used by business to help manage risks. Its value lies in the attempt it makes of providing more certainty of and via information in an uncertain environment.

Makridakis et al [122, p8] categorise the various forecasting methods in Table 44.

[1] The definition was provided by NationsBank.

Table 44 - Categories of Forecasting Methods and Examples of their Application[1]

Type of forecasting situation	Type of Information Available: Sufficient quantitative information is available		Little or no quantitative information is available, but sufficient qualitative knowledge exists		Little or no information is available
	Time-series methods	Explanatory or causal methods	Explanatory methods	Normative methods	
Forecasting continuation of patterns or relationships	Predicting the continuation of growth in sales or GDP	Understanding how prices and advertising affects sales	Predicting the speed on transportation around 2020	Predicting how cars will look in 2005	Predicting the effects of interplanetary travel; colonisation of the earth by aliens;
Forecasting changes - or when changes will occur - in existing patterns or relationships	Predicting the next recession or how serious it will be	Understanding how the effects of price controls, or the banning or advertising on TV will affect sales	Forecasting how a large in crease in the oil price will affect the consumption of oil	Having predicted the oil embargo which followed the Arab-Israeli war	discovery of new cheap, harmless energy that has no pollution impact

The role that forecasting plays in the risk management context is similar to benchmarking. Their purpose is to provide insight into a practice, event or object. It is this insight which guides the analysis in all the processes including identification, estimation and evaluation.

(f) Portfolios

Portfolios are simply an approach to minimise the effect of risk by not "keeping all the eggs in one basket". The benefit arises from diversification and the application of the Law of Large numbers and the Central Limit Theorem [124] which reduces the effects on any one loss experience.

For a portfolio, the expected return is [107][2]:

Equation 5

$$E(R_p) = \prod_{i=1}^{n} (x_i \times E(R_i))$$

Where:

x_i is the percentage of money in investment i.[3]
$E(R_i)$ is the expected return of investment i.

[1] Some of the information has been modified to make the examples valid in today's context.
[2] This has been simplified from the source.
[3] x_i is also the portfolio weight of the individual investment.

$E(R_p)$ is the expected return of the portfolio.

It is worth noting that only unsystematic risk can be diversified and not systematic risk [107, p345]. The reason lies in the relative sensitivity of the unsystematic risk as opposed to the relative insensitivity of systematic risk.

(g) Management of unwritten rules

As described previously, much literature exists on change management. Of the total amount, a significant portion pertains to the human related issues. It could be argued that this is reasonable considering that business change results from and exists for people. The range of change interventions that are available are classified in Table 2 and appendix A.

In order to determine which type of change initiative would be appropriate, the type of business change must be determined and then matched against Table 2. This must then be correlated to the associated risks. Once this is known, then the appropriate intervention should be selected.

There is one change method that should be considered, regardless of the type of business change under consideration, namely the "unwritten rules". This is described below.

One of the popular themes over the last decade has been performance measurement and hence management. The concept has been to set the strategy - vision, mission and so forth and then to set measures into place to determine how business is performing against the strategic baseline. Concepts like critical success factors (CSFs), key performance indicators (KPIs), key performance areas (KPAs), standards, etc. have been devised and used to achieve these means.

Setting measures however require more attention than a direct linkage to the strategic requirements of performance. In order to bring about change, behaviour needs to be changed. As Goldratt [30] indicated, people will behave according to the measures put into place whether or not these measures relate to the bottom-line or not. Scott-Morgan [51] describes the importance of understanding how these measures or "rules" result in a set of "unwritten rules" that people device to achieve their desired measures. An example of this cause-effect relationship is:

Written rule:	You must be accountable for the profit and loss in your area.
Unwritten rule:	(1) Protect you area at all cost.
	(2) Ensure the quarterly reports look OK.
Underlying results:	(1) No risk-taking behaviour.
	(2) Sort-term views on the future (e.g. cash now, no future focus).

The author indicates that if this is harnessed in the correct way, the correct change can be brought about [51, p27]:

"... there is a chain of logical cause and effect that can be traced from specific business problems via the unwritten rules all the way back to the written rules and management actions that drive the company. And that means you can do something about them."

He proposes a model for identifying the unwritten rules and then relating this back to appropriate manageable actions. This framework is shown in Figure 59.

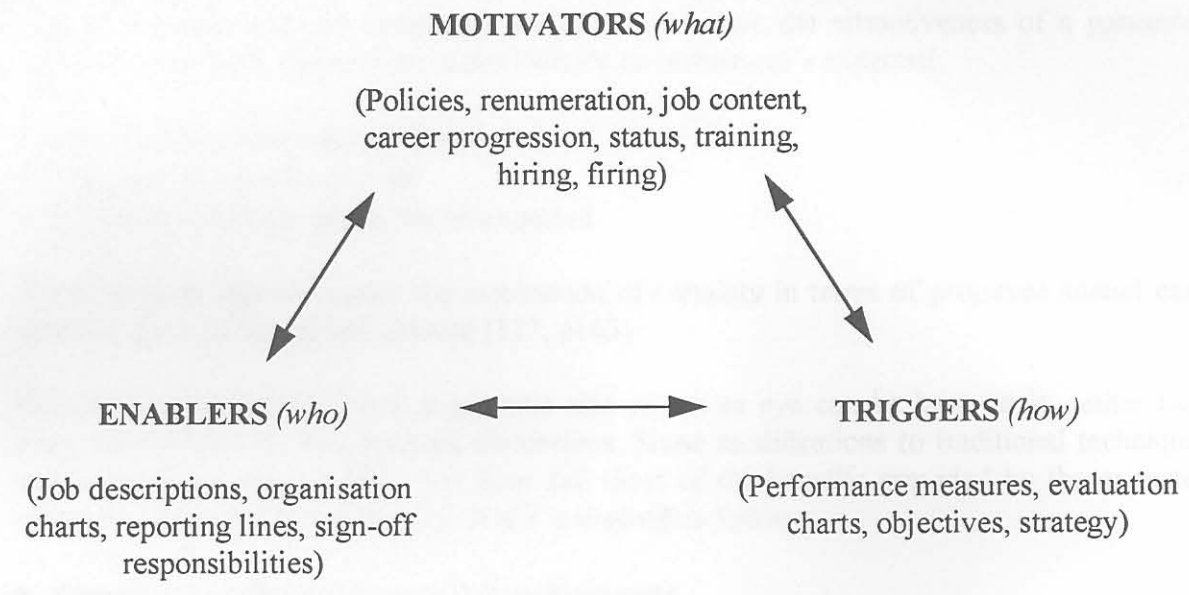


Figure 59 - Scott-Morgan's Unwritten Rules Model

Three facets need to be understood when uncovering the unwritten rules, namely the motivators (the reasons people do things), the enablers (who does what and how they fit into the organisation) and the triggers (how the who go about achieving what). The authors indicates in his experience for each of these three facets, three types of risk exist that need to be managed in order that changes be successfully managed through implementation. The matrix of these side effects is shown in Table 45.

Table 45 - Unwritten Rules and Risks of Business Change

Perceived Pressure: New vs. Existing	**Side Effects Caused by Conflicts**		
Weaker	Lipservice CYNICISM	Isolation IMPOTENCE	Rebellion ANARCHY
Balanced	Subversion TORTURE	Power Play CIVIL WAR	Camouflage GRIDLOCK
Stronger	Sabotage SUICIDE	Conspiracy TREACHERY	Paranoia PANIC
	Motivators	**Enablers**	**Triggers**
	Derivation of these unwritten rules that conflict with the initiative.		

The nine risks listed in the table are barriers to the successful transition from the de facto business situation to the new derived solution. Being able to understand the unwritten rules and their interaction in business dynamics provides a key to unlocking the human gates to change.

The scope of this technique must however be evaluated to determine where it can be effectively employed. It focuses only on practices internal to an organisation (the internal drivers) or where actions and behaviour can be conducted by the people within the organisation.

(h) Ishikawa diagrams

Ishikawa or wishbone diagrams are used as mental maps which assist in deriving a set of core problems or risks. The technique was made popular in the continuous improvement environment as a means of highlighting root causes. A representation of this, as applied to the risk management environment, is given in Figure 22, Figure 23 and Figure 24 [55]. In these diagrams Martin aims to highlight generic risks found during 3 phases of business risk of a BPR initiative.

This study recommends the causal loop diagram, mainly because of its ability to integrate more significantly with other techniques, e.g. simulation. Where the Ishikawa diagram approach is entrenched in practice, it follows that its sustained use may be more prudent.

(i) Expected monetary value

Net present value (NPV), internal rate of return (IRR) and payback are traditional and very popular methods used by companies wishing to measure the attractiveness of a particular business investment. These dimensions indicate an investment's expected:

- Magnitude of return in real terms.
- "Degree" of return expected.
- Period in which the return can be expected.

These methods operate under the assumption of certainty in terms of projected annual cash flows in terms of timing and amount [127, p163].

Risk is often identified, but it is put one side where an eye can be kept on it, rather than integrating it into the key financial dimensions. Some modifications to traditional techniques can be used to integrate risk, but these fall short of the benefits provided by the expected monetary value (EMV) technique[1]. EMV is derived as follows:

- Quantify the relative probability of each outcome.
- Weight each outcome's financial value by its respective probability in order to derive the risk-weighted average value.

[1] The shortcoming of the other techniques are provided in appendix B.

EMV is based on mathematical expectation where expectation is defined as [106, pp46-49][1]:

Equation 6

$$E = \prod_{i=1}^{n} a_i p_i$$

where: a_i is the expected value at level i

p_i is the probability of value a_i being realised.

Moilanen and Martin [127] limit n to 3 where 3 values and probabilities are used to derive the EMV as shown in Figure 60, where:

VL is the LOWEST value, with P1 chance of this being realised;
VM is the MOST LIKELY value, with P2 chance of this being realised;
VU is the UPPER value, with P3 chance of this being realised;
L is the lowest value, with zero probability;
U is the highest value, with zero probability.

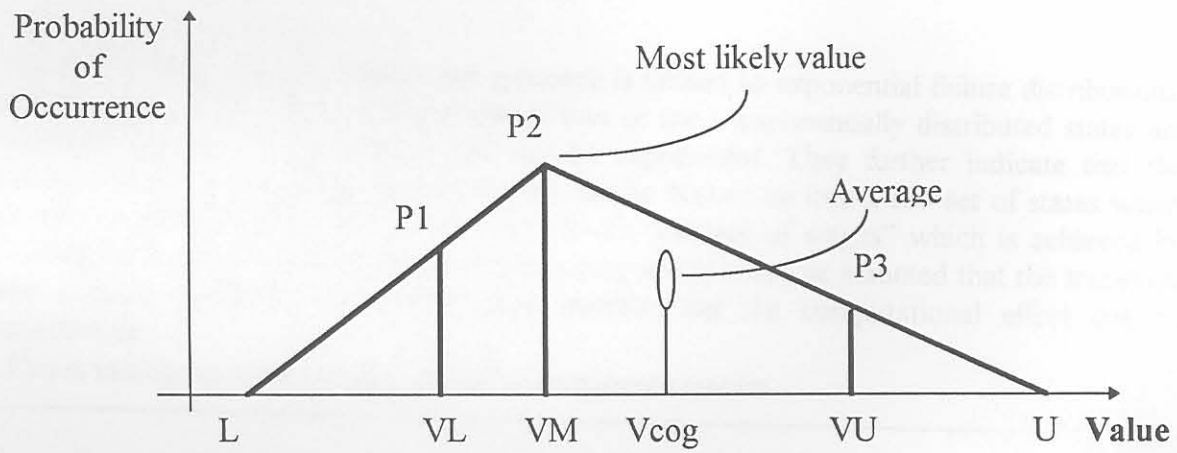


Figure 60 - EMV Triangulation

From Figure 60, a triangular distribution is assumed. The values VL, VM and VU correspond to a_1, a_2 and a_3 respectively in Equation 6. Using the triangular distribution, it is possible to establish 5 equations involving the 8 variables, namely a_1, a_2, a_3, p_1, p_2, p_3, L and U as described in appendix B. This allows for the values a_1, a_2, a_3, to be defined and probabilities p_1, p_2, p_3 and values L and U to be calculated. With this information available, it is possible to determine the EMV and its corresponding weighted-averaged probability in the distribution.

In order to derive the EMV, the following must be taken into consideration:

- Possible values for a variable within a business scenario[2].

[1] This equation has been simplified.
[2] This is the business scenario as described earlier and not different levels of a variable within a scenario.

- Relative probabilities, where they sum up to 1.
- Risk-weighted average for the variable in the probability series.

This technique is described in more detail in appendix B.

(j) Markovian modelling

The Markovian approach can be used to model events that can vary either discretely or continuously with respect to time and space[1].

Reliability problems can generally exist in a number of discrete and identifiable states and are continuous in time [133, p225], i.e. they exist continuously in a particular state until a transition occurs which brings it to another state where it resides continuously until another transition occurs and so on.

If one considers a business area as a system, then Figure 61 illustrates a simplistic Markovian state space diagram[2].

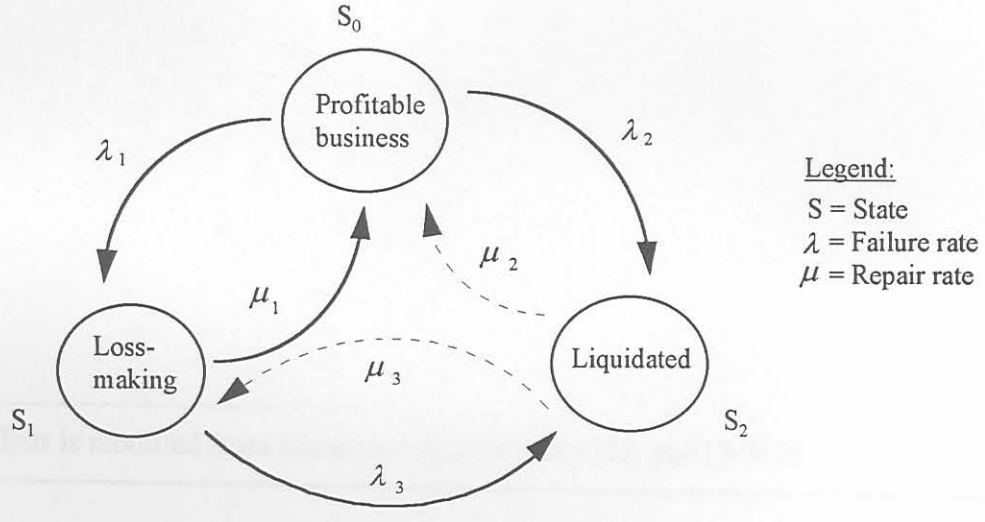


Figure 61 - Simplistic State Space Diagram

[1] It must be noted that the Markovian approach is limited to exponential failure distributions. Billinton [133, pp302-313] indicates that if two or more exponentially distributed states are combined then the resulting state will not be exponential. They further indicate that the reverse is true, i.e. a non-exponential system can be broken up into a sub-set of states which are exponentially distributed. This is done by the "method of stages" which is achieved by dividing the total time period into intervals during which it can be assumed that the transition rates remain constant. The authors also indicate that the computational effort can be considerable.

[2] This is analogous with a single repairable component system.

From Figure 61, a profitable business could result in a loss-making state or it could be liquidated although the likelihood is that it would first be loss-making before it would be liquidated. Note that μ_3 is unlikely as a liquidated business is usually disseminated or sold off in entirety. Similarly μ_2 also has a low likelihood as few liquidated businesses are restored to their former status in practice. State S_2 in this example would therefore typically be an absorbing state.

Appendix D provides some theory on the Markovian approach as well as application to an example.

While Markovian modelling suits the business change environment in terms of fit and application, it does have a few limitations, namely:

- It requires the availability of reliable quantitative information.
- The more complex the model, the more complex and labouring the computational effort required.

This does however, promise to provide a useful contribution given that the limitations are taken into consideration.

(k) Life cycle analysis

Literature provides considerable theory addressing the analysis components of the solution life cycle as highlighted by Figure 57. This trend was echoed by the market research where respondents were not currently giving much attention to issues such as operation and phase-out in terms of risk management (Figure 38). As in systems engineering where life cycle cost plays an important role, it is prudent to undertake a life cycle analysis of a business solution. Practice has indicated that downsizing exercises have promised to cut costs significantly. Sometimes however, the phenomenal retrenchment cost is not taken into account.

Key to establishing the attributes of the life cycle is the dividing of the business solution into life cycle phases. This includes all phases from problem identification to phase-out as shown in Figure 68. It is plausible to tailor the life cycle to suit the specific attributes of the solution under consideration. In order to elucidate the nature of the prospective costs, the life cycle cost profile should be constructed, an example of which is shown in Figure 62[1].

[1] This is modified from Blanchard and Fabrycky [23, pp517-519].

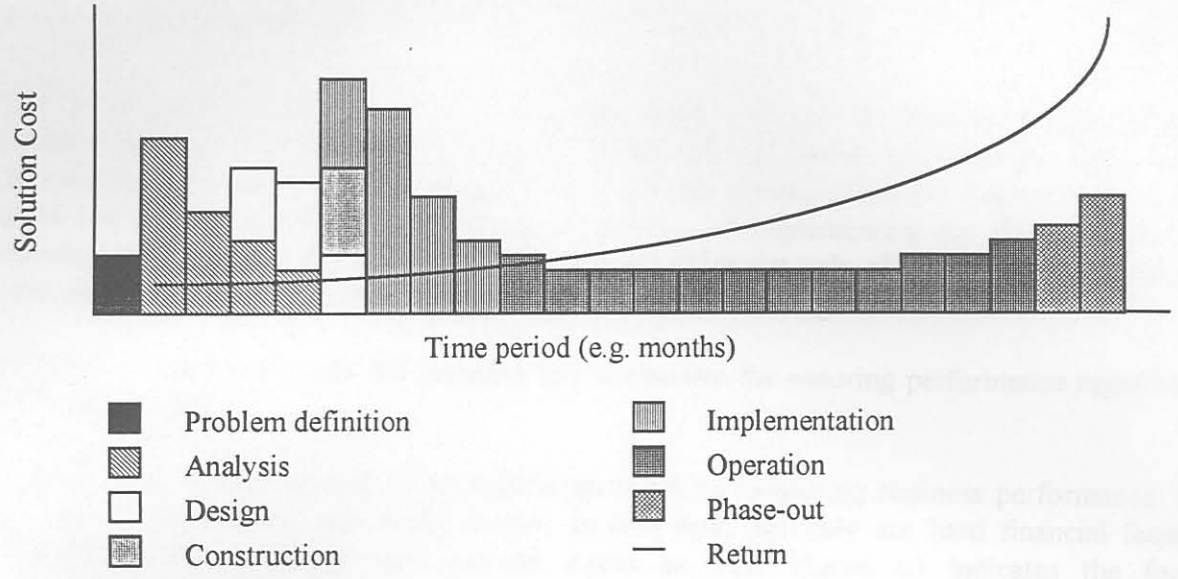


Figure 62 - Life Cycle Cost Profile

This analysis integrates well where risks and the associated management costs (e.g. insurance) are included. Risk management cost could be categorised within the various phases or it could be put into a cost code of its own in order that its magnitude and progress is made visible.

(l) Balanced scorecard

It was described earlier how important measurement is in business change. Clearly this is as critical for normal operations. The balanced scorecard [140] is an approach that has gained much popularity both in literature and in practice[1]. The outline of the balanced scorecard (BS) framework is shown in Figure 63.

[1] Many debates exist around the scorecard, but the core principles seem to have consensus from academics as well as practitioners.

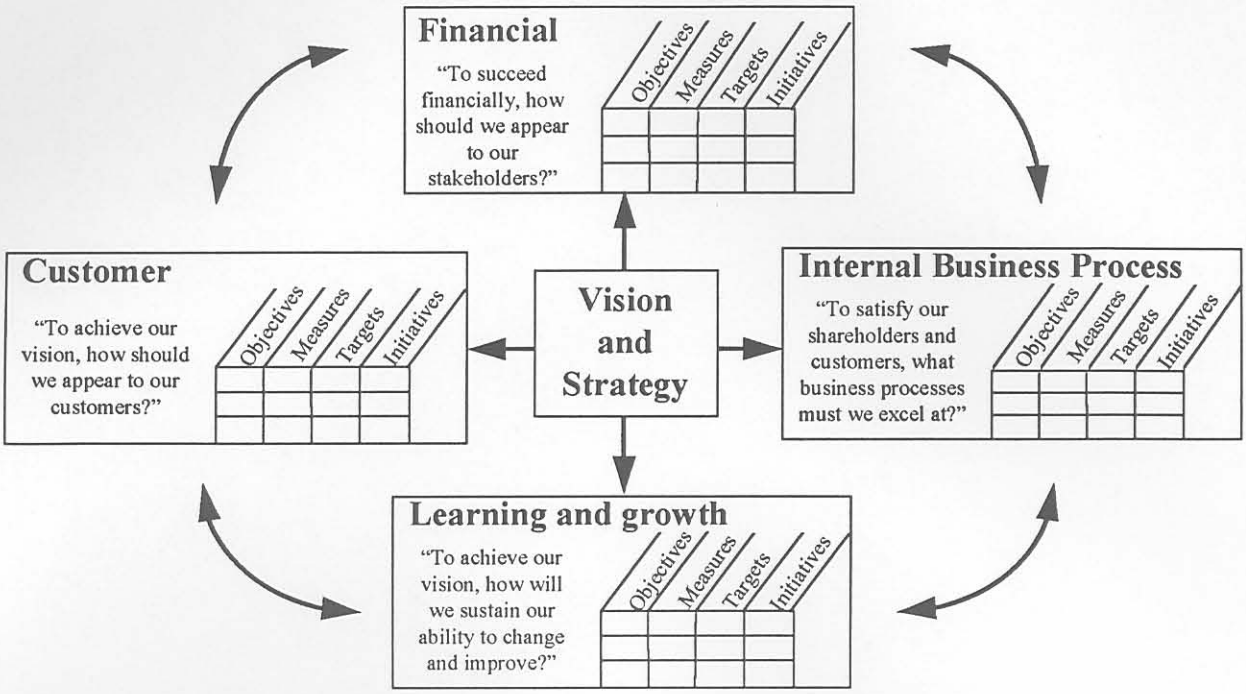


Figure 63 - Balanced Scorecard Framework

The BS provides the vehicle for taking strategy and enacting it. It provides the direct line between strategy, actions and performance monitoring. It further provides the means for formulating business strategy in a manner that contracts all employees. For example, Iscor the steel and mining corporate, has started the process of implementing the BS from senior director level down to the lower supervisory levels. This not only aligns actions but directly contracts individuals to the achievement of the strategies and targets.

It follows therefore that the BS provides the mechanism for ensuring performance regarding risk management.

The BS is so named because of its holistic approach to measuring business performance. It focuses on those areas that really matter. In this way, not only are hard financial facets measured, but the longer term growth issues as well. Figure 63 indicates the four perspectives, namely[1]:

- Financial.
- Customer.
- Internal business processes.
- Learning and growth.

In these perspectives a number of objectives exist that are derived from the strategy. A set of measures are established to ensure the monitoring of the progress of these measures. For each

[1] The researcher has used a variation of the scorecard where a fifth perspective, namely holistic is added. This sometimes highlights holistic contribution which may not be categorised under the other four perspectives.

measure at least one target is set. In order to achieve these targets, business initiatives or actions are set under way. Progress is continuously monitored via these measures.

3.7 Chapter conclusion

This chapter has provided the analysis of all the components critical to the study. It has taken current literature and practitioner experience into consideration and put forward as set of propositions. These propositions were then tested against the market by means of a market research. The findings of this research then helped to guide further research into the most appropriate tools and techniques relevant to the field of study. This analysis is then synthesised into a generic framework in the following chapter.

4. Synthesis

4.1 Chapter context

The benefits of quantitative methods in risk management are described by Bernstein [141, p48] as follows:

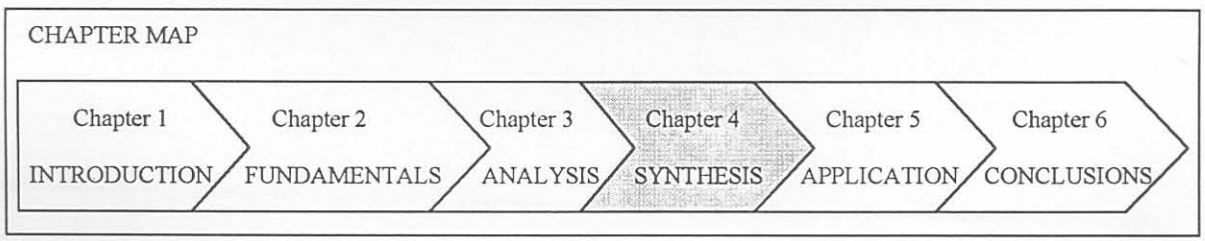
As one ingenious idea has piled on top of another, the development of quantitative techniques for managing risks has enhanced our quality of life and has set the accelerating tempo of modern times. These methods allow people to take more risks than they otherwise would - a benefit to society, which cannot progress without risk takers."

Mintzberg however observes that [142, p587]:

For while systematic data create the foundation for our theories, it is the anecdotal data that enable us to do the building. Theory building seems to require rich description, the richness that comes from the anecdote. We uncover all kinds of relationships in our hard data, but it is only through the use of this soft data that we are able to explain them.

The Concise Oxford Dictionary [74] defines synthesis as:

Combination, composition, putting together, (opp. analysis); building up of separate elements esp. of conceptions or propositions or facts, into a connected whole, esp. a theory or system.



This chapter forms the heart of the thesis in that it takes the analysis from the preceding chapters and synthesises it into a conceptual theoretical framework for the management of risk in business change. This framework is then tested in the following chapter by means of practical application.

4.2 Framework requirements

The preceding analysis has resulted in the following general requirements:

- The generic risks identified must be accommodated and treated appropriately.
- The risk management model must make provision for the 5 change types.
- Use must be made of the identified quantitative and qualitative techniques.
- The identified tools must be built into the framework.
- A risk management framework must address the complete business improvement life-cycle.
- The approach needs to be integrated with the other business management activities.
- A systems approach must be ensured.

Results from the research in the previous chapter indicated that in addition to the areas that receive due attention in terms of change management risk, the following will require attention in the future (Figure 40):

- Use is made of appropriate qualitative and quantitative techniques.
- Sufficient resources for implementation and contingencies.
- Regular review of benefits and risks during implementation.
- Formal clear implementation plans are accepted.
- Risk analysis done in parallel with change analysis.
- Post implementation risk management plans.

It follows that if the synthesised framework assists in addressing these areas, then value will be added to businesses experiencing business change in the event that the proposed framework is employed. In order to further assist with synthesis of the framework, the major advantages and disadvantages shown in Table 46 should be taken into cognisance as provided by the market research (Figure 48 and Figure 49).

Table 46 - Major Advantages and Disadvantages of a Formal Risk Management Approach

Advantages	Disadvantages
• Facilitates changes management • Problems are identified and contingencies are put into place. • Provides a longer term focus. • Minimises exposure to failure.	• Some solutions are overlooked due to their high risk. • Requires additional effort, skills and time.

4.3 Baseline case

A hypothetical case has been developed for three purposes:

- Facilitate the logical reasoning in the synthesis process for this thesis.
- Provide a first-line test case for the model developed in the thesis.
- Facilitate the understanding and reasoning process for the examiner/reviewer of the study.

In order to assist with synthesis, a theoretical case was developed which provides the framework for developing constructs for the full spectrum of business dynamics as relevant to this study. As this case is lengthy, it has been attached as appendix G. In brief, the case deals with a chicken processor whose business situation requires remedying. A range of options are available with their respective risks. It must be noted that while the case is a realistic representation of any business in the chicken processing industry based on the researcher's experience in this area, it in no way refers to any particular company, other organisation or person whatsoever.

4.4 Modelling

4.4.1 Overview concepts

Literature and experience indicates that the prudent starting point for analysis is the business strategy regardless of the magnitude of the area undergoing the analysis. This means that either the strategy is coherent and clearly understood or is carefully derived. It can be argued that strategy must be made clear or an integral component of any type of business change that is being considered. It is just the role that strategy plays that differs as shown in Figure 64. The change types that bring about lower strategic leverage have a stronger alignment need, i.e. they are dictated more by strategy than they set the strategy.

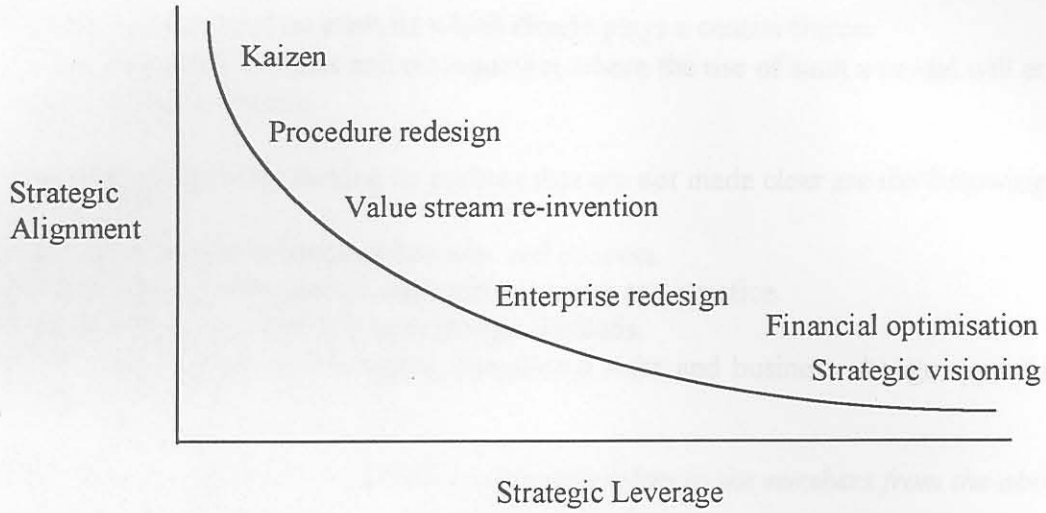


Figure 64 - Role of Strategy in Business Change Initiatives

At the strategic level a few key risks would be identified. These are the few areas where the business could be vulnerable. Clearly some risks may not have any relevance regarding change initiatives, but at this point the relevant facets have been identified. It follows that the more strategic the change initiatives, the more strategic risks are relevant. What has therefore been achieved by identifying the strategic risks, is that the strategic context has been pegged.

The next analysis is largely dependent on the type of business change under consideration. It is however possible that a general approach be employed in order to analyse the risks and then manage these accordingly. In other words, regardless of whether kaizen or value stream reinvention is being considered, it is possible to have a generic framework that assists the analysis of risk and the management thereof.

In exploiting this, the framework proposed by Charette is considered. The original representation (Figure 20) is depicted in a different graphic as shown in Figure 65. The purpose of this is to highlight its core attributes.

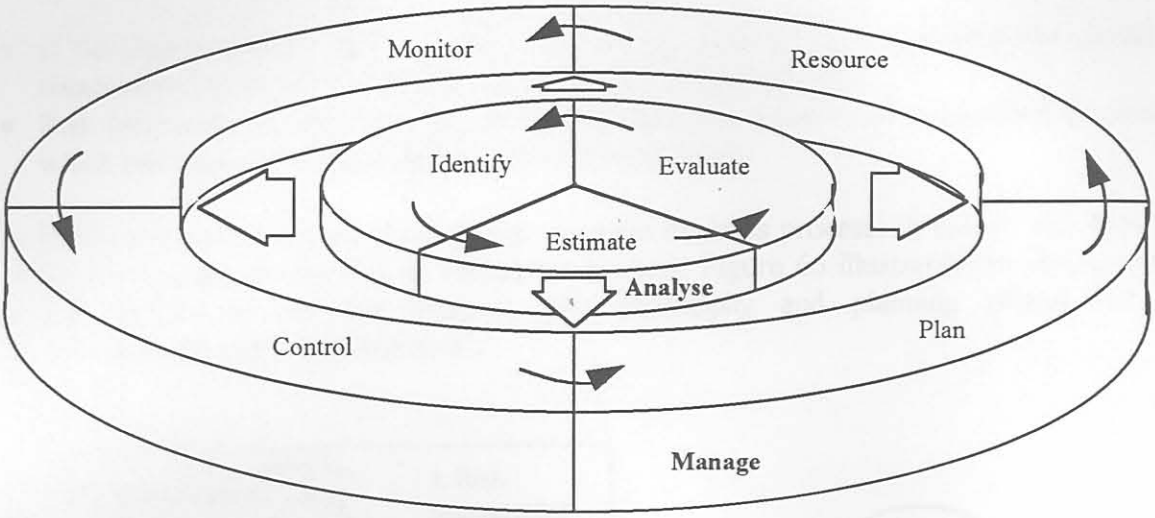


Figure 65 - Modified Charette's Risk Analysis and Management Process

From the diagram, the risk analysis activity is central. The first step is risk identification which involves the process of disseminating the issues and then crystallising the core risks. The following step is risk estimation which entails the assessment of how far reaching the risk is. The evaluation phase involves the understanding of what options are open for action (if required) in terms of the identified risks. As shown this is typically an iterative process.

Once the risks have been analysed, the management process is possible. In Charette's terms, the first step is planning, then resourcing these plans, monitoring their execution and then controlling by means of corrective action or the deployment of contingencies. Not only is the process recursive, but it also continuously interacts with the analysis exercise.

The possible attributes regarding this model are:

- Emphasis is placed on analysis which clearly plays a central theme.
- It positions risk analysis and management where the use of such a model will ensure that it gains due prominence.

Areas that are possibly lacking or perhaps that are not made clear are the following:

① The relationship between philosophy and process.
② Commonality with general management terms and practice.
③ Integration with other business change methods.
④ The relationships with business operational risks and business change type risks (project orientated)

Note: The remainder of the section continually refers to the numbers from the above list.

(a) Relationship between risk philosophy and risk process

In point ① above, business theory and practice indicates that tight relationships need to exist between philosophy and process. Very conceptually, philosophy provides the guidelines

within which process operates. It further provides direction for instances where processes do not exist. Processes are those set of sequential and or parallel actions which detail the actions that need to be taken. Liberally applied, the relationship between the risk philosophy and the risk process(es) is analogous between the vision (or strategic intent) and the business processes.

As instrument to understanding this relationship better, the factors influencing the risk philosophy need to be examined. This is largely governed by the following:

- The attributes of the risk under consideration.
- The organisation's propensity to risk.
- The propensity to risk of the various role players or key decision makers involved.
- Demands of the stakeholders.
- Dictates of the business environment other than the stakeholders (e.g. new technology).

The relative importance of these are given in sequence of the above list.

A feasible question arises in terms of whether philosophy follows process or vice versa. Argument for the former is that if weight in terms of philosophy holds in the sequence given in the preceding list, then the risk process holds the key to the articulation of the risk philosophy. The argument for the latter could arise from:

- If the organisation is mature in terms of risk management, then the philosophy should be reasonably rugged and sufficiently equipped to guide the process.
- Risk philosophy is articulated at the abstract and conceptual level as opposed to process which operates at the functional and transactional levels.

In business it can be argued that strategy precedes business process. In reality, this does not occur sequentially, rather it is an interactive process. Figure 66 illustrates the interaction of project phases in the risk analysis, risk philosophy and planning phases for the commercialisation of a new business[1].

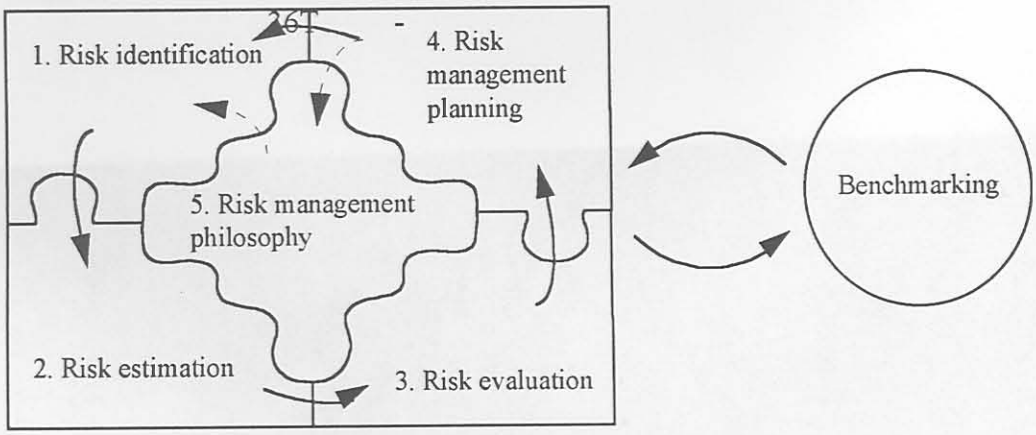


Figure 66 - Interaction between Risk Philosophy and Risk Process

[1] This is described in more detail in the application (chapter 5).

(b) Commonality with general management terms and practice

In point ②, it was raised that the management functions of (1) plan, (2) resource, (3) monitor and (4) control do not necessarily align with general management theory. As described earlier in the study, various models exist in terms of management functions. One traditional model has been (1) plan, (2) organise, (3) lead and (4) control. More recent thinking has alluded to the new roles for management where the role moves from paternalistic to facilitative. Verbs like communicate, mentor and leadership are taking more prominence. There is however no absolute in approach - paternalistic or facilitative as they are and will be situation dependent.

It may be argued that the term management may pertain to two different concepts, namely:

- Senior staff in the organisation.
- Fundamental functions required to achieve a mission.

In this light, (1) planning, (2) organisation, (3) leading and (4) control are the basic functions required to achieve a mission. Taking modern management trends into account then, the "senior staff" play a facilitative role while the management functions are increasingly becoming the domain of the "lower" level staff. The revised management framework as shown in Figure 67 is therefore suggested.

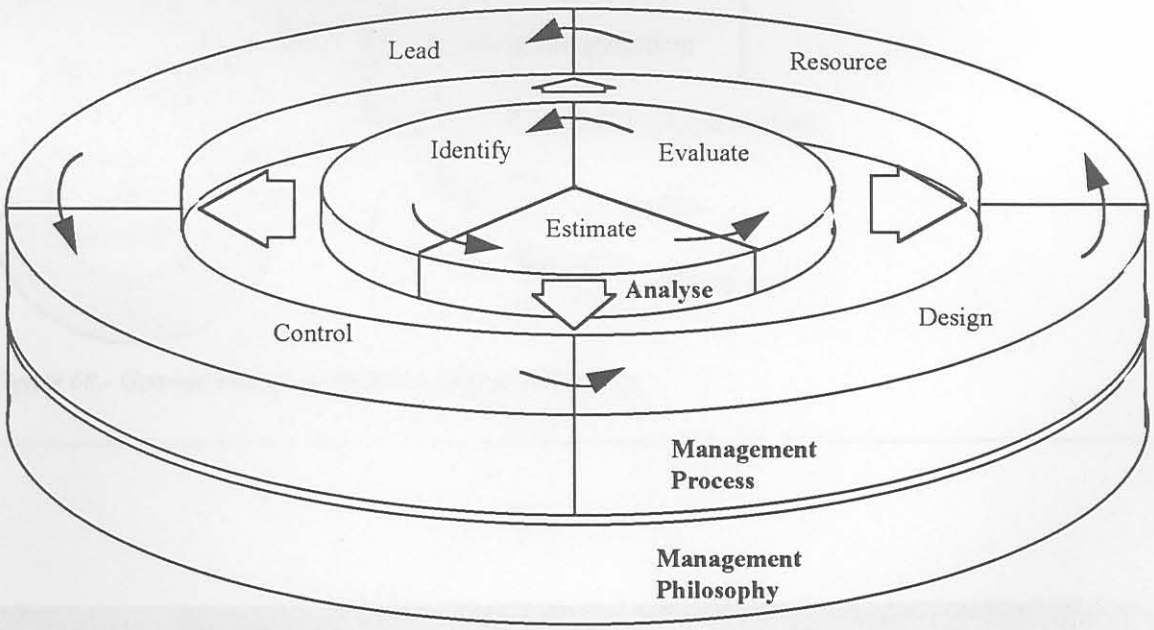


Figure 67 - Conceptual Risk Management Framework

This model is however conditional on the following definitions:

- **Design** - This involves all the management actions required to plan the risk management actions and the risk portfolio.
- **Resource** - Resourcing entails the resourcing and execution orientated activities required to mobilise the risk management actions regarding the business change.
- **Lead** - This involves the definition of leading described in chapter 2.

- **Control** - This entails the monitoring and corrective action orientated management activities.

Note that the analysis is still kept central to the hub, but it is in fact the seed of the planning function.

(c) Integration with other business change methods

From point ③, the most important management method that requires integration is the change initiative under consideration.

The results of the market research (chapter 3) indicate the importance of risk management during the life cycle of the solution (Figure 38). The area in the life cycle where risk management is traditionally practised ranked highly in terms of the supplier's response. They did believe that where focus should be placed in the future in terms of integration with the business change cycle are:

- Identification of the need for improvement.
- Contingency development.
- Solution implementation.
- Operation.
- Solution phase-out.

At the transactional and functional levels, methods do vary, particularly from change type to change type. At the conceptual and abstract levels however, there is a consistency in terms of approach. If one considers (1) Winston's operations research methodology (Figure 4), (2) Watson's business systems engineering model (Figure 16), (3) the generic engineering model (Figure 17), Charette's risk management process (Figure 20), the traditional business improvement life cycle (Figure 57), etc., a common thread can be seen Activities common to all business change initiatives are shown in Figure 68.

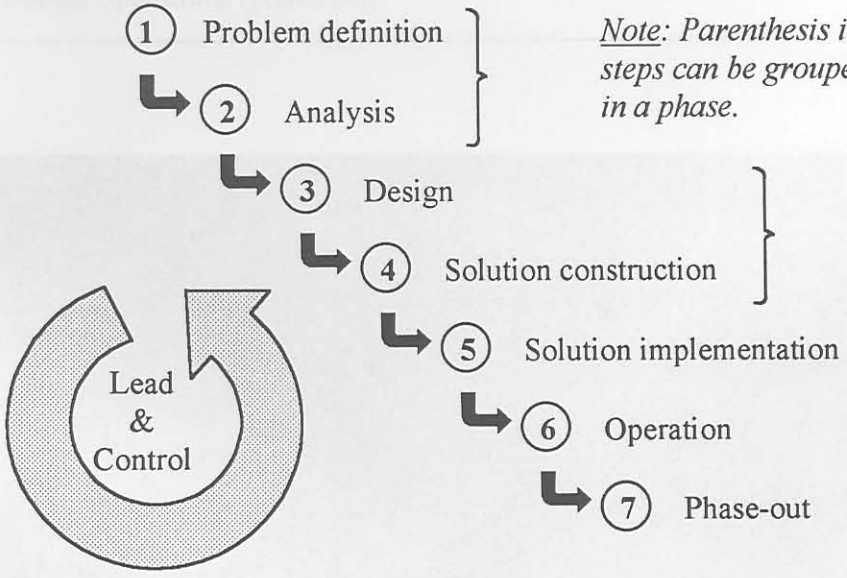


Figure 68 - Generic Phases of Business Change Initiatives

From the figure, the clear starting point is the business definition which may indeed be a business problem or perhaps an opportunity. The ensuing analysis involves the understanding of the situation under consideration. This may entail benchmarking, simulation, scenario planning or risk analysis. From the analysis, synthesis is possible in the design phase following which the solution is constructed. In some cases, design and construction may be very closely linked. The implementation phase is the culmination of the preceding activities where business change or transformation is enacted. While phases (6) and (7) are often neglected, attention is also required here. This was confirmed by the market research. Throughout the complete cycle, leading and cybernetics or control is ensured.

Figure 68 indicates that some steps could be grouped together into five distinct conceptual phases, namely:

- Analysis.
- Design.
- Change.
- Operations.
- Phase-out.

All the steps in Figure 68 will however be referred to during the synthesis as these were highlighted during the market research as being gaps in terms of risk management.

Using this model (Figure 68) as the basis for considering the integration between the risk management process and other solution generation processes, the task is more transparent. Risk analysis should be undertaken on an integral component of the solution analysis phase. Similarly the two design phases should coincide which includes the establishment of the management philosophy. Solution construction and implementation correspond closely with the resourcing phase in the risk management model. The solution phase-out phase is in itself a project of similar dimensions to the preceding phases (1) to (5), it is however critical in some instances that this be taken into cognisance before the solution sees the light of day.

Phase (6) of the business change cycle, namely operation is discussed in more detail later in paragraph (d), as it deals with point ④, i.e. the integration between business change risks and business operational risks.

Leading and controlling are two crucial management functions which are undertaken throughout the cycle, but plays a particularly prominent role during construction and implementation.

(d) Relationship between business change risks and business operational risks

This sub-section aims to understand the role risk management plays in the business change situation as opposed to the normal operational situation. Graphically from Figure 68, the difference lies in phases (1) to (5) and (7) as opposed to phase (6). The preceding text provides insight into risk management at conceptual level during business change. It is therefore worthwhile analysing contemporary theory regarding business risk management during operations (phase (6)).

A research project was concluded in 1995 which aimed to assess best practice in business risk management and then suggest a framework for managing risk [143][1]. While the report indicated it aimed to include the risks exposed to during change, the focal point was business operations. This being the case, it would allude to making the integration task easier under the assumption that the purported model is valid for business operations.

Two hypotheses that the study aimed to investigate was:

- Organisations realise the complexity of the risks they face.
- Organisations need more of a comprehensive approach for managing risk.

The results of the study indicated that the hypotheses held true which are consistent with the market research findings of this study.

The research put forward a framework constituent of 3 major facets, namely (1) a common business risk language, (2) an effective organisational control structure and (3) a process view of the business. This framework is summarised as follows:

(i) Develop a common business risk language.

For the purposes of integration and productivity, communication must be made seamless by means of a common language and understanding throughout the organisation. Arthur Andersen suggest the model in Figure 69 as a basis for a common language [143, p15].

[1] The research indicated in depth interviews with senior management at more than 40 global organisations based in North America and Europe. A further questionnaire was submitted to 3000 companies world-wide, but it is unclear what the response rate was like.

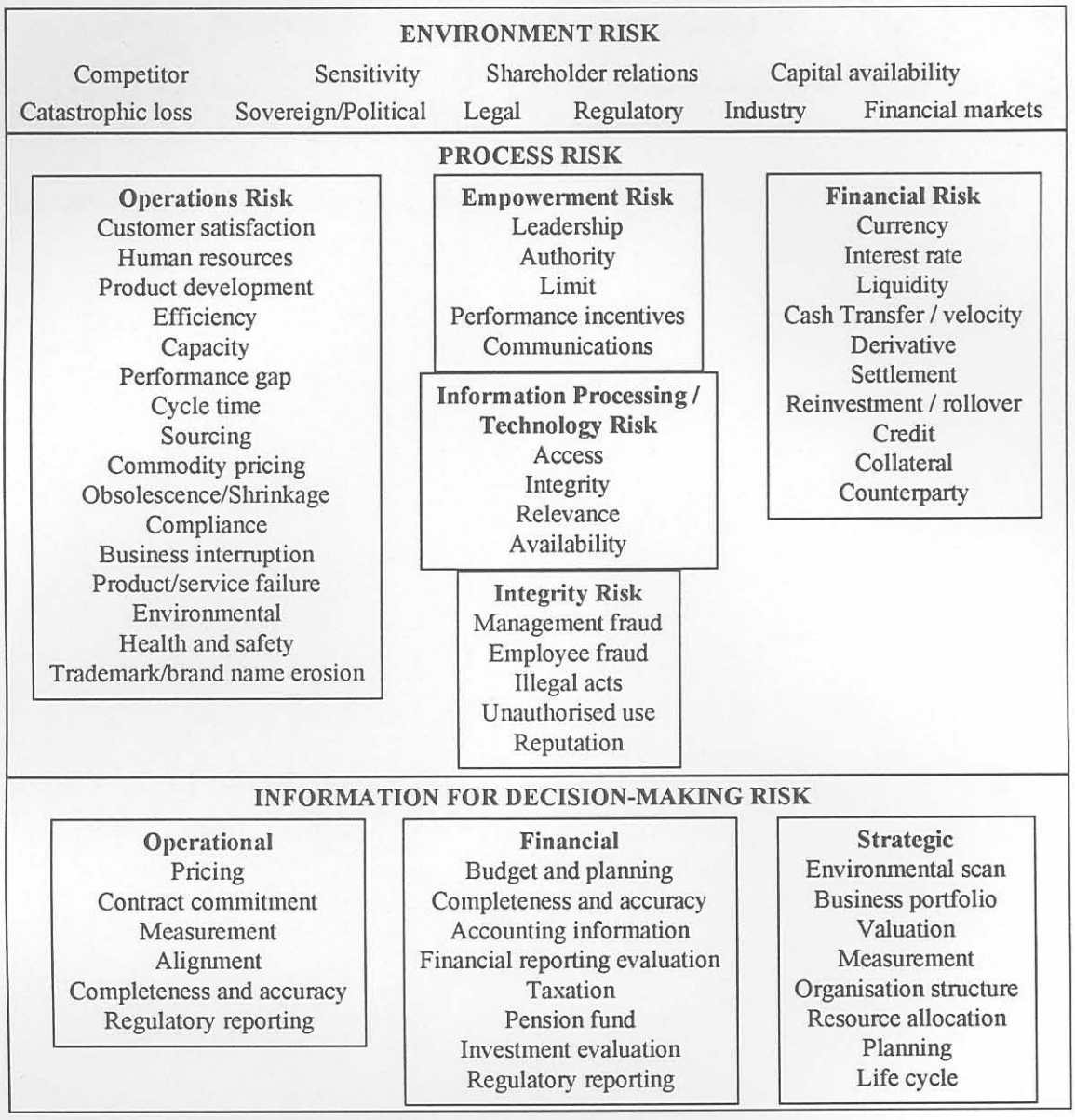


Figure 69 - Arthur Andersen's Model for a Common Language

In Figure 69, environmental risk pertains to "*where these are external forces that could either put a company out of business or significantly change the fundamental assumptions that drive its overall objectives and strategies.*" Process risk however, "*arises when business processes do not achieve what they were designed to achieve*". The authors indicate that information for decision-making risk "*arises when information used to support business decisions is incomplete, out of date, inaccurate, late or simply irrelevant to the decision-making process*".

(ii) Develop an effective organisational control structure

The authors indicate that an effective control structure will assist in anticipating risks and adapting processes accordingly. They define three levels of control, namely

- Strategic control (see Figure 71).

- Management control (see Figure 72).
- Business process control (see Figure 73).

These controls have a hierarchical relationship as shown in Figure 70.

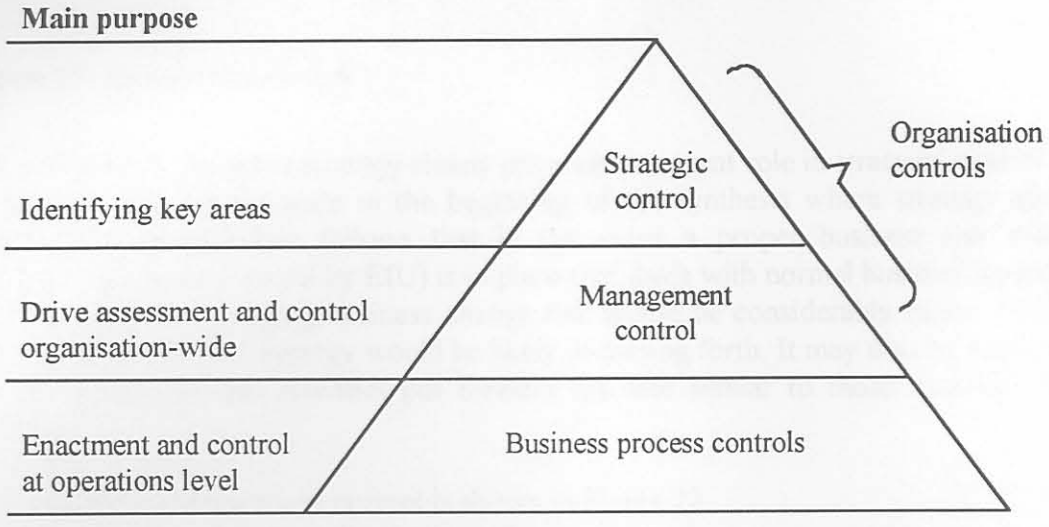


Figure 70 - Relationship between Business Risk Control Levels

The strategic controls are shown in Figure 71.

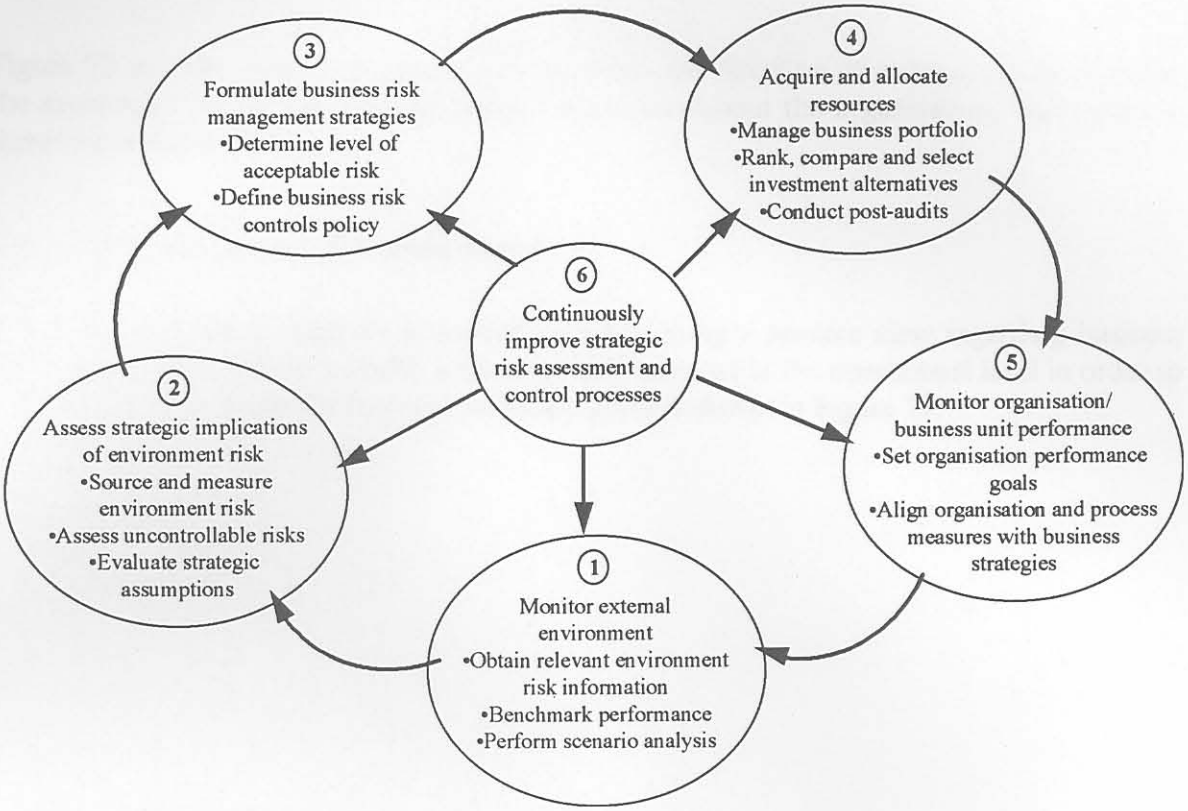


Figure 71 - Strategic Risk Controls

From Figure 71, business strategy clearly plays an important role in strategic control. This ties in closely with the rationale in the beginning of the synthesis where strategy also plays a pinion role. It therefore follows that in the event a proper business risk management framework (as put forward by EIU) is in place that deals with normal business operation, then the first steps in managing business change risk would be considerably easier. Not only will the task be easier, but synergy would be likely in coming forth. It may also be noted that some of the techniques and activities put forward are also similar to those detailed later in the chapter.

The model for management control is shown in Figure 72.

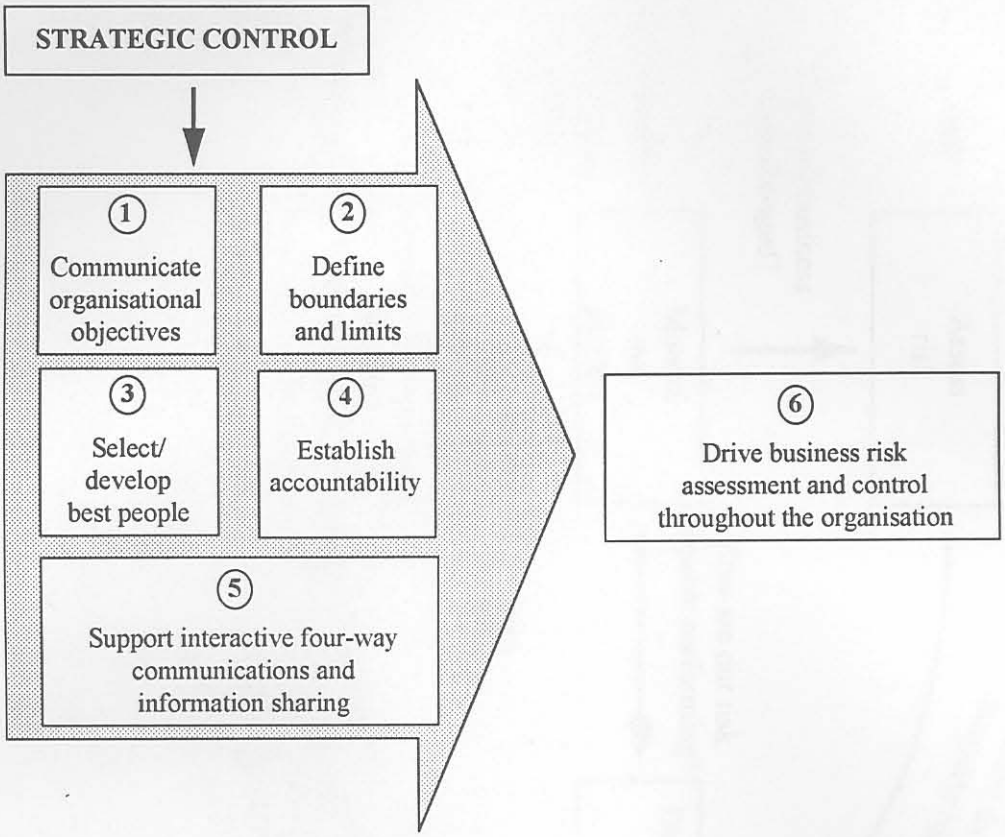


Figure 72 - Management Risk Control

Figure 72 indicates that management control takes the direction of strategic control, drives the assessment further and aims to enact control throughout the organisation. This operates therefore at the tactical level.

(iii) Create a process view of business control

The authors feel that emphasis is needed on establishing a process view regarding business risk management. This is in reality a set of actions required at the operational level in order to manage risk. The model for business process control is shown in Figure 73.

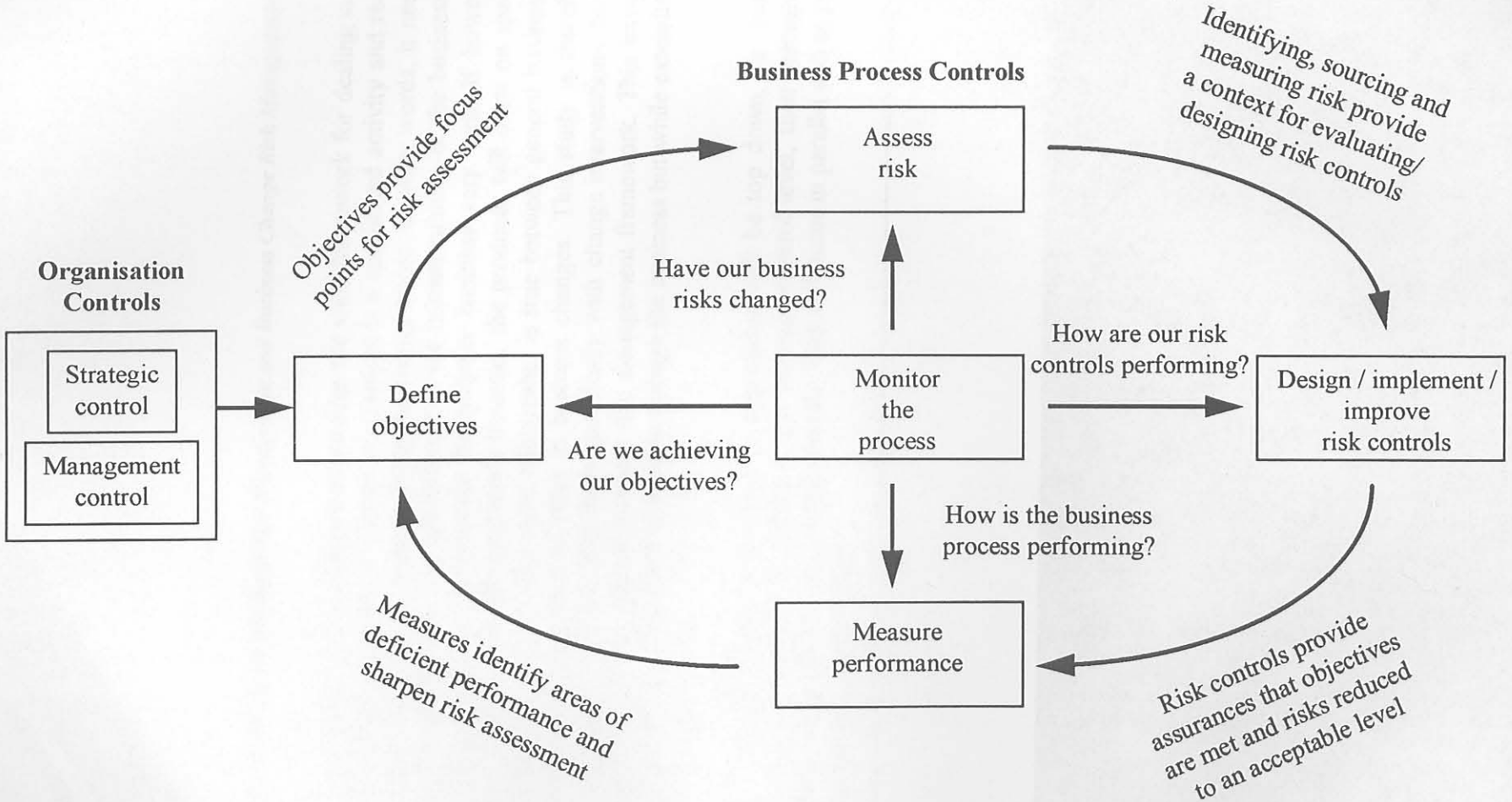


Figure 73 - Business Process Risk Controls

Figure 73 illustrates the important role business process controls play in business risk management. It is the engine where risks and business operations come together. It provides the enactment of objectives, the performance assessment and monitoring of success. It provides the knowledge base for learning and is effectively the risk expert system or heart of the organisation.

With the EIU business risk management model having been summarised above, its integration with business change risk management can be established. This is facilitated by means of Figure 74.

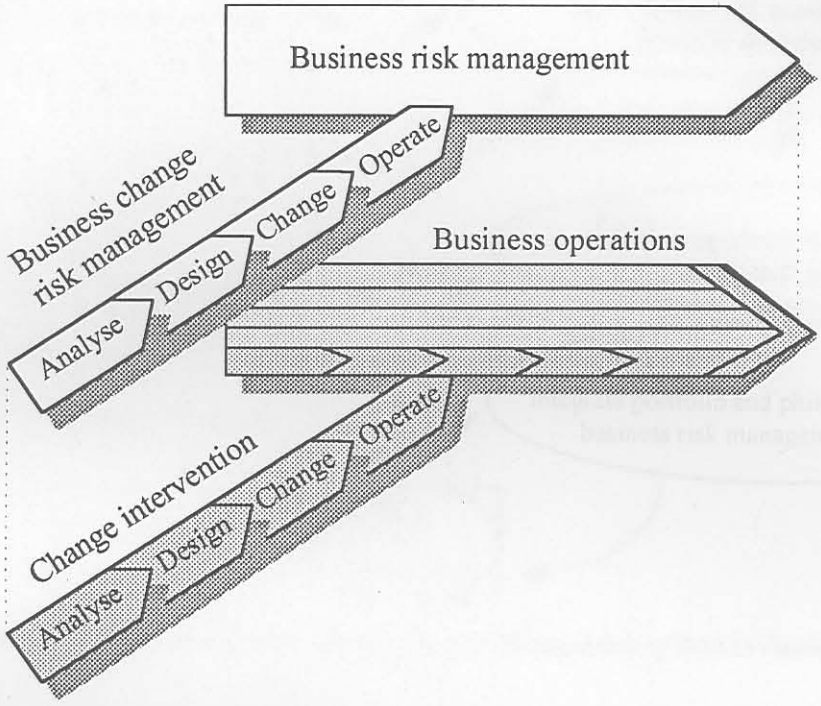


Figure 74 - Interaction between Business Risk Management and Business Change Risk Management

From Figure 74, business risk management provides the wide framework for dealing with all risks within the business context. A change intervention is a specialised activity and requires specialist resources and skills in order to bring the change about. In other words, it needs to draw on a set of competencies that are different to the normal running of the business. For example a polymer producer understands the polymer business very well. If however a business change is required in the producer's business, the producer will draw on specialist assistance such as a consultant. The same relationship is true between general business risk management and the management of risks in business changes. This study is therefore a specialisation of risk management that deals specifically with change interventions, but also integrates seamlessly with the general business risk management framework. This integrated approach provides business with a set of tools to manage the business but while extending the tool set.

The sequence of integration between the two approaches will be top down, i.e. business change risk management will first interact at the strategic control level, then management control and finally with the business process controls. This will occur in parallel and as part of the business change intervention itself.

It should be noted that while it is highly desirable for a business to have a comprehensive business risk management framework in place, very few businesses have this as was indicated by the researcher's market research as well as the EIU study [143]. Business change risk management can be implemented without this being in place. It will most likely require a little more effort.

4.4.2 Business change risk management process

Crystallising the reasoning of the previous section, it is possible to provide a generic process for the management of risk in business change initiatives. The high level process is shown in Figure 75.

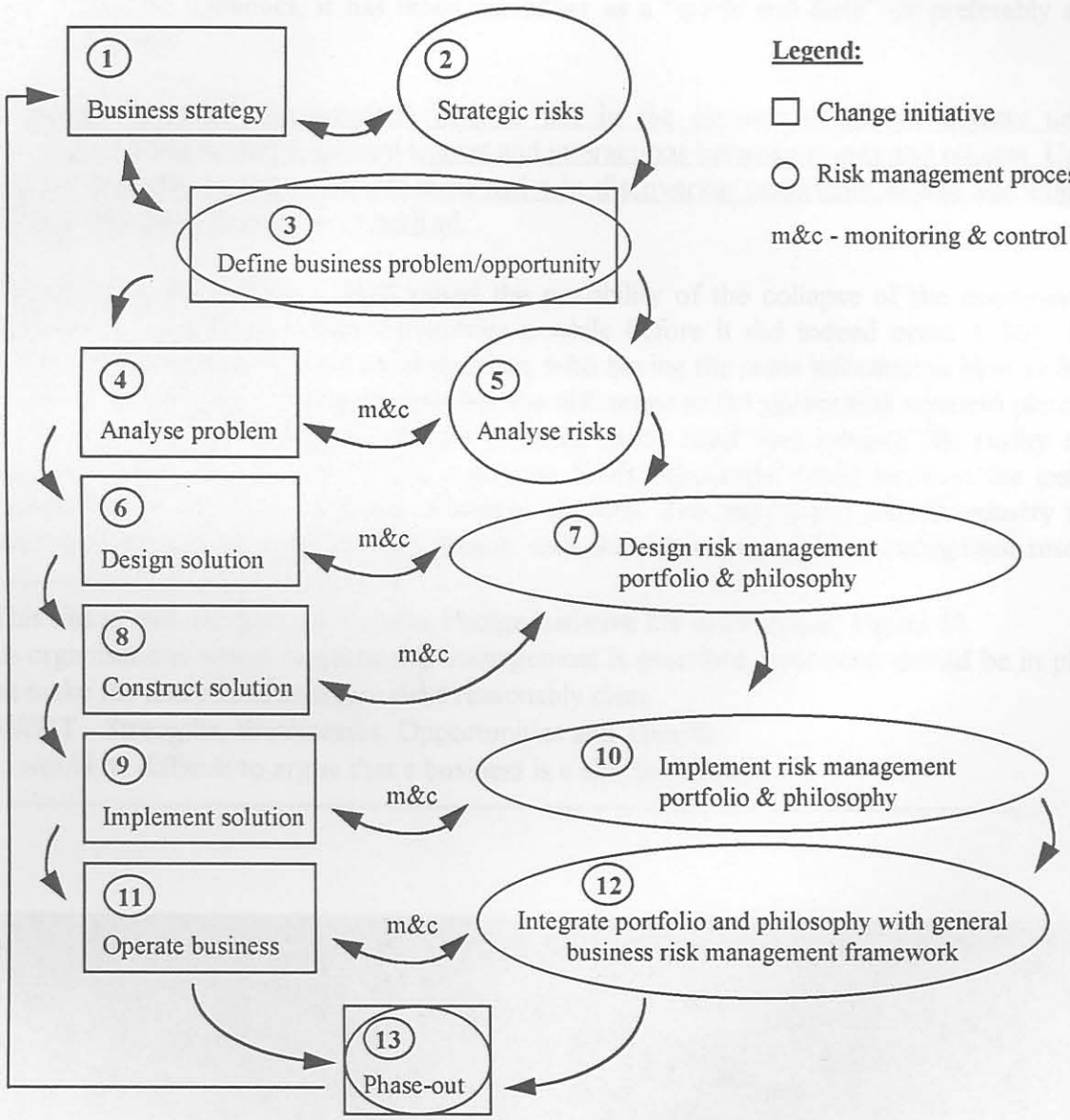


Figure 75 - High Level Generic Process for the Management of Risk in Business Change

Figure 75 illustrates the interaction between the business change risk management process and:

- The change intervention[1].
- Normal business operation.
- General business management framework.

The subsequent sections describe the phases of the business change risk management processes in more detail.

4.4.3 Derivation of strategic risks

This section describes the interaction of the process elements numbered (1) and (2) in Figure 75, i.e. *business strategy* and *strategic risks*.

As described in the chapter on fundamentals, strategic planning has taken on various forms over the last 20 years with its popularity waxing and waning. Presently, many businesses do not even spend much time in this area. Various methods are also employed in the derivation of strategy. It therefore follows that strategies and the strategic processes are inconsistent and not necessarily well attuned to making the strategic risks clear[2]. An appropriate selection of methods and tools should assist in this regard.

At the strategic level, one of the areas that play a very important role is the environment. One of the most common techniques used to summarise the strategic situation in this regard is a SWOT analysis[3]. Experience with this technique is that it is generally used as an instrument to brainstorm the SWOT's that come to mind during the strategy session. In the context of today's business dynamics, it has more use either as a "quick and dirty" or preferably as a summarising tool.

In complex systems[4] the greatest risks lie not in the obvious events or objects under consideration, but in the interdependencies and interactions between events and objects. Using appropriate methods and tools will even assist in discovering underlying events and objects that may otherwise have gone unnoticed.

As illustration, Royal Dutch Shell raised the possibility of the collapse of the communistic regime in the old Eastern Block countries a while before it did indeed occur [135]. This scenario was presented to the CIA at the time, who having the same information base as Shell dismissed this possibility. Schwartz ascribes the difference to the power that scenario planning has in uncovering plots and the threads between plots. Shell then realised the reality of a brand new risk - the collapse of the organised Soviet structures could result in the instant availability of a significant amount of energy sources. This would put the oil industry in a situation similar to the gold industry where, with the move from gold as recognised reserve

[1] This ties in with the generic business change initiative life cycle model, Figure 68.
[2] In organisations where business risk management is practised, processes should be in place that make the analysis of strategic risks reasonably clear.
[3] SWOT - Strengths, Weaknesses, Opportunities and Threats.
[4] It would be difficult to argue that a business is a simple system.

standard, many countries are selling off their gold reserves. The effect of significant demand reduction in the world surplus and resulting diminishing in the gold price. In South Africa where the gold mining industry plays a non-financial role, its greatest saviour has been the consistent devaluation of the Rand.

It follows that scenario planning plays a very important role, not only for normal strategic planning, but also for the identification of key risks and assistance with its analysis and contingency design.

While scenario planning is a very powerful tool for modelling the external environment, systems dynamics provides the ability to model the internal business dynamics. It must be noted however, that it can be used to complement scenario planning as well[1]. Another emerging approach is eco-systems modelling which is also being used in strategy derivation [144]. Its benefits are however not significantly different to the approaches described in this study and has therefore not been included.

Mathematical modelling techniques as a strategic level modelling tool are limited as:

- They require a lot of accurate data which more often than not is non-existent, particularly at the strategy level.
- They become so complex that they may be cumbersome to manage.
- It is impracticable to continuously monitor the business dynamics and adapt the model accordingly[2].

The greatest use of such a tool at this level lies therefore in the analysis of a focused area that requires consideration, not the dynamics of the whole strategic environment or even a meaningful subset thereof, e.g. internal business processes.

The benefit of system dynamics modelling however, is that it provides for various levels of functionality. In order to facilitate understanding of the subject under consideration, various types of diagramming techniques are employed. The most common of these are the causal loop diagrams and the stock and flow diagrams [138]:

- Causal loop diagrams indicate causality.
- Stock and flow diagrams indicate more structural detail (particularly in respect of behaviour) than causal loop diagrams.

Some systems dynamic software offerings are able to seamlessly integrate these diagrams and then progress to the mathematical modelling behind the diagrams. One example of this is Vensim[3]. The advantage of this tiered approach is that interrelations in terms of the underlying interaction is clearly understood. It is then possible for areas where concern lies to be modelled in more detail.

---

[1] One of the most notable models developed using system dynamics was the modelling of the world in the late 1960's, early 1970's with specific reference to the sustainable reserves of oil. While this created significant controversy then, it has since been used to model a wide array of macro systems.

[2] This is only valid given present capability. Future advances should make this more lucrative.

[3] Vensim is a registered trademark of Ventana Systems, Inc.

In summary, during process elements (1) and (2), the business strategy and strategic risks, the methods and deliverables shown in Table 47 should be used.

Table 47 - Strategic Level Methods and Deliverables for Risk Identification

#	Method/process	Deliverable	Comment
1	Driver analysis	Key business drivers	Helps establish business context
2	Establish strategic architecture	Vision, mission, strategic intent, business objectives	Helps establish business context
3	Scenario planning	Scenarios, key risks	
4	System dynamics modelling	Causal loops, stock and flows, simulation results	The usefulness of deliverables lies in descending order from causal loop diagrams

4.4.4 Definition of business problem or opportunity

This process element is critical, yet in practice there is seldom time spent on articulating exactly what the problem or business opportunity is. Various methods and frameworks do exist from the skimpy to the most detailed (e.g. statement of work in the military environment). This activity is important for the following reasons:

- The proximity of the problem/opportunity is identified.
- Stakeholders can be identified and their role established.
- Work can be scoped out.
- The nature of the problem or opportunity is understood.
- The problem or opportunity is articulated in a fashion conducive to broader communication and understanding.

If this process is not done properly, it in itself becomes a significant risk that will hamper activities during the change initiative and could even result in misalignment between delivery and the business needs. The method and deliverables of the process are described in Table 48.

Table 48 - Problem Definition Methods and Deliverables

#	Method/process	Deliverable	Comment
1	Problem/opportunity analysis	Problem/opportunity identification	-
2	Stakeholder analysis	Stakeholders and their needs	-
3	Project definition	Project mandate, method description, scope in terms of project and problem/opportunity	-

4.4.5 Risk analysis

This section refers to process element (5) shown in Figure 75. Once the business problem or opportunity is known and the strategic risks identified, the risk analysis can start in parallel with the analysis of the business problem (the change initiative process). From Figure 67, the

key elements are the risk identification, the risk estimation and the risk evaluation. The purpose of each key element is detailed as follows:

- **Risk identification** - This involves the identification and definition of the risks in the area under consideration.
- **Risk estimation** - This involves qualifying and quantifying the impact that the risk could have on the business.
- **Risk evaluation** - This entails the analysis of the various risk management options that are open for consideration as well as the recommendation for the most appropriate approach.

The three elements are considered in more detail in the following text.

(a) Risk identification

As with the definition of the business problem or opportunity, it is crucial that the risks are clearly identified. This means that the core risks are identified and not their symptoms or secondary risks. This is achieved by cause-effect analysis which is established in the manner provide by the causal loop diagrams. The importance of this exercise is seen in the light that it does not help to exacerbate the level of risk by incorrect risk identification. The problems that could arise if the identification is not done properly, include:

- The real risks are not managed as they are unknown.
- Effort and money is spent managing something that provides little value.
- The occurrence of risks that were not foreseen diminishes the credibility of the risk analyst or organisation.

Another approach to identifying risks in business change is by using a checklist. While the causal loop approach provides a path to the core risks, the checklist will assist in accelerating the risk identification process. Using the market research (chapter 3), the framework shown in Table 49 is recommended for the identification of business change risk. This list must not be confused with the framework provided for by Arthur Andersen as shown in Figure 69. The Andersen framework categorises business risks as relevant to business operation in general. These frameworks complement each other as put forward earlier.

Table 49 - Prioritised Framework for Sources of Risk in Business Change

FOUR KEY RISK THEMES			
1. *No reliable methods and tools which are propagated by the lack of understanding regarding the impact of the change on the business.* 2. *Lack of focus on achieving business results manifested in poor greater organisational involvement.* 3. *Poor leadership throughout the complete change life cycle.* 4. *Not having empathy for the stakeholders' needs.*			
Tier 1 Risks	**Tier 2 Risks**	**Tier 3 Risks**	**Tier 4 Risks**
1. Lack of top management commitment 2. Poor communication 3. No focus on financial implications 4. Lack of customer focus 5. Poor vision 6. Ignore employee concerns 7. Poor change management attention	8. Implement without testing 9. Misalignment with strategy 10. Not anchoring changes in culture 11. Failure to appreciate risks 12. Not anticipating effort and energy 13. Wrong implementation method 14. No sense of urgency 15. Not consider holistic issue	16. Poor attention to innovation 17. Inappropriate tools 18. Misalignment of technique and paradigm 19. Take on too much 20. Innovate too slowly 21. No plan for short term success 22. Mis-use of techniques 23. No use of experienced specialist	24. Too much focus on analysing the current 25. Aim for minimal gains 26. Declaring success too soon

The framework provided in Table 49 was developed from the market research conducted as part of this study/ The four themes represent the four most important areas of risk in business change as crystallised by means of factor analysis. From the sample, four clear tiers of individual risks emerged which represents the groupings of risks as prioritised by the sample's responses. While the nature and risks differ per business and situation, the framework provides a benchmark from which to work.

It is further important that once the risks have been disseminated, they must be condensed into the critical few. This is achieved using two approaches:

- The cause-effect analysis described earlier.
- Clustering of common risks.

There must be caution that the risks are not over-clustered, as it may be difficult to derive the correct set of management actions during the risk evaluation process. The next process, risk estimation, will also assist in the prioritisation of the risks in terms of severity. The remaining insignificant risks can then be side lined from the remainder of the risk analysis process.

(b) Risk estimation

As discussed previously, the purpose of the estimation process is to establish the magnitude of the risks under consideration. These attributes can be quantified or qualified. Much of the available literature that focuses in this area assumes that the process to the estimation, and the process from the evaluation, requires less consideration. As discussed in the study this cannot

be the case. A myriad of theories exist which offer assistance in the qualification and quantification of risk[1].

In order for risk analysis to be successful in the business change context, a few principles should hold, namely:

- The analysis process should be understandable.
- The analysis process should be easy to use and maintain.
- Integrate easily with the change initiative methods and tools.
- Flexible enough to accommodate different estimation models and perspectives.

A wide range of estimation tools are on the market. The market research (Figure 45) indicated that there are two clear groups of tools that are preferred as shown in Table 50.

Table 50 - Profile of Preferred Risk Management Tools

Group	Rank	Tool	Typical Data Format
1	1	Market research	Statistics, qualitative information
	2	Forecasting	Numerical, statistical, qualitative
	3	Scenario planning	Numerical, statistical, qualitative
	4	ROI	Fraction
	5	RONA	Fraction
2	6	NPV	Currency value
	7	Outsourcing	Currency value
	8	Contracting	Currency value
	9	IRR	Fraction
	10	Portfolio analysis	Value, spatial position
	11	Simulation	Statistics
	12	Insurance	Statistics, currency value

While Table 50 illustrates the effectiveness of tools currently in use, it is possible that these techniques are not the most effective, given that the sample is valid and representative. The reason is that the sample and indeed the population may not necessarily be au fait with the more advanced and new techniques. This does not however, provide a problem as the estimation techniques will be situation and method dependent. The crux lies in taking the results of the risk estimation and comparing this with other estimation tool results. The value of the ranking of the tools as shown in the table lies in the guideline to the most popular current tools.

[1] Some techniques include (many of the following are the proprietary of the companies shown in brackets):

- Decision trees [64].
- Rapid methodology (Willis Coroon).
- Risk profiling (Sedgwick Risk Services).
- SWIFT (IRCA).
- MCDM.
- etc.

Benchmarking is a technique that is useful in helping to determine what:

- Thresholds in terms of risks should be.
- What best practices in terms of risk management interventions are.

This information can be gleaned from strategic, performance or process orientated benchmarking. The availability of a knowledgebase of best practices and measures will greatly accelerate the risk analysis process in general (not just risk estimation). The precept must however be that the knowledgebase is to encourage good practice and not become a rule book.

Table 50 illustrates the variability of the outputs of the various risk estimation approaches. This indicates that in order to be able to compare "oranges with apples", a normalised approach is required.

The approach proposed for integrating the various risk estimation results, is the normalised scorecard. This is illustrated in Figure 76.

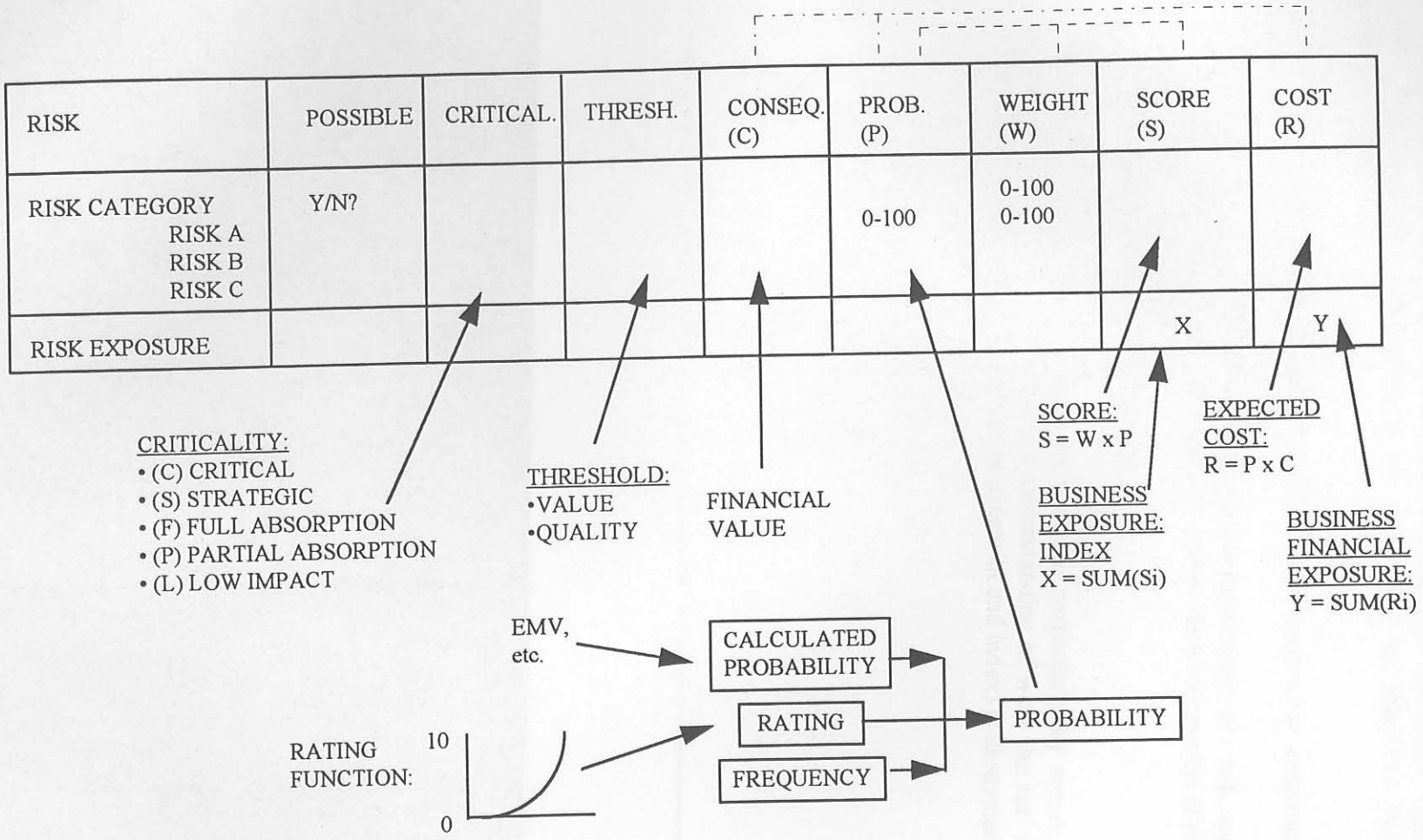


Figure 76 - Normalised Risk Estimation Scorecard

The scorecard provides for 2 methods of estimation, namely financial (COST) and index based (SCORE). They both work off the probability of risk as indicated in the scorecard. The financial exposure directly impacts on the NPV and IRR of a change initiative. This is illustrated by means of Table 51.

Table 51 - Business Initiative Attractiveness Calculation

Revenues / Costs	**Period 1**	**Period 2**	**Period 3**	**Period 4**	**Period 5**
1. Income					
2. Savings					
Total cash Inflows:					
3. Expenses					
4. Risk exposure					
5. Cost of risk management					
Total cash outflows:					
Total net cash flows:					

Referring to Table 51, one of the traditional approaches to evaluating a project's attractiveness is by means of IRR, NPV and or payback. In these methods, risk is brought in by means of putting in a safety factor on the rate of return which could result in unnecessarily high discounting. It follows that the reverse is also possible. This method is able therefore to provide a direct relationship between risk and the financial attractiveness of a business intervention.

It can be noted that the same result could be achieved by using the EMV approach [127] and discounting risk directly into the revenues and expenses. In this instance the magnitude of risk is not itemised separately. Here caution must also be made to ensure that the cost of risk management is accounted for. It is however possible to use EMV logic in the derivation of risk exposure and probabilities in the scorecard as described later. This method is recommended.

The index based approach provides a useful management tool in instances where:

- It is difficult or impossible to establish the financial impact of a risk occurrence.
- A financial quantification is not important, rather the minimisation of risk is.
- Many "soft" risks abound.
- A quick assessment needs to be made.

This method allows for the sensitivity analysis, particularly by means of weighting. This contributes significantly to an objective understanding of what the real risk drivers are. The relationship between the two dimensions (financial and index) is illustrated in Figure 77.

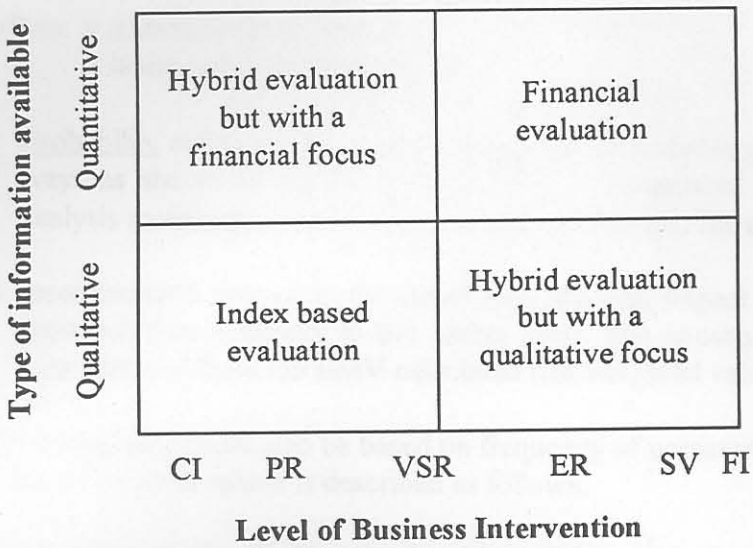


Figure 77 - Relationship between Financial and Index Based Evaluations

From Figure 77, the higher level the business intervention, the more the need for financial evaluation methods and vice versa. The index method could typically be more appropriate in a TQM project for example.

The scorecard provides for the following functionality:

- Risks are divided into meaningful categories in order to cluster risk trends and profiles.
- The possible column serves as an aid in the identifying process. All risks are left on the scorecard until it is determined how possible the risk is by means of the Delphi technique. The non-possibles are then removed.
- The purpose of the criticality column is to provide a qualitative estimation in terms of the criticality. While this information is not pertinent, it assists in providing a first draft in terms of the importance of risk. This is particularly useful in workshop format where participants with limited time are able to provide direction in terms of where risk estimation efforts should be focused. The criticality indicators are:
    - Critical - This risk poses a very real threat both in magnitude and immediacy. Realisation of the risk is both likely and will have serious consequences.
    - Strategic - A strategic risk holds the likelihood of serious consequences but the immediacy is not necessarily high. For example, if risk materialises, consequential damages could be R100 million. The frequency of occurrence may however, only be once in 250 years.
    - Absorption pertains to the level of impact meaning the degree to which the business will absorb the risk in the event of its occurrence. Full absorption means that the impact will be reasonably high although not strategic. Partial absorption will have an average impact.
    - Low impact is self explanatory.
- The threshold value is also an aide variable. It sets the level of risk beyond which attention will be required. This may be expressed in terms of a value or quality description. This is the limit beyond which a risk becomes unacceptable.
- Consequence (C) is an expression of the financial exposure, should the risk come to fruition.

- Expected cost (R) is the product of probability (P) and consequence (C) (see Equation 7). This cost is the expected risk weighted exposure which companies use as the basis for NPV as example.

Equation 7

$$R = PC$$

- Business financial exposure (Y) is the sum of the individual risk weighted financial consequences of risk, shown in Equation 8. This is the value that should be included in the project evaluation sheet as shown in Table 51.

Equation 8

$$Y = \sum_{i=1}^{n} R_i$$

where: n is the number of risks.
R is the risk weighted cost of risk i.

- Probability refers to the likelihood of the risk occurring. This can be expressed in three ways as shown in Figure 76. It could be a calculated probability using any number of analysis techniques available, e.g. the hazard rate (λ) for an equipment item.

A recommended approach for calculating the risk impact and its probability is the EMV approach (see appendix B and earlier text). The consequence and probability is then the value derived from the EMV calculated risk weighted value and probability.

The probability could also be based on frequency of occurrence per year or the rating function could be used, which is described as follows.

Rating refers to the likelihood of a risk realising. This does not necessarily equate with the statistical likelihood or probability. It is only the case if the estimation technique provides this - for example the results of a simulation.

The recommended tool here is the rating function as shown in Figure 78. As purported earlier, a means of integrating dissimilar and or risks that are difficult to estimate must be used. This is what the rating function allows.

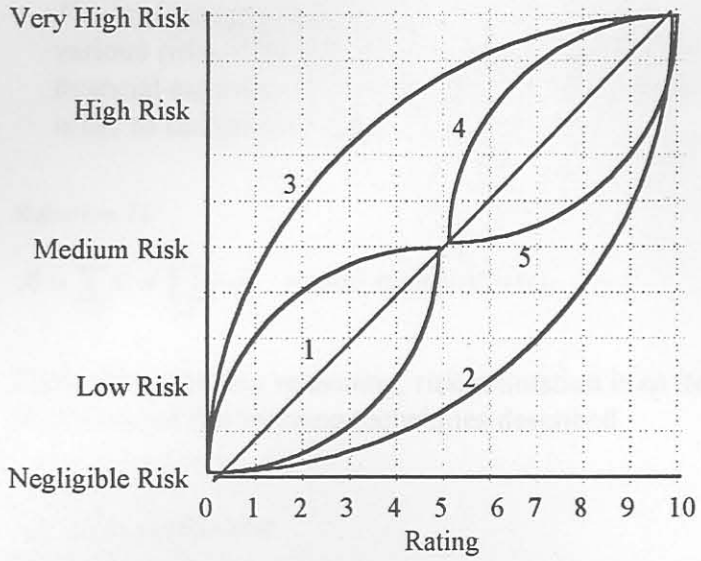


Figure 78 - Standard Rating Functions

Figure 78 illustrates 5 standard rating functions. A generic framework provides for a simple yet effective application. The y axis ranges from very high risk to negligible risk. The x axis ranges from 0 to 10. The precept of the relationship between the axes is, the higher the risk, the higher the rating or value.

Function 1 provides for a standard linear function where the degree of risk is directly proportional to the rating. Function 2 correlates with the parabolistic curve where only quadrant 1 is valid. The equation for this is given by Equation 9.

Equation 9

$$y^2 = 4ax,\ x \in [0,10]$$

The behaviour of function 2 implies that the impact of the risk accelerates very quickly. The opposite characteristic is valid for function 3.

Function 4 illustrates the behaviour of a risk where as a low risk it quickly gains importance, but as the risk becomes higher, the weight decelerates. The shape of the curve correlates with the standard cumulative lognormal failure distribution. Again, the reverse holds true for function 5.

The functions provides a generic framework for the curve. It is possible to alter the shape of the curves by changing the value of the constant, for example a in the parabolistic function. Once the behaviour of a risk has been correlated with a function, the function is fairly insensitive to minor changes in the values of the constant. This is primarily because the value taken from the x-axis is in integer form between 0 and 10. The net effect is even less sensitive if the weight is low as described further on. In the case where the weight is a maximum of 100 and the estimator is out by 1 integer point (on the x axis), the error is not very high considering that best estimate is being used to evaluate the risks across the board.

Note, that the rating function is to be employed as a tool for evaluating the probability of the financial exposure, the rating must be expressed as a percentage.

- The weight (w) variable relates to the risk category (first column)[1]. The purpose of this is to highlight the importance of the certain categories of risk over others. The degree of the weight can vary from 0 to 100, but in practice a scale of 0 to 50 has generally been sufficient.
- The score (s) (or relative importance) of a risk is obtained from the product between the probability and the weight. As illustrated by Equation 10.

Equation 10

$$s = wp$$

- The business exposure index (X) (see Equation 11) represents the cumulative score of the various risks. The higher the value, the higher the risk exposure of the business. Like the financial exposure (Y), it is used as a value from which to bring risk management actions in order to reduce the value.

Equation 11

$$X = \sum_{i=1}^{n} s_i = \prod_{i=1}^{n} w_i p_i, \quad n \text{ is the number of risks}$$

From the preceding reasoning, risk estimation is an iterative process. The iterations are limited by the use of the focusing techniques described.

(c) Risk evaluation

Risk evaluation pertains to the generation and evaluation of alternatives for management action aimed at the minimisation of risk exposure. These actions relate to any effects of the change initiative whether during or after the business change exercise.

It is possible to provide a general categorisation of the type of management attention required as proposed by EIU [143, p30]. They put forward the categorisation based on the relationship between the likelihood of the risk and the risk's significance as shown in Figure 79.

[1] It is possible to relate the weight variable to the criticality type as well.

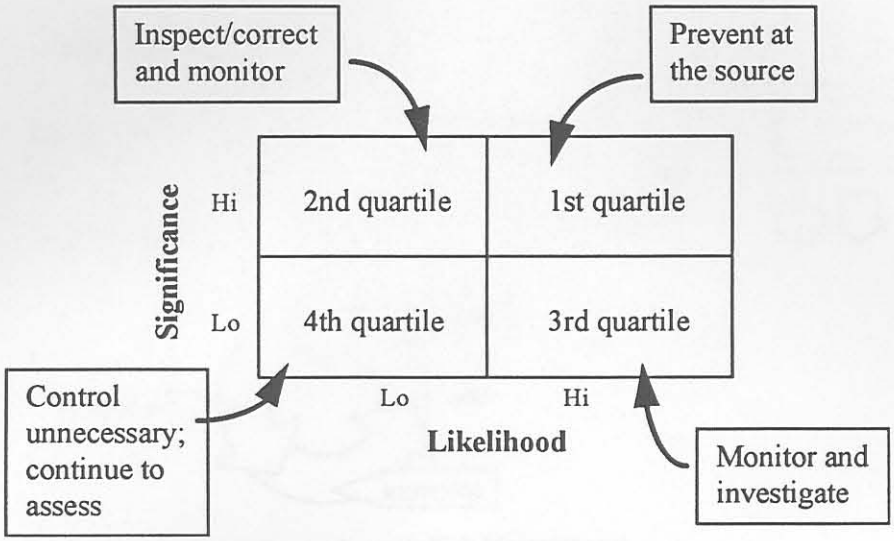


Figure 79 - EIU's Model for Business Controls

The EIU indicate that the most serious group of risks (the first quartile) require (1) avoidance, (2) transfer or (3) preventative actions. Avoidance typically refers to the discontinuation of activities or objects that give rise to risks. Transfer strategies involve moving some exposure to another party via mechanisms like insurance, strategic alliances, etc. In the first quartile avoidance and prevention must be undertaken at the source. The "lesser important" risks (quartiles 2 and 3) can use inspect and correct techniques where it may be acceptable to put in strategies downstream from the sources of risk. Fourth quartile risks do not require management attention and it is prudent to remove unnecessary controls that were designed for the risks if they were indeed instituted.

In general, four categories of management techniques can be used, described as follows[1]:

- Elimination entails the removal of the source of risk.
- Prevention entails the prevention of the risk materialising, i.e. the source of risks still exist, but its occurrence is prevented.
- Two general mitigation categories exist, namely transfer (as described earlier) and other management techniques. The end result of mitigation is that the consequences of risk occurrence is alleviated somehow.

The market research revealed 3 levels of management techniques generally employed to manage risks in business change. These techniques cut across all the change management types. These 3 levels based on their perceived effectiveness is shown in Figure 43. In general, the 8 most important techniques are:

- Focus on delivering benefit to customers.
- Strong committed leadership.
- Ensure a vision is established.
- Put performance measures in place.
- Align initiatives with business strategy.
- Ensure high levels of communication.

[1] This varies slightly from the EIU model shown in Figure 79.

- Up-front cost benefit analysis.
- Address employee needs.

The above list clearly ties in well with the management of the major risk themes shown in Table 49. Like with the risks that are situational, it follows that their management actions will also be situational.

In devising a management strategy, it is important that the principles described in chapter 2 are taken into consideration. The starting point is value or additional value generated. One of the most important techniques that emerged over again regardless of the business change type was customer involvement. This brings in the importance of value generated and the corresponding alignment with customer perceived utility. At the macro organisation level the dynamics between risks and management actions are put forward with the assistance of Figure 80.

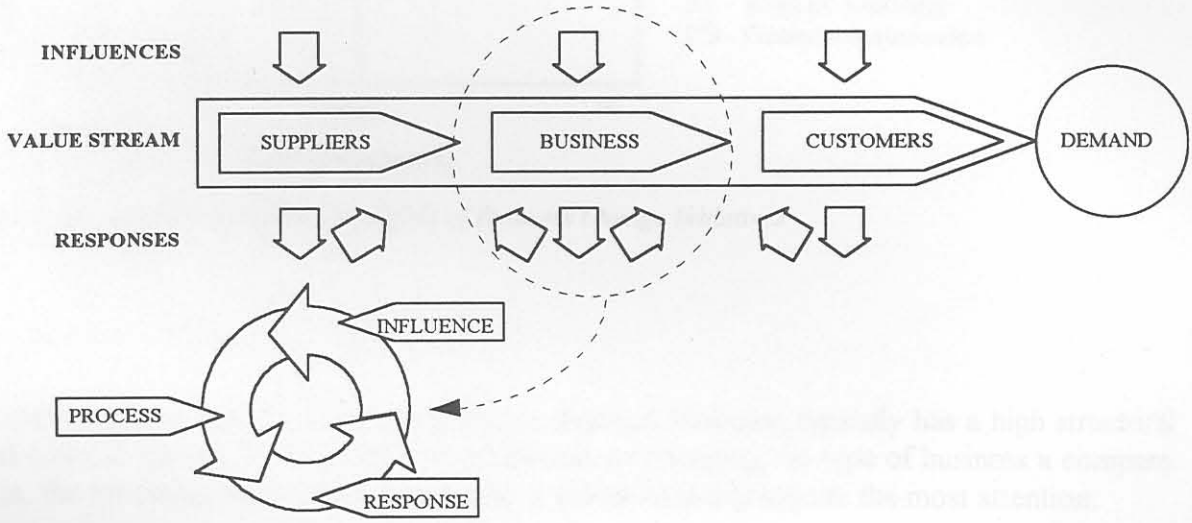


Figure 80 - Business Dynamics and Risk Management

Figure 80 illustrates that a business is an integral part of its environment. Systems theory indicates that it is influenced by external factors, the largest being those upstream (suppliers) and downstream (customers). It then processes these influences and in turn inflicts a response on its environment. This then induces a similar cycle from its environment and the cycle perpetuates as it is assumed to function as an open system. It follows therefore that a management strategy devised to address the risk in business change (and clearly also in normal operations) takes cognisance of this.

Some of the factors per change type are discussed.

(i) Financial optimisation

This type of change type does not necessarily change the physical structure of an organisation and would have a limited effect on the culture of its employees as shown in Figure 81.

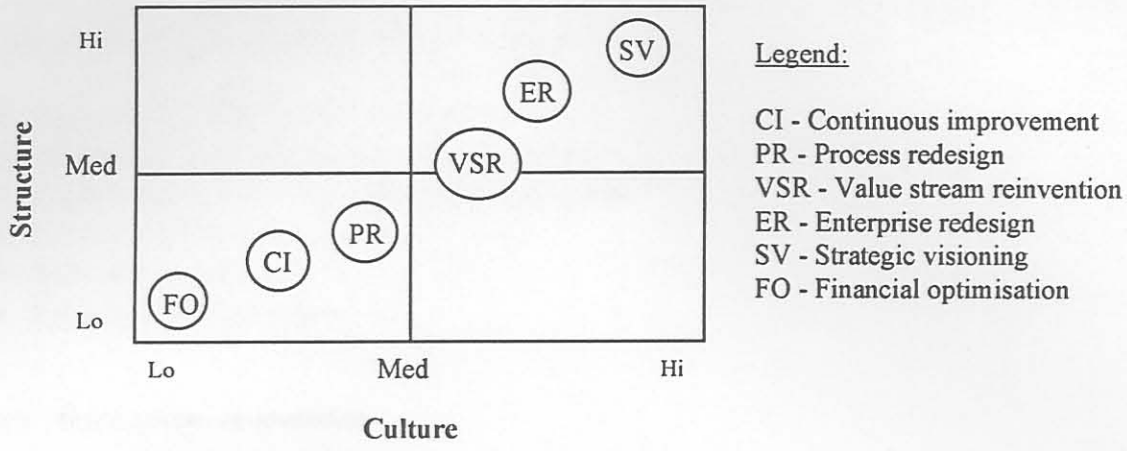


Figure 81 - Structural and Cultural Impacts of Business Change Types

The main aim of financial optimisation is to, with the use of a range of financial instruments, maximise income for the organisation; but off the existing operational base. This may involve obtaining favourable tax directives, setting up offshore companies, etc. The most important considerations at this level are:

- Consideration of regional and international law and their trends.
- The management strategies do not taint the raison d'être of the business.

Compared to other business change statistics, financial optimisation is attractive as illustrated in Figure 82. Financial leverage can be very high with a reasonably small amount of employee effort. Risk management should however, ensure that "financial engineering" does not impact negatively on the main line of business.

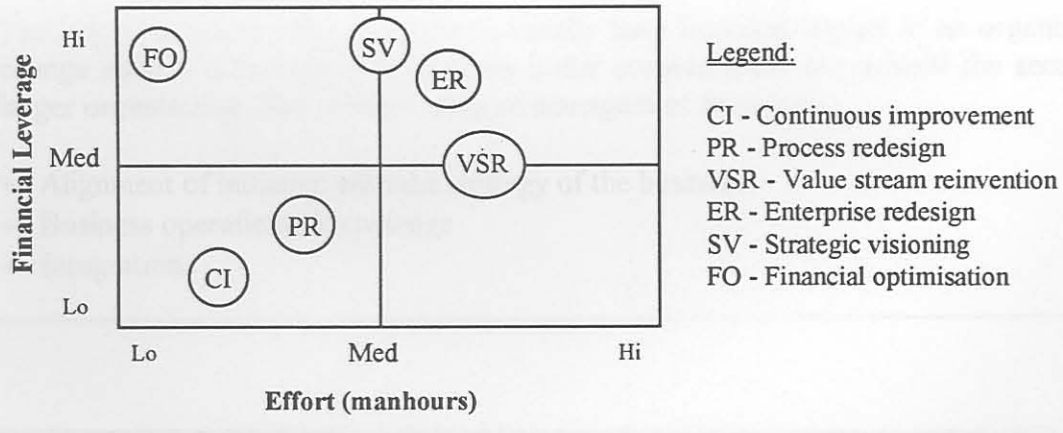


Figure 82 - Financial Leverage vs. Effort of Business Change Initiatives

(ii) Strategic visioning

In stark contrast with financial optimisation, strategic visioning typically has a high structural and cultural impact. As this change type focuses on changing the type of business a company is in, the following areas of risk management would normally require the most attention:

- Managing the mindset of the key players from within the organisation.
- Ensuring that all the key information is made available about the area where the visioning is being undertaken.
- Ensuring that the right competencies are gathered both for assisting with the change and for operating in the new way.
- At this level there are often windows of opportunity and accordingly execution should be ensured.
- The nature and individuals or groups involved in the partnership arrangements.
- Information security.

(iii) Enterprise redesign

This involves the redesign of current business or expansion of opportunities. The key areas that would require management attention are:

- Ensuring key information is available.
- The number and competencies of resources.
- Capital acquisition and cash flow management.
- Partnership management.
- Information security.
- Project implementation.

(iv) Value stream re-invention

This is primarily internally focused where the aim is end to end redesign of the way the current business operates. This is however, given that the structure of its interaction with the external world remains reasonable unchanged. This would follow that the most important areas for attention would be:

- Paradigm management.
- Business knowledge.
- Leadership.
- Setting stretch targets and achieving them.
- Involving the various stakeholders.
- Change in measurement.

(v) Procedure redesign

The impact of these change initiatives usually have localised impact in an organisation. The change itself will be radical in the area under consideration, but against the security of the larger organisation. The primary areas of management focus are:

- Alignment of initiative with the strategy of the business.
- Business operational knowledge.
- Integration.

- Ensuring implementation is affected and due attention received.

(vi) Continuous improvement

Continuous improvement initiatives typically have a low structural and cultural impact (Figure 82). Accordingly, leverage and effort is low but so is risk. Areas generally requiring most attention in terms of risk management are:

- Sustained employee commitment to ongoing improvement.
- Alignment of initiatives with business strategies.
- Ensuring that due management attention is achieved.
- Technical flexibility.
- Measurement.

Once a management strategy has been established, it must be:

- Described.
- Placed into the scorecard framework to evaluate its impact on the risk exposure.
- Its actioning must be confirmed against other management alternatives (in order to ensure a common baseline and understanding)

Bringing all the risk management actions together requires an extension of the scorecard. What becomes available is a portfolio of risk management actions aimed at reducing the risk exposure of the business as a result of the business change. The evaluation scorecard shown in Figure 83 shows the extension of the scorecard.

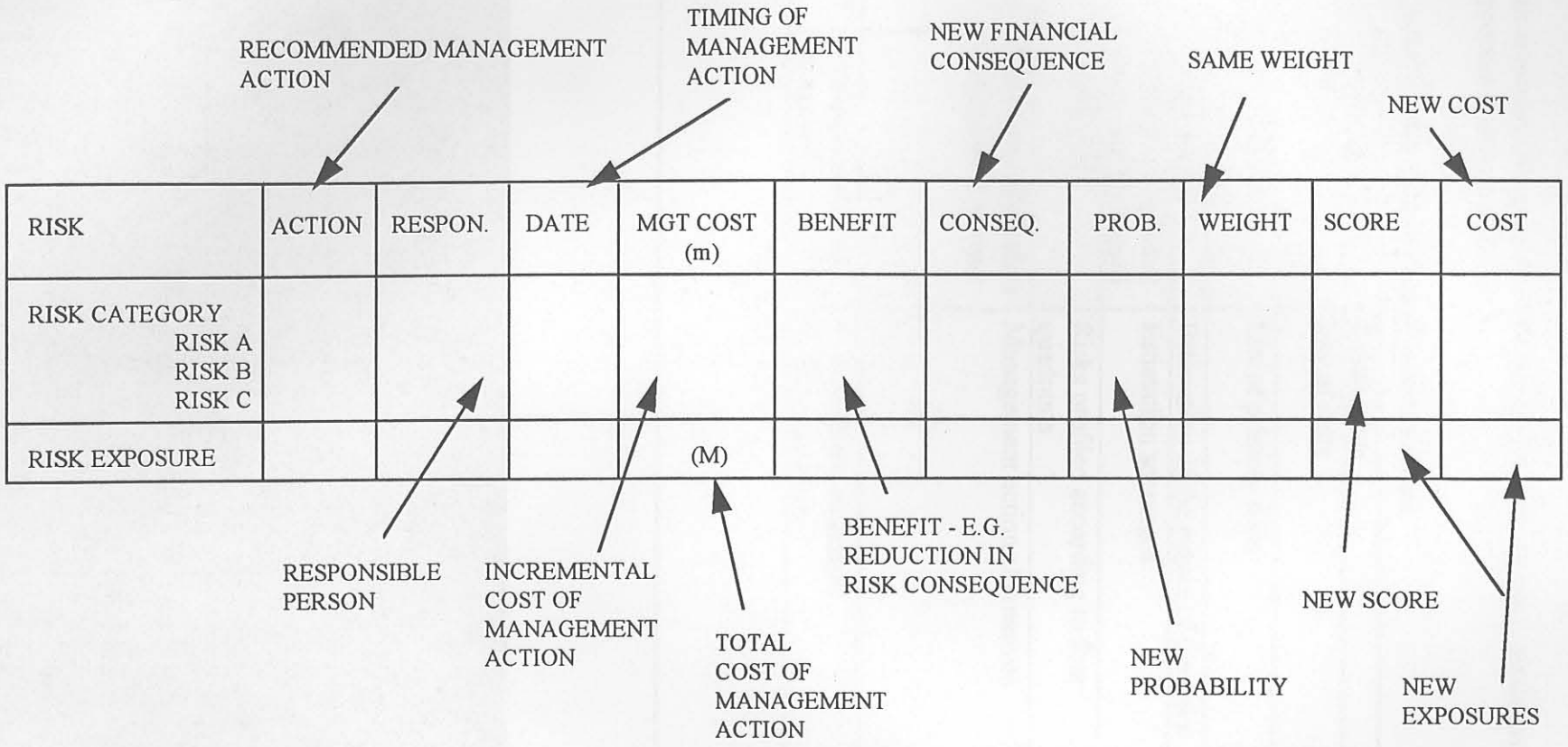


Figure 83 - Risk Evaluation Scorecard

In populating the scorecard and optimising the risk portfolio, it is worthwhile aiming to identify common initiatives in order to eliminate "excessive" actions while achieving synergy. This is described in more detail in the next section.

Columns 2, 3 and 4, namely Actions, Responsible and Date relates to a standard management action sheet. The Management Cost column indicates what the cost of the risk management action is. This might be the insurance premium or the external consultant cost as example. It is not very common that organisations cost efforts where internal manpower is required. This is still a cost, even if it is an opportunity cost. The remaining 6 columns perform the same purpose as the last 6 columns of the estimation scorecard (Figure 76). They establish the new values with the revised level of exposure. This is an iterative process in order to optimise the exposure.

The total cost of the management actions is given by M, where M is expressed as Equation 12.

Equation 12

$$M = \sum_{i=1}^{n} m_i$$

where: n is the total number of risks.
m_i is the cost of management action(s) attributable to risk i.

In summary, the methods and the deliverables of the analysis process in the risk management process is shown in Table 52.

Table 52 - Risk Analysis Methods and Deliverables

#	Method/process	Deliverable	Comment
1	Identify risks	List of risks	Use of causal loops of risk check-list
2	Reduce risks	List of primary risks	Use of causal loops or clustering
3	Estimate risks	Estimation of the nature of the risks	
4	Establish normalised estimation scorecard	Estimation scorecard	Use benchmarking for best practice inputs
5	Profile risks	Risks profiled according to four quadrants	(See Figure 79)
6	Determine alternative management actions	Management action alternatives	Use guidelines provided in the section above. Include life cycle analysis. Use benchmarking for best practice inputs
7	Establish evaluation scorecard	• Evaluation scorecard • Risk exposure	

4.4.6 Design risk management portfolio and philosophy

This section refers to process (7) of Figure 75.

As shown in Figure 84, there is an optimal region where the level of management cost justifies the level of risk exposure. Even if the best decision-making information is available, the degree of management attention will vary between organisations and the type of individuals involved. The driver for this behaviour is primarily the organisation's or person's risk propensity.

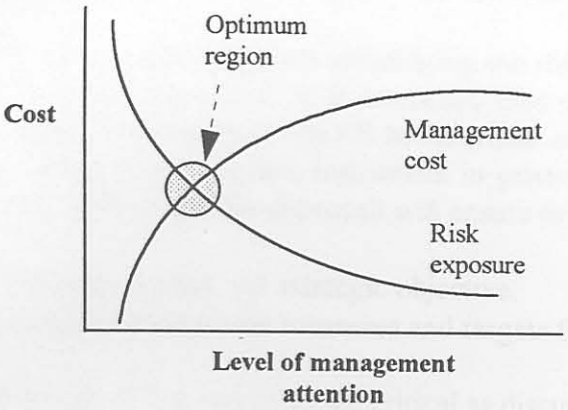


Figure 84 - Risk Exposure vs. Management Cost

The optimum region is governed by the nature of the risk portfolio, the organisation's risk propensity and the organisation's risk philosophy. The two key instruments required to establish the risk portfolio are the evaluation scorecard (Figure 83) and the portfolio itself (Figure 79). In broad terms the scorecard aims to drive efficiency of the risk management actions, while the focus of the portfolio is effectiveness.

The nature of the organisation's risk propensity and the risk philosophy will be tightly coupled as the philosophy will be the result of the organisation's propensity. As described during the analysis, risk propensity is not a uniform phenomenon as propensities vary across organisational levels and functional designations [85]. While managerial levels are less averse to risk, they tend to take decisions that suit their career needs [87].

Taking note of the propensity variances, it is prudent for the organisation to establish an objective and suitable risk management philosophy. The philosophy therefore needs to be driven by two key factors, namely the business strategy and the business culture. If a general business risk management structure is in place, then it follows that this philosophy will be in place. This cannot however be cast in stone as the business change may indeed necessitate the change in culture and hence require a new governing philosophy. One of the key factors that literature and practice raised as pertinent to significant business change was the "firing" of the management team. This per definition, implies a mindset change and hence philosophy change.

There are three ways of dealing with problems associated with risk propensity. The first is the surgical removal of leadership as discussed in the preceding paragraph. The second is changing the way people behave by changing their context. The most effective approach to

achieve this is the "unwritten rules" described in chapter 3 [51]. The basis of this is that measurement governs behaviour. The third and most common approach is knowledge transfer whether by means of informal communication or by formal tuition.

Core to the philosophy is an understanding of the risk environment and how the organisation needs to manage risk in relation to its environment. A concept that provides useful insight in this regard is Charette's risk helix (Figure 19). This helix helps to answer the following questions:

- The linkage between risk management and the competitiveness of the business.
- The importance that risk plays in the business.
- The effort required to manage the risks.
- The type of business management philosophy that is suitable in order to achieve a certain level of risk management.
- Reactive versus proactive approach.

It is then possible to translate these issues into a context that is understandable and meaningful to all who have to address the risks in the business.

As described previously, risk philosophy serves as a guideline that gives focus where formal rules and processes are void, particularly in a highly empowered environment.

Once the intervention has been designed and the philosophy established, the management of the risks during the operation of the business once it has been changed must be designed. The framework for this design is supplied by EIU as described previously. The design is based on the three levels of control namely, strategic, managerial and business processes. The frameworks are shown in Figure 71, Figure 72 and Figure 73 respectively.

The key to integrating and assimilating the risk interventions into normal business practice is the balanced scorecard. It is conceded that other forms of measurement systems could be used, but the benefits of the BS as described earlier promises not only to provide an excellent performance management instrument in general, but also to accommodate risk management actions with ease. This approach will ensure that the risk intervention is:

- Tied into a clear, yet strategic objective.
- Assigned transparent measures and targets for progress monitoring.

The design of the measures are critical as discussed earlier. This includes the design of:

- The risk management measures.
- The other business measures, but based on the *new paradigm*.

In the former, the measures relate directly to the risk management actions, while the latter is good practice in managing the risks of business change itself. This is substantiated by the market research where 54% of the respondents indicated that current change initiatives generally focus on changing behaviour of people. Only 29% felt that this was not the case (see Figure 46).

The methods and deliverables of the portfolio and philosophy design phase are summarised in Table 53.

Table 53 - Risk Management Portfolio and Philosophy Design Methods and Deliverables

#	Method/process	Deliverable	Comment
1	Optimise risk portfolio	Risk portfolio	Risk portfolio in conjunction with evaluation scorecard
2	Establish risk philosophy	Risk philosophy	Use the risk helix and the implications of the portfolio
3	Design operational risk management processes	Operational risk management processes	Use EIU framework as a baseline. Use benchmarking.
4	Design performance management requirements	Performance management structures	Use balanced scorecard and unwritten rules approaches. Use benchmarking for target setting.

4.4.7 Implement and integrate risk management portfolio and philosophy

This sub-section puts forward the processes (10) and (12) of Figure 75, namely the implementation of the risk management portfolio and philosophy and the integration with the operational business risk management processes. The implementation has to take the following into consideration:

- Nature and timing of the change intervention design and implementation.
- Nature and timing requirements of the business change risk portfolio and accompanying philosophy.
- Other risk management structures in place.
- Organisational constraints, e.g. resource limitations.

The implementation approach is situation dependent and would rely heavily on the risk management action. As example, the risk management actions could range from the conducting of an education session to the taking out of patents[1].

Implementation must be executed according to normal management practices, which would typically take on project management dimensions. Resourcing should be highlighted however. At this level the organisation is dealing with risks that could make a significant difference to the business. It is therefore sensible that not only are the risk management actions properly designed, but that they are suitably resourced. It often happens that an organisation prefers to use resources that require no short term cost or effort which can end up being "penny wise; pound foolish".

The integration with business operational risk management must be executed according to the approach described in paragraph (d), p178. This is however dependent on whether the

[1] The last example is a risk in itself. While a patent aims to prevent other parties gaining from a company's labours, it does actually place the design in the public domain. It is often not too difficult for another organisation to alter a design or copy directly and risk litigation.

Table 54 - Integrated Risk Management Framework

Process Element[1]	#	Method/process	Deliverable	Comment
Derive strategic risks				
(1) & (2)	1	Driver analysis	Key business drivers	Helps establish business context
	2	Establish strategic architecture	Vision, mission, strategic intent, business objectives	Helps establish business context
	3	Scenario planning	Scenarios, key risks	
	4	System dynamics modelling	Causal loops, stock and flows, simulation results	The usefulness of deliverables lies in descending order from causal loop diagrams
Define business problem				
(3)	1	Problem/opportunity analysis	Problem/opportunity identification	
	2	Stakeholder analysis	Stakeholders and their needs	
	3	Project definition	Project mandate, method description, scope in terms of project and problem/opportunity	
Analyse risks				
(5)	1	Identify risks	List of risks	Use of causal loops of risk check-list
	2	Reduce risks	List of primary risks	Use of causal loops or clustering
	3	Estimate risks	Estimation of the nature of the risks	
	4	Establish normalised estimation scorecard	Estimation scorecard	Use benchmarking for best practice inputs
	5	Profile risks	Risks profiled according to four quadrants	(See Figure 79)
	6	Determine alternative management actions	Management action alternatives	Use guidelines provided in the section above. Include life cycle analysis. Use benchmarking for best practice inputs
	7	Establish evaluation scorecard	• Evaluation scorecard	

[1] The process element refers to the process element number in Figure 75.

organisation currently practices business risk management. Its execution is based on the design as described in the previous sub-section (paragraph 4.4.6).

4.4.8 Phase-out

A business solution is either phased out because its goal is being terminated or because it needs to be replaced by an improved solution. A risk management solution can be terminated during any business solution phase process, from design through to solution phase-out. In the phase-out of a business change risk management solution, the following areas need consideration:

- During the risk evaluation process, proper life cycle analysis is done.
- During its implemented life it is monitored and controlled.
- In phase-out, its preceding analysis is taken into account but a causal analysis is done to understand its effect on its environment if it is indeed phased out, or even if it isn't.

4.5 Risk management framework

This section summarises the preceding analysis into an integrated framework for the risk management of business change. The constructs of the preceding tables are integrated into Table 54. The framework is then described by means of the following figures.

Figure 85 illustrates the overview business risk management process. This has been divided into 5 distinct phases, namely:

- Analysis (see Figure 86).
- Design (see Figure 87).
- Implementation (see Figure 88).
- Operation (see Figure 89).
- Phase-out (see Figure 89).

The purpose behind the generic approach is to dovetail with a business intervention process, regardless of the level of change being inflicted. This supports the respondents' view in the market research where the majority felt that this was possible (Figure 50). Structuring the model at the conceptual level will allow for applications at the functional and transactional level regardless of the business application.

Process Element[1]	#	Method/process	Deliverable	Comment
			• Risk exposure	
Design risk portfolio and philosophy				
(7)	1	Optimise risk portfolio	Risk portfolio	Risk portfolio in conjunction with evaluation scorecard
	2	Establish risk philosophy	Risk philosophy	Use the risk helix and the implications of the portfolio
	3	Design operational risk management processes	Operational risk management processes	Use EIU framework as a baseline. Use benchmarking.
	4	Design performance management requirements	Performance management structures	Use balanced scorecard and unwritten rules approaches. Use benchmarking for target setting.
Implement and integrate portfolio and philosophy				
(10) & (12)	1	Implement and integrate risk management portfolio and philosophy	Implemented risk portfolio and philosophy	Business change risk management portfolio is integrated with normal management and operational risk management practice
Phase-out risk management intervention				
(13)	1	Phase-out change risk management intervention	Phased-out intervention	

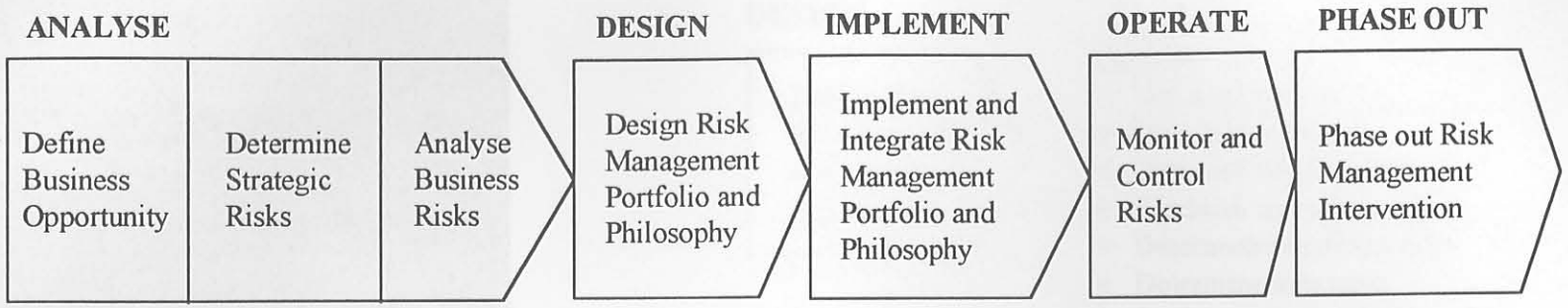
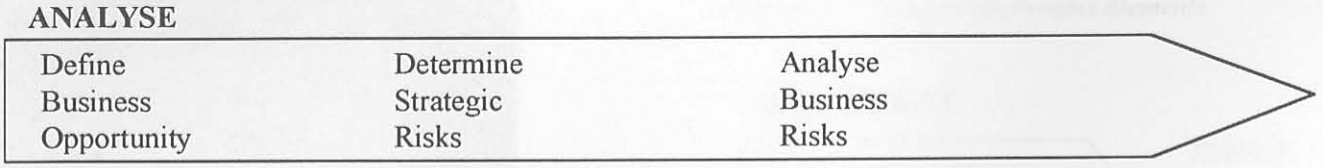


Figure 85 - Overview Business Change Risk Management Process



Process:
- ✧ Opportunity analysis
- ✧ Stakeholder analysis
- ✧ Project definition

Deliverables:
- ✧ Stakeholder needs
- ✧ Project mandate

Process:
- ✧ Key business drivers
- ✧ Strategic architecture
- ✧ Scenario planning
- ✧ Cause-effect analysis

Deliverables:
- ✧ Business strategy
- ✧ Scenarios
- ✧ Strategic risks

Process:
- ✧ Identify business risks
- ✧ Estimate impact of risks
- ✧ Use benchmarking
- ✧ Profile risks
- ✧ Generate risk interventions

Deliverables:
- ✧ Risk estimation scorecard
- ✧ Risk profiles
- ✧ Risk evaluation scorecard

Figure 86 - Risk Analysis Process Elements

DESIGN

Design Risk Management Portfolio and Philosophy

Process:
- ✧ Use benchmarking
- ✧ Select interventions
- ✧ Optimise risk portfolio
- ✧ Establish risk philosophy
- ✧ Determine unwritten rules
- ✧ Determine measures
- ✧ Design operational processes

Deliverables:
- ✧ Optimised evaluation scorecard
- ✧ Optimised risk portfolio
- ✧ Risk management philosophy
- ✧ Business measures
- ✧ Operational process designs

Figure 87 - Risk Design Process Elements

IMPLEMENT

Implement and Integrate Risk Management Portfolio and Philosophy

Process:
- ✧ Integrate with business intervention
- ✧ Establish interactive communication structures
- ✧ Communicate risk objectives, interventions and measures
- ✧ Diffuse philosophy throughout the organisation
- ✧ Establish ringfences
- ✧ Recruit and develop resources
- ✧ Institute accountability, responsibility and authority
- ✧ Implement risk management interventions

Deliverables:
- ✧ Implementation plan
- ✧ Implementation
- ✧ Integration with operational practices

Figure 88 - Risk Implementation Process Elements

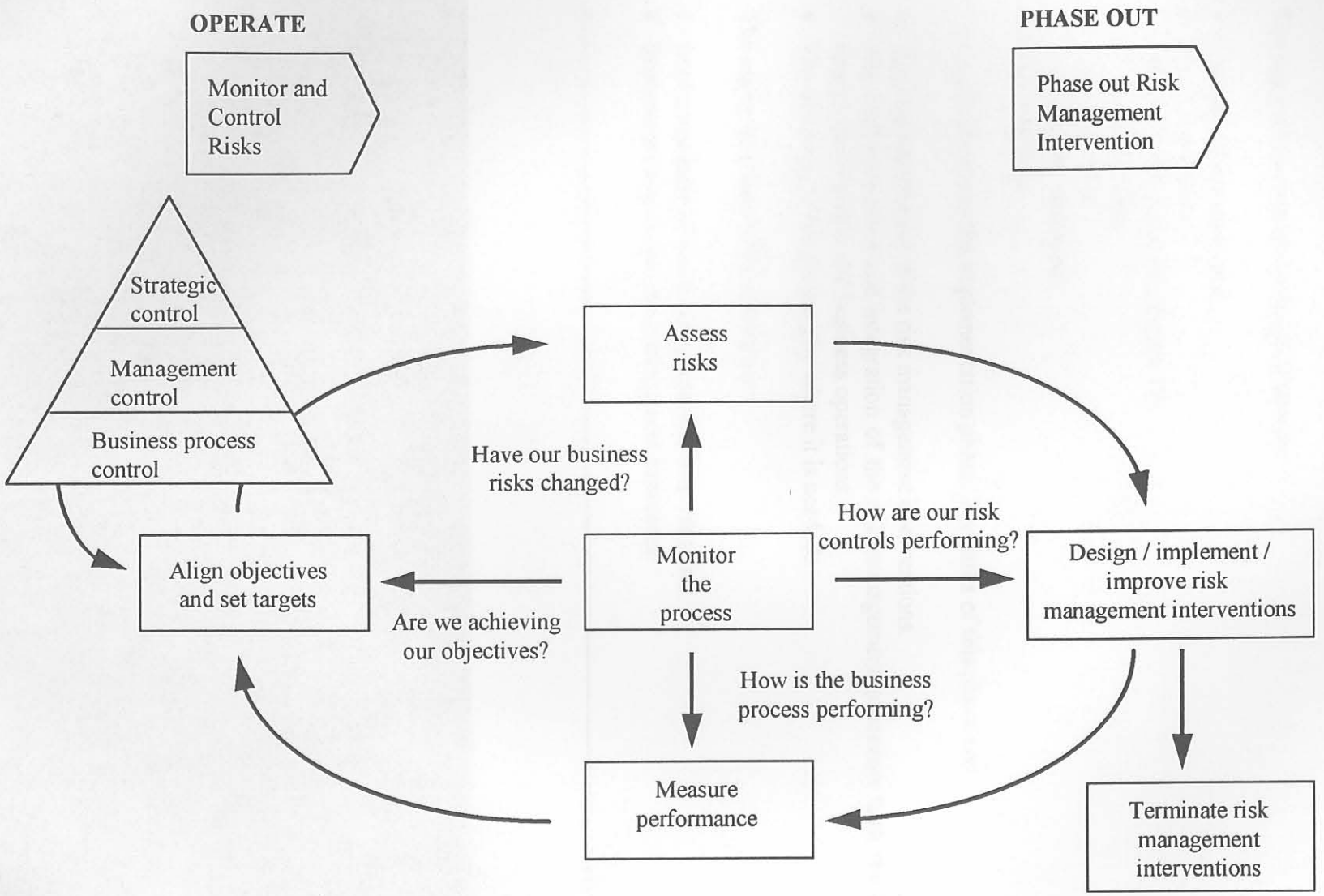


Figure 89 - Risk Operation and Phase-out Process Elements

The analysis phase (Figure 86) provides for the seamless integration with strategy regardless of the level of the business intervention. It does allow flexibility where some business analysis has been done. It crystallises the appropriate information into a form that can be used for risk analysis purposes. Key activities in this phase are the:

- Establishment of strategic risks.
- Identification of business risks.
- Estimation of risks.
- Risk evaluation.

The key instruments are:

- Scenario planning.
- Cause-effect analysis.
- Estimation scorecard.
- Evaluation scorecard.
- Risk portfolio.
- Benchmarking.

The design phase (Figure 87) takes the analysis and constructs into:

- An optimised set of risk management interventions.
- An optimised portfolio.
- A performance management framework.
- An operational risk management process design.

The key instruments of the design phase are:

- The evaluation scorecard.
- The risk portfolio.
- Charette's risk helix (see Figure 19).
- Process modelling.
- Unwritten rules.
- The balanced scorecard.
- Benchmarking.

Figure 88 illustrates the implementation phase. The tasks of this phase are:

- The implementation of the risk management interventions.
- The implementation and integration of the risk management processes with the business change intervention and business operations.
- The diffusion of the philosophy where it is needed.

The major activities of this phase are:

- Implementation of the risk management interventions.
- Implementation of the risk management processes.

- Integration of the risk management interventions and processes with business change interventions.
- Diffusion of the risk management philosophy.

The key instruments of the implementation phase are:

- Project management.
- Change management (see appendix A).
- Performance monitoring and control.

The operation and phase-out phases are illustrated in Figure 89. These two phases, while being the culmination of the efforts of the business change risk management task, lie mainly in the domain of the business operational risk management environment. It is for this reason that the framework is employed (see paragraph (d), p178). For the purposes of the business change environment the business risk management process as illustrated in Figure 89 has been modified.

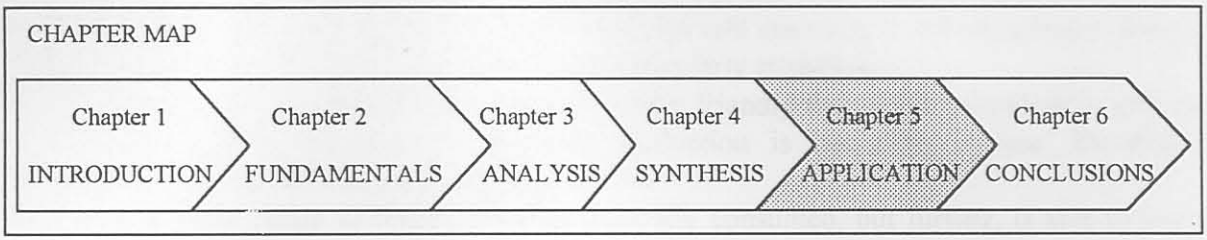
4.6 Chapter conclusion

This chapter has put forward a theoretical framework that provides a generic means for managing the risk of business change. This framework was synthesised from the analysis of the preceding chapters that include prevailing literature, practitioner experience, market research and relevant tools and techniques. The theory was generated by means of the parameters set from the analysis as well as deductive and inductive processes included in the synthesis approach.

The product of this chapter is untested theory. It is the task of the next chapter to challenge the various aspects of the theory.

5. Application

5.1 Chapter context



This chapter aims to describe the application of the theory in practice. The developed theory is used to conduct a consulting engagement where its attributes are tested. This application is used to challenge the theoretical framework by means of the evaluation put forward. The purpose of this evaluation is to identify gaps, limitations and to ascertain whether the theory holds water. Finally, hypotheses are put forward.

NOTE:

The nature of the project is such that it is very sensitive to the client in that it entails a major business change and opportunity. It is because of this reason that sensitive details regarding the application cannot be divulged. The researcher has committed to a non-disclosure agreement and therefore no compromising details may be replicated.

As there are very few operators in the area in South Africa, the name of the company is also not disclosed. Attempts are therefore made to describe the application in a way that allows for insight to the reader, but without divulging sensitive information. The focus is therefore on the process and the fit that the theory holds with this and not the details in the process or the detailed results of the process.

5.2 Background

Company X is an operator in the South African process industry. It has a staff complement of about 40,000 employees including a few subsidiaries that it owns in a number of diverse industries. It is a major exporter of raw materials and various other forms of value-added product. X has a few offices dotted around the world but no major operation outside of South Africa.

As a process operator, it shares many similar attributes with other process operators. The most outstanding are listed as follows:

- The business is very capital intensive.
- High volumes, low margins.
- Conservative regarding R&D - will rather outsource this.
- Intense global competition from other operators.
- Strong emergence of substitutes.

Other attributes that colour the nature of the company are:

- A bit of "group think" exists mainly from the isolation during the apartheid years and the fact that it has always been a major source of employment.
- The company has many resources in a wide range of fields and often feel that if anything needs to be done, they can do it themselves.

5.3 The Opportunity

During the past 10 years one of the chief engineers in X had been experimenting with a new base technology. In the last two years the engineer and his team had been able to bring the technology to a point where a commercial scale plant could be erected. The innovation is very significant for the following reasons:

- It is the first technology that promises to practicably integrate various processes that are traditionally batch orientated. The benefit of this is that it illuminates the ineffectiveness and the multitude of process inefficiencies usually associated with batch orientated processes.
- Estimates are that the process can reduce the capital and operating costs between 20% to 30% of the current industry standard. In a capital and resource intensive industry like the process industry this makes the technology particularly attractive.
- The process is significantly more environmentally friendly than other processes in use. As discussed earlier, pressure on emission production is becoming intense. Developed countries should find this particularly attractive.
- It uses a wider range of feedstocks than generally consumed, but further, is able to use a lower grade of feedstock. With the scarce resources in this area, the opening up of other feedstock options not only allows flexibility in resource usage but also allows for tolerance in cost structures.

These factors make the technology attractive not only for a company trying to come down the cost curve but also a global industry which is pinned against aggressive competition from substitutes.

The options open to exploitation range as follows:

- Establish a new business division (operating as a company or any other appropriate legal entity) within the group which will undertake the full range of business activities including R&D, marketing, construction, manufacturing, finance, etc.
- Run a core business which only does development and key commercial activities but outsources other activities.
- Licence the technology to plant contractors and derive income from a metric like Rand per unit product produced.
- Sell off the technology to another capable party and derive a once-off income from the innovation.

5.4 Approach

5.4.1 Overview

The approach to the project is described as follows. The first step in the project was to establish a commercialisation project, the aim of which was to investigate the most appropriate path for exploitation and then implement this successfully. The researcher was commissioned as external auditor for the project as well as the specialist consultant on the risk management sub-project. The project was broken up into four distinct phases as shown in Figure 90.

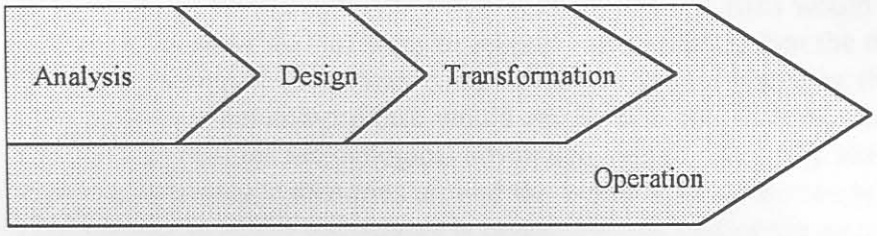


Figure 90 - Phases of the commercialisation project

The purpose of the individual phases of the business solution project are described as follows:

- **Analysis** - This entailed the detailed analysis of the various environmental components making up the attributes of the product and its business environment. Sub-projects in this phase included market research, benchmarking of similar organisations and competing technologies, due diligence on the previous feasibility study, life cycle analysis, scenario planning, analysis of financial optimisation options, risk analysis and the formulation of a baseline business case.
- **Design** - The purpose of this phase was to take the results of the analysis and synthesise this into a set of constructs for the implementation. Sub-projects were orientated around strategy setting, business structural and cultural design and board presentations for further action.
- **Transformation** - The purpose of the transformation phase was to successfully enact the design constructs.
- **Operation** - Figure 90 indicates that the operation phase was undertaken the same time as the analysis. This may seem odd, but in practice, before the commercialisation project commenced, a full-scale commercial plant was being erected to firstly, prove its techno-economic feasibility at this level of operation and secondly, to provide the production site with a low cost production facility. It therefore made sense to integrate the current construction effort with the commercialisation project, with the plant providing not only proof of commercial viability, but also the first implemented site.

The approach to the risk analysis component of the project is shown in Figure 66. The first three steps in the process, namely (1) risk identification, (2) risk estimation and (3) risk evaluation pertain to the analysis phase of the commercialisation project. Risk planning and the risk management philosophy pertain to the design phase of commercialisation project.

5.4.2 Risk analysis

The analysis commenced with an understanding of what the key corporate strategic issues are. This proved to play a very important role in the analysis. The project team were very committed towards the successful commercialisation of the project and in certain instances felt that senior management did not share the passion for the commercialisation or even realise its potential. This held a threat in that a rift was forming with the result that the analysis was not aligned with the business reality and a few "loose cannons" were emerging.

The first step therefore was to identify the strategic risks, i.e. those key risks as opposed to the multitude of technical, financial and process orientated risks. The commercialisation opportunity posed the possibility of a significant change to the direction of the business. The commercialisation proposition was dependent on the strategic position that the corporation was trying to take and not necessarily vice versa, regardless of how attractive the opportunity may be. The risks at this level are dependent on a set of questions as listed below.

- Does the corporation want to diversify its portfolio?
- Is the opportunity a feasible business?
- Is this a business that the corporation would like to enter?
- Does the corporation have the competencies to get into the business?

The sequence of questions assumes that the previous question has a yes answer. If all answers are yes (or fairly close to this) then it would indicate that the full ownership option be pursued (see paragraph 5.3). An answer of no to any, and specifically the first question would indicate a limited involvement in the pursuit of the commercial opportunity.

Regardless of the answer (yes or no), a set of strategic risks would be prevalent. For example, if the organisation did not want to diversify its portfolio, then the risk would be that they may have compromised their own competitiveness by not pursuing the technology, assuming it was feasible. This compromise would result from two factors, namely (1) not pursuing first pick at a significant technological advantage, and (2) they had already submitted applications for patents in major countries around the world. Part of the condition of patent submission is that the nature of the technology is revealed to the rest of the world. This risk on the yes side would be that the CEO would come under pressure for investing in a new venture which was not core, particularly in the light that some major investments in the core business recently had been lack-lustre and the market capitalisation had been dwindling significantly.

The four core questions and their risks played an important role in establishing focus. Alignment with strategic direction was made clearer for senior management, and empathy with the holistic corporate dynamics was established with the project team.

The next step in the analysis was the identification of the business risks. This was achieved by a workshop where specialists in the various fields of the project gave their collective opinion on what the various risks were. The framework that was used to assist the identification of the business risks is shown in Figure 91.

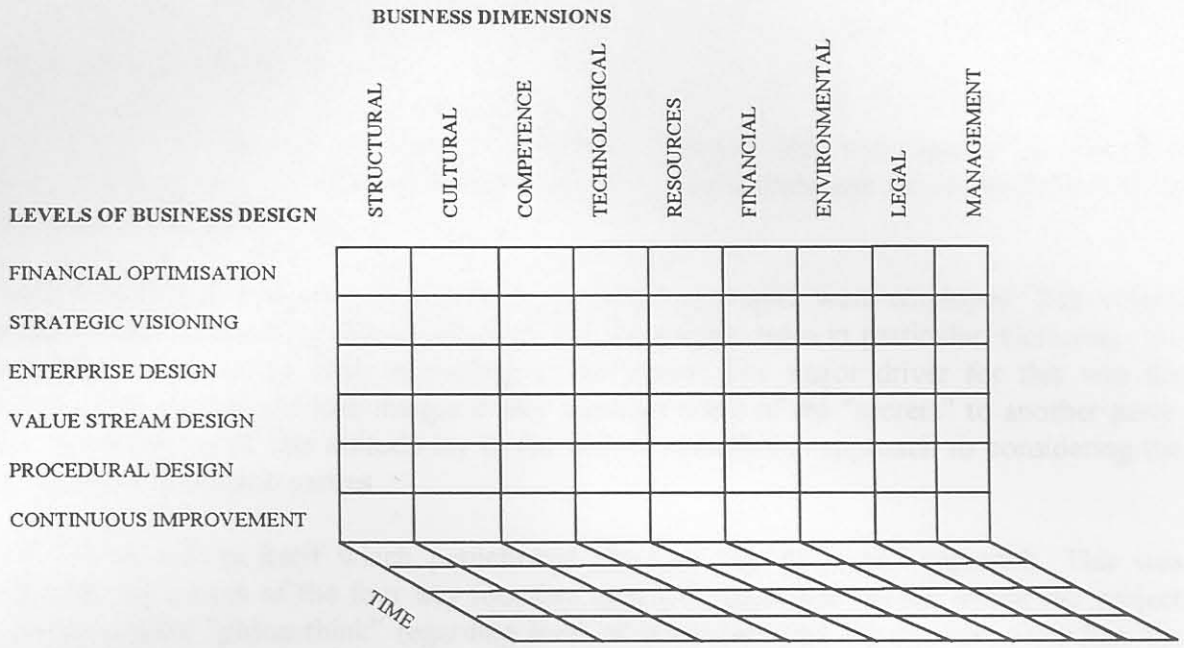


Figure 91 - Risk Identification Framework for the Commercialisation Project

The purpose of the framework (Figure 91) was to assist the identification of risks in workshop format. The x-axis pertains to the various dimensions (e.g. risk groups) of a business typical to that under consideration in the commercial opportunity. The y-axis pertains to the type of business design (and clearly related analysis) that would be considered in the commercialisation project. The z-axis pertains to time. For example a window of opportunity exists for the exploitation of the technology. If this is not seized, then the commercialisation may not be feasible[1].

The identification workshop as well as other project material revealed a lengthy list of roughly 150 risks. Logically, the next step involved the rationalisation of these risks. This was achieved by clustering and core risk analyses with the assistance of the risk estimation scorecard. The risk estimation and evaluation scorecard templates used for this application are shown in appendix E (application documentation). For reasons given earlier, neither the list of risks nor the primary risks are included. The following major types of risk were however, found to be the most important:

- Proof of commercial scale techno-economic viability of the technology.
- Lack of competencies and capability in this business.
- Some limited technical risks pertaining to the innovation itself.
- Some limited financial orientated risks.
- Lack of focused leadership.
- "Loose cannons" and "short-sightedness".
- The window of opportunity elapsing.
- Loss of intellectual property.

[1] This window was driven by factors like (1) other technological developments, (2) changes in feedstocks, (3) changing demand for the product, etc.

Only two types of estimation tools were used, namely the rating functions and the calculated probabilities. The calculated probabilities were used to determine the financial exposure, while the rating functions were used to establish the relative weighting of risks and their respective sensitivities.

The evaluation centred mainly around a set of management related actions. These actions ranged from the establishment of off-shore structures to the hiring of specialist personnel. The derived interventions included mitigation, avoidance and transfer strategies in the ratio as shown in Table 55[1].

Table 55 - Distribution of Risk Intervention Strategies

#	Strategy	%
1	Mitigation	50
2	Avoidance	40
3	Transfer	10

5.4.3 Risk management design

The design involved three major components, namely the optimisation of the risk interventions, the design of operational management mechanisms and the establishment of the risk management philosophy.

Table 55 indicates that very few transfer orientated strategies were employed. This relates primarily to the culture of the organisation and the project team in particular. Culturally, the organisation wanted to keep everything under wraps. The major driver for this was the concern that they would lose margin if they exposed some of the "secrets" to another party. The manifestation of this attitude lay in the almost xenophobic approach to considering the involvement of outside parties.

This was a risk in itself which perpetuated the "we can do it all" approach. This was addressed by means of the four key focusing questions described earlier. While the project team developed "group-think" regarding level of ownership and involvement regarding the opportunity, the directors were able to take a more holistic view in terms of what would be best for the corporation. This highlights the importance of understanding strategy in a business change initiative, regardless of the change type. A change initiative is undertaken with the aim of improving an organisation's overall standing in the short as well as long term. A change effort must not lose sight of this by becoming the all consuming object of attention.

From the above it is clear that the management actions tied in closely with the philosophy - the more conservative the actions, the more conservative the risk management philosophy. These in essence perpetuate the characteristic of each other. What was clear in the project was that during the initial phases of the commercialisation, a particularly strong management philosophy would be required. The driving reason was that the owners of the opportunity would have to make sure that they exploited the opportunity and would not be limited by

[1] This distribution is approximate.

undesirable tactics from the competition. Once the business had been established, it would be possible to have a less conservative approach to risk management.

As risk management would be playing an important role in the initial stages of the commercialisation and the business in practice, it was imperative that appropriate risk management constructs be built into the various facets of the new business. During the design phase of the project the strategy was formulated, the business processes designed and the cultural constructs put into place. The risk management needs were built into this. It can be noted that the business constructs were generic enough to be valid for a plant construction business regardless of the nature of ownership of the business. The process design was based on world best practice which was derived from a benchmarking study into this area.

5.4.4 Implementation

At the time of documenting this application, the business opportunity was in process of implementation. During this process the following key risk management strategies were being put into place, namely:

- Establishment of clear leadership.
- Procurement of specialist competencies and leadership to enact the change.
- Putting measures in place to ensure that the opportunity realises its potential. One of the management actions behind this was the commissioning of another external consultant to confirm the purported benefits of the opportunity.
- Bring the shareholders into the process to communicate the opportunity clearly and ensure that the opportunity is enacted according to its real merits.
- Development of a conceptual partnership model where a win-win situation can be created for the exploitation of the innovation.

It is interesting to note the correlation between these risk management strategies and the 4 risk management themes that emerged from the market research (see Table 49). While the organisation has not finalised the structure for exploitation of the opportunity, it has set into motion the risk management strategies that were identified during the analysis. The most key is the procurement of the correct competencies. The risk then lies in that these competencies may fail (e.g. due to specialists leaving), but contingencies for this occurrence has been put into place.

5.4.5 Operation and phase-out

The business solution has not been through its complete life cycle and accordingly, the risk management interventions have not had the opportunity to follow through.

5.5 Relevance of the application

The application has provided the opportunity to test the risk management framework across a wide range of business intervention types. The relevance to the various change types are shown in Table 56.

Table 56 - Application's Relevance to the Business Change Types[1]

#	Change type	Relevance
1	Strategic visioning	The opportunity lies mainly in this area. It presents the corporation with an opportunity which, based on projections, could account for 60% of the total current business in 5 to 10 years. The line of business lies in a completely different area to the current operations. The implications of the opportunity are a new set of competencies and structural and cultural requirements.
2	Financial optimisation	The opportunity requires the establishment of off-shore structures not only to minimise unnecessary financial charges but also to provide an acceptable structure in order to undertake business at the global level[2].
3	Enterprise redesign	This level of change usually entails the expansion of current business or the acquisition of new businesses in a similar line. There was limited relevance to this change type.
4	Value stream reinvention	The design phase of the project put forward a greenfields business structure. This entailed the business processes, strategies and cultural dimensions which can be equated to value stream invention as opposed to reinvention.
5	Procedure redesign	Limited procedure redesign was involved in the exercise.
6	Continuous improvement	As with procedure redesign, limited continuous improvement was involved. The business design did however make pro-active attempts to accommodate a continuous improvement type structure in the future business architecture including the appropriate philosophy.

Perusal of Table 56 indicates that the application provides for a reasonably wide range of testing in terms of the various categories of change types. Those change types that provide the most leverage have been included (see Figure 81 and Figure 82 for an illustration of the leverage profiles of the various change types).

[1] The shaded rows indicate those change types that have the most relevance to the application under consideration.

[2] These structures would be very useful for other business opportunities and makes sense regardless of this particular opportunity. Its need has been however, been articulated via this project and therefore the risk management is designed and enacted from this project. Like other risk management interventions, the risks need to be managed in an integrated manner along with other business risks once operational.

5.6 Evaluation

This section provides the key where the study comes together in order to get closure. It forms the juncture where the developed theory is tested against application and either the complete theory or a portion thereof is confirmed and a group of hypotheses are put forward where confirmation is not possible. This is graphically illustrated in Figure 2.

The vehicle for achieving this is the verification of the research. This verification comprises of the validity and reliability components. While these topics vary from the requirements of a quantitative orientated study, they are still required in a qualitative study as described in chapter 1. Before these concepts are addressed, the data across the study is examined, but with particular reference to the application.

5.6.1 Analysis

The analysis is guided by the research questions listed in paragraph 1.4. For the ease of reference, these are repeated here. The grand tour question of the study is:

"How can the risks of business change interventions be successfully managed?"

The sub-questions to this are:

- Can the high purported failure rate be substantiated and therefore confirm the need for this study?
- What risks occur when a business moves through a change?
- What types of business changes occur?
- Is there a common thread in risk across industry sector and type of change?
- What management techniques are currently being used to manage the risks of business change?
- What techniques in diverse fields hold potential for managing the risks in business change?
- How can all the risk management factors be integrated into a framework, if this can indeed be achieved?
- Is the risk management framework practicable?

These questions are answered in the following analysis.

(a) Can the high purported failure rate be substantiated and therefore confirm the need for this study?

Various sources indicated that many business change initiatives are not delivering the results that they should purportedly provide. The failures can be as high as 70% according to some reports (see chapter 1). The market research (quantitative analysis) in chapter 3 indicated that while most initiatives were either successful or highly successful (total 59%), a meaningful number of these initiatives (41%) did indeed achieve less than desirable results (see Figure 29).

The corporation that was the subject of the application was undergoing a significant business change initiative which took the form of a downsizing/streamlining exercise. This was undertaken at various centres across the country. The first of these experienced significant cultural distress and production loss. It is only once appropriate risk management measures had been implemented that the improvement targets were achieved. It is interesting to note that the two key risks that needed to be addressed were:

- Not all the stakeholders' concerns were taken into account and properly addressed.
- Strong leadership was in place but it proved to be the wrong type of leadership. The existing leadership tended to function and rely on the S4 style (using the situational leadership model). New leadership was put in where the S1 style was employed which was far more directive, taking little leeway from achieving the desirable results.

This correlates closely with the four main risk themes that emerged from the factor analysis conducted in the market research.

The need for the study was further confirmed in the market research where a significant portion of the sample (62%) felt that the failure of business change initiatives could be attributed to poor risk management (see Figure 47). This was further supported by the quantitative study where 50% of respondents indicated that a generic approach to risk management was indeed possible.

Proof of the importance of risk management in business change comes via the commissioning of the researcher to undertake the risk analysis and design as described in the application. The need for this was manifested in the actioning of risk management interventions which changed the behaviour of management on the project (the 4 core questions described earlier in chapter 5). The success of this resulted in a further commission, also alluding to the need for proper risk management.

(b) What risks occur when a business moves through a change?

The literature study and the market research provides direction regarding the types of risks that a business may experience when undertaking a business change. A wide range of risks were selected from literature and practitioners' experience which were then taken to the market to (1) test their validity and to (2) determine the major themes of risk.

Factor analysis was used to reduce the list of risks into a set of 4 generic themes as given in paragraph (c), p123. These themes are confirmed via two other sources. The first is via practitioners in the field who assisted with the theory generation phase of the study. The second is via the application described earlier in chapter 5 that does indicate a close correlation with these themes.

What the application and the market research does suggest, is that there are risks which are unique to every business change initiative. This does not pose a problem however, unless they cannot be identified.

(c) What types of business changes occur?

During the initial stages of the study it was difficult to establish a universal classification of business change types that would be meaningful enough to use as a standard for comparison. This difficulty was borne by the wide range of change types, the variances across organisations and the fact that the unsubstantiated nature of some material raises concerns regarding validity and reliability.

In order to provide a starting point, Martin's 5 level business change hierarchy was used (see Figure 25). The five levels seem feasible. A sixth level namely financial optimisation was added. The difference with this though is that is has a limited organisational impact while having a significant financial impact as illustrated in Figure 81 and Figure 82. With this model as a basis, the market research tested the use of this model. The quantitative analysis revealed that the 5 level model of Martin proved to be useful while financial optimisation as a level of change received little support (see Figure 30).

While this model does provide a useful framework for analysing the type of business change under consideration, it is feasible that a particular business intervention may operate at various levels in the business change type hierarchy. Evidence for this is provided by practitioners in the field as well as the application which illustrates this phenomenon in Table 56. While it is granted that the intervention may incorporate various change types, it is feasible to analyse the change intervention by means of the individual change types of which it is comprised. The analysis attributable to each change type can then be used to analyse the complete intervention under consideration.

(d) Is there a common thread in risk across industry sector and type of change?

This question relates to proposition 2 of the quantitative research included in chapter 3. This research concludes that there are 4 general themes of risk which can be attributed to business change, regardless of the level of business change under consideration. In individual cases however, risks are significantly different across the various levels of business change. The research further indicates that risks are significantly different across business sectors.

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These findings tie in with the findings in the preceding sub-section.

(e) What management techniques are currently being used to manage the risks of business change?

This question is largely answered by means of the literature study and the market research undertaken in chapter 3. The respondents ranked the list of management techniques according to use and effectiveness. What was interesting is that the same techniques ranked in the top 8, although their sequence differed according to the ranking criteria as shown in Table 35 (p133). These techniques are evaluated in Table 57 against their use and effectiveness in the application.

Table 57 - Use and Effectiveness of Techniques in the Application

Effectiveness Ranking (Quantitative Research)	Use (Application)	Effectiveness [1](Application)	Technique
1	✓	●	Focus on delivering benefits to the customer
2	✓	●	Put strong committed leadership into place
3	✓	●	Ensure a vision is established
4	✓	◕	Put performance measures into place
5	✓	●	Align initiative with business strategy
6	×	⊕	Ensure a high level of communication
7	✓	●	Undertake a cost-benefit analysis up front
8	✓	◓	Address employees' needs

Table 57 indicates that all of the techniques were used except for the high level of communication. The exclusion of this technique is reasonable since the project has a high level of intellectual property which has to be protected. As illustration, information is limited only to the project team, even most of the organisation's own employees are not privy to any sensitive information regarding the opportunity.

The use and effectiveness of the other techniques was very high as illustrated with the shaded circles. The last, namely addressing the employees needs does not feature as highly as the others with respect to effectiveness, mainly as the opportunity is a new business under consideration. This means that the change does not necessarily imply that existing jobs and habits will be affected. A significant portion of the project staff were also contractors which in itself limits the concerns normally associated with own staff during a business change. It may be noted however that the needs of the very few key employees had to receive significant attention as they were effectively removed from their "safe" line jobs and put into a situation where their future was uncertain. This was however not a proactive strategy as it was more of a "fight the fire" approach.

It must be noted that another technique, namely the *establishment of the correct competencies* rates very highly in the application both in terms of use and its effectiveness. From the market research, this is the 9th factor out of 29 both in terms of its use and its effectiveness which seems to support this assertion in the application. It follows that it is reasonable that these 9 factors are at least considered as risk management techniques when

[1] Legend (this is used throughout the remainder of the analysis section):
● = *Extremely effective*, ◕ = *Highly effective*, ◓ = *Reasonably effective*, ⊕ = *Limited effectiveness*, ⊕ = *Not effective at all* OR *was not tested/used*

undertaking a business change, particularly relates to the levels of change types that can be mapped onto the application (see Table 56).

The literature study also explores a range of tools that are used in support of risk management. As with the techniques, these were also tested in the market research exercise. Also, like with the techniques, the same group of tools features in the top 4 in terms of use and effectiveness as shown in Table 36 (p134). The use and effectiveness of these top ranked tools are evaluated against their use in the application as shown in Table 58.

Table 58 - Use and Effectiveness of Tools in the Application

Effectiveness Ranking (Quantitative Research)	Use (Application)	Effectiveness (Application)	Tool
1	✓	●	Forecasting
2	✓	●	Market research
3	✓	●	Scenario planning
4	✓	◕	Return on investment (in its various forms)

Table 58 illustrates that all these tools were used and proved to be effective in the application.

(f) What techniques and tools in diverse fields hold potential for managing the risks in business change?

In order to try and bring in some innovative thinking, some lateral fields of endeavour where risk is managed are reviewed in paragraph 3.5. These fields and their most relevant techniques are listed in Table 59.

Table 59 - Summary of Potential Techniques and Tools on Other Fields

#	Field	Technique/Tool	
1	Financial investment management	For systematic risks: • OPT • APT • CAPM • β coefficient	For unsystematic risks: • Portfolios • Diversification
2	Banking	• Portfolios • Hedging • Hold liquid assets • Forecasting	• Decentralised decisions on assets, centralised on control • Scenario planning • Linear programming
3	Technology management	• Scenario planning • Delphi	• Systems dynamics • Willingness to terminate projects
4	Insurance	• Portfolios • Hedging • Reinsurance	• Measurement coupled to incentive schemes • Modify structure of insurance policy • Standardisation of processes
5	Environmental management	• LCA • Scenario planning • Market research • Hedging	• Financial resources for contingencies • Insurance • Address perceptions of risk • Communication
6	Business investment	• NPV • IRR	• RONA • EMV
7	Product management	• Guarantees • Image	• Improve the level of information (e.g. by market research)
8	Engineering projects	• Contracting	• Insuring
9	Systems reliability engineering	• Probability distributions	• Markovian modelling

Table 59 provides a summary of techniques used to a greater or lesser extent in the various fields. The following list is selected from this summary (the first few relate to techniques while the remainder pertains to tools):

- Address unrealistic perceptions of risk.
- Willingness to terminate projects when this clearly becomes the right option.
- Standardisation of processes and procedures.
- Financial/liquid provisions for contingencies.
- Measurement coupled to incentives.
- Guarantees.
- Insuring.
- Portfolios.
- Hedging.
- Forecasting.
- Scenario planning.
- Linear programming.

- Delphi.
- Markovian modelling.
- Financial return measures including NPV, IRR and EMV.
- LCA.
- Market research.

The choice of the above list is based on those risk management techniques and tools which appear to enjoy the most attention. There is some overlap in the type of tools used in other fields and those covered in the market research. The first 4 techniques provide some interesting approaches that may be useful. Those tools and techniques which were used in the application and their effectiveness is evaluated in Table 60. It must be noted that those tools and techniques which have already been addressed are not included in the table.

Table 60 - Effectiveness of Other Techniques and Tools in the Application

Effectiveness (Application)	**Technique/Tool**	**Effectiveness (Application)**	**Technique/ Tool**
	Standardisation of processes and procedures		Delphi
	Measurement coupled to incentives		LCA
	Insuring		

Table 60 indicates that the use of the other techniques proved to be successful, except for insuring. This is however not a fair test of the technique as appropriate opportunities did not arise with which to test it. It is worth mentioning the Delphi approach proved to be highly successful, particularly in the risk analysis phase.

The tools and techniques which were not tested via the application, but have the potential for use in the risk management of business change are the following:

- Markovian modelling
- Insuring
- Portfolios
- Hedging

(g) How can all the risk management factors be integrated into a framework, if this can indeed be achieved?

The constructed risk management framework is described in paragraph 4.5. This framework was developed from the literature, the quantitative based market research and practitioner inputs. The evaluation of this framework against the application is provided in the next sub-section (see paragraph (h)).

(h) Is the risk management framework practicable?

In order to determine if the framework is feasible, the analysis is based on the framework described in paragraph 4.5 (p210). The basis for the evaluation is Table 54 where the process and the anticipated deliverables are discussed.

(i) Derive the strategic risks

The application is a little different to some of the lower level business interventions in the sense that two levels of business strategy were involved. These were firstly, the mother corporate from which the innovation was nurtured and secondly, the new greenfield business under consideration. The project originally was tempted to conduct its own strategic analysis exercise, which is based on the assumptions that (1) either the mother organisation's strategy was clear and concise or that (2) it had no relevance for the strategy of the opportunity. Either assumption is flawed as the opportunity is dependent on the mother corporation for direction and enactment. The implication is that this strategy should first be made transparent. The opportunity analysis did initially go ahead without taking due cognisance of the mother corporate strategy. This did cause some tension as the initial comment from the corporate strategy was that "we are not in this business", which understandably led to some tension.

Table 61 indicates the process required in order to derive the strategic risks. As described above this was necessarily done at two levels, namely at (1) corporate level and at (2) opportunity level. The corporate level analysis focused more on process element 1 (PE_1) and PE_2. The opportunity analysis functioned at all the PE levels. It may be noted that this was an iterative process as shown in Figure 92.

Table 61 - Analysis of "Derive Strategic Risks"

#	Process	U[1]	E	Deliverables	U	E
1	Driver analysis	✓	●	Key business drivers	✓	●
2	Establish strategic architecture	✓	●	Vision, mission, strategic intent, business objectives	✓	●
3	Scenario planning	✓	●	Scenarios, key risks	✓	●
4	System dynamics modelling	✓	◔	Causal loops, stock and flows, simulation results	✓	◔

Table 61 indicates that all the PE's were used, either during the analysis or the corporate strategy or during the analysis and establishment of the strategy for the opportunity. While the system dynamics modelling PE and its deliverable were not considered extremely effective, they are still promise to be useful. This is primarily due to the timing of the modelling. It was unfortunately done later in the process; during the design phase (see Figure 90) and its usefulness in the initial identification of risks was therefore limited. It will be far more useful if the modelling, particularly the causal loop analysis is conducted up front. A system dynamics

[1] U = use, E = Effectiveness

simulation was not done. It was not necessary in the application, and may not be required in general. It may be useful in certain instances where a high level of uncertainty exists; i.e. neither experience nor primary information is available.

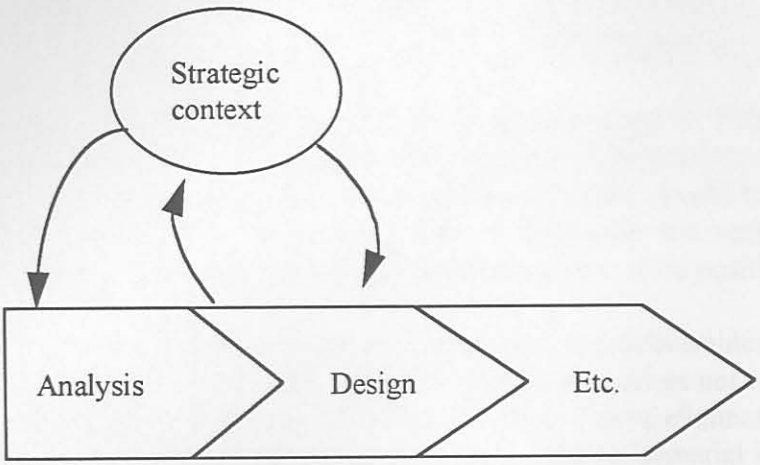


Figure 92 - Iterative Strategy Analysis and Design Process

In summary, the process elements and deliverables as described in the framework are useful in practice. The simulation of the system dynamics is not always required; only in areas of high uncertainty.

(ii) Define the business problem

The analysis of the business problem/opportunity definition based on the application is outlined in Table 62.

Table 62 - Analysis of "Define Business Problem"

#	Process	U	E	Deliverables	U	E
1	Problem/opportunity analysis	✓	●	Problem/opportunity identification	✓	●
2	Stakeholder analysis	✓	●	Stakeholders and their needs	✓	●
3	Project definition	✓	●	Project mandate, method description, project and opportunity/problem scope	✓	●

Table 62 indicates that the PE's and the deliverable based on the application prove to be very effective. These processes were all used in the project and served the business intervention process just as well as it did the business change risk management process. A very useful technique that emerged from the application was the establishment of a *baseline business definition*. This baseline allows various parties to work on various aspects of a project and not mis-align their efforts. In other words it provided a useful configuration management service. This baseline was then also used in the analysis (described in the next sub-section) of the risks, where the baseline risk exposure was determined.

(iii) Analyse the risks

The use and effectiveness of the analysis process elements in the application are summarised in Table 63

Table 63 - Analysis of "Analyse the Risks"

#	Process	U	E	Deliverables	U	E
1	Identify risks	✓	●	List of risks	✓	●
2	Reduce risks	✓	●	List of primary and *meaningful risks*[1]	✓	●
3	Estimate risks	✓	●	Estimation of the nature of the risks	✓	◕
4	Establish normalised estimation scorecard	✓	●	Estimation scorecard and *baseline risk exposure*	✓	●
5	Profile risks	×	⊕	Risks profiled according to four quadrants	×	⊕
6	Determine alternative management actions	✓	●	Management action alternatives	✓	●
7	Establish evaluation scorecard	✓	●	Evaluation score card and risk exposure	✓	●

Table 63 shows that all the process elements except for PE_5, "profile risks", were used. The reason why this was omitted was because of project time and the need for the ensuing deliverables. In retrospect, the inclusion of this PE would have made a significant difference to the productivity in the long term. It allows for the very clear but quick inspection and generation of management interventions by virtue of its positioning in the 4 quadrants.

As Table 63 indicates, those processes used and deliverables generated proved to be at least very effective. In PE_2, the reduction of risks was taken not only to the primary risks, but also the irrelevant risks (even if they were primary) were eliminated. This takes the generated risk management framework further and proved to be essential in order to reduce the number of risks identified, especially in the light of the original listing which amounted to circa 150 risks.

PE_4 indicates that an additional concept, namely the *baseline* was added during this process element as alluded to in the preceding sub-section. This does not make a significant change to the process. The purpose of this is to set a basis from which risk exposure can be improved. With a baseline in place, it is possible to set a target for the improvement of the risk exposure. This concept is particularly useful in projects at the higher level of business intervention where the financial attractiveness plays a very important role before getting into the project. The market research indicated that a cost benefit analysis done up front is one of the top risk management techniques.

One of the top risk management tools was claimed to be the return on investment type measures like NPV. The NPV of a project for example, is directly related to the riskiness of the project. In some instances the discount rates are coupled to the risk rating of a country.

[1] The italics indicates an additional deliverable or process.

Using the standard country risk premiums may actually turn very attractive projects down where this is used as the standard discount factor. If the risks can be better managed then it may be possible to the bring the rate down and provide a more realistic NPV factor.

(iv) Design the risk portfolio and the philosophy

Table 64 illustrates the use and effectiveness of the "design the risk portfolio and philosophy" process elements in the application.

Table 64 - Analysis of "Design Risk Portfolio and Philosophy"

#	Process	U	E	Deliverables	U	E
1	Optimise risk portfolio	✓		Risk portfolio	✓	
2	Establish risk philosophy	✓		Risk philosophy	✓	
3	Design operational risk management processes	✓		Operational risk management processes	✓	
4	Design performance management requirements	✓		Performance management structures	✓	

From the table, all the process elements and the corresponding deliverables were used. They were all very effective except for PE_1 as shown. The reason for this was that the optimisation of the risk portfolio was not explicitly used. A more indirect form of analysis was employed in determining the range of optimal actions. The use of the four quadrant technique as shown in Figure 79 would have been far more productive in that it is able to focus attention on those important risks and accordingly suggest a range of typical risk management interventions.

In order to assist with this approach, it is recommended that the estimation scorecard be modified as shown in appendix C. This appendix describes the more important worksheets recommended for the analysis and design phases of the risk management framework.

(v) Implement and integrate the portfolio and philosophy

The use and effectiveness of the implementation and integration process as relevant to the application is shown in Table 65.

Table 65 - Analysis of "Implement and Integrate the Portfolio and Philosophy"

#	Process	U	E	Deliverables	U	E
1	Implement and integrate portfolio and philosophy	✓	◒	Implemented risk portfolio and philosophy	✓	◒

Table 65 illustrates that a very moderate level of use and effectiveness was achieved. This again is not due to the level of ineffectiveness of the process, but the fact that at the time of documentation, the implementation and integration had not been complete. It is therefore only possible to assess the effectiveness based on the limited implementation, which in the researcher's opinion is insufficient to infer generalisability.

(vi) Phase out the risk management intervention

As the business solution is currently in the process of implementation, it is not possible to assess the phasing out of the risk management intervention as shown in Table 66.

Table 66 - Analysis of "Phase out the Risk Management Intervention"

#	Process	U	E	Deliverables	U	E
1	Phase out the risk management intervention	×	⊕	Phased-out intervention	×	⊕

5.6.2 Verification

Verification is understood by means of the evaluation of validity and reliability [11, pp157-159]. Validity is constituent of internal and external validity.

(a) Internal validity

Internal validity pertains to the accuracy of information and whether this reflects reality. This has been demonstrated by the following:

- The study has used various methods and sources to confirm trends or discover inconsistencies. The quantitative and qualitative components of the market research in paragraph 3.3 were used to confirm the literature. In turn, these were used to generate the theory with inputs from practitioners. This theory was evaluated against the application. Where possible and relevant, other situations in practice where taken to evaluate the consistency of the theory.
- In Table 1, the epistemological assumption indicates that in a quantitative analysis the researcher is independent from that being researched, while the opposite is true for qualitative research. The positioning of the researcher in respect of the various phases of the study was achieved in accordance with these guidelines. This is demonstrated as follows. During the market research the researcher was only involved in the submission of

the questionnaires and the analysis of the returned data, while the researcher was intimately involved in the qualitative component of the study.
- The internal validity of the market research is discussed in paragraph (g), p87.

(b) External validity

External validity pertains to the generalisability of the results of the study. The external validity of the study is evaluated as follows:

- The external validity of the quantitative research is described in paragraph 3.3.3, which indicates the relevance of the results across all business sectors.
- Only one application was used to test the theory which may raise on concerns regarding the generalisability to other types of business applications [15]. The analysis did however entail a very detailed investigation into an application which included a wide range business change types. This detailed understanding of one application is perhaps richer in terms of the contribution to the theory that a superficial analysis across a few case studies [16].
- Where relevant, other references in practice were included to try and test generalisability in certain cases.
- The theory was constructed with the inputs of practitioners across the world from a wide range of industry sectors as described in chapter 1.
- It is felt that a reasonably high level of confidence can be held in the findings of the study. Those areas where the generalisability is uncertain can be considered hypotheses. These are listed later in this chapter.

(c) Reliability

Reliability in the qualitative study is concerned with the ability to replicate the study given the same instruments and conditions. Yin [12] recommends the use of a protocol for data collection in order to assist in ensuring the replication of the results in another setting. This was done during the study where:

- A protocol of the instruments, procedures and rules of the study was defined.
- A database with the relevant data, notes and reports was kept.

5.6.3 Hypotheses

This paragraph raises those factors of the study, where they were either not tested or concerns exist regarding their generalisability. They are listed as follows:

- "Ensure a high level of communication" is a technique useful for managing risks in a business change project. It plays more of a role in the lower level change interventions than in the higher level interventions.
- Markovian modelling can be a very useful technique in modelling and understanding the risks in business change interventions. It is however, limited to situations where the change conditions are not too complex.

- Insuring, portfolios and hedging are also useful techniques in managing the risks in business change interventions.
- The use of the four quadrant risk profile technique (see Figure 79) is useful in focusing effort and helping to quickly, yet reliably identify risk management interventions.
- The last two phases of the risk management framework (see Table 54), namely (1) implement and integrate the portfolio and philosophy and (2) phase out the risk management intervention provide a useful framework for dealing with the risks in business change during these phases of the management life-cycle.

5.7 Chapter conclusion

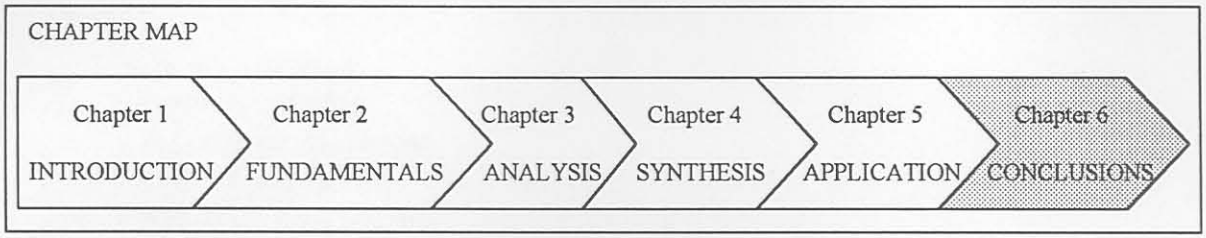
This chapter has provided an evaluation of the theory synthesised in the preceding chapter. This evaluation was based on its application to a "real-world" business problem, the answering of the key research questions defined in the first chapter and the thesis verification analysis. The key findings of the chapter are that the theory holds true with the proviso of a few recommendations. A set of hypotheses also resulted.

6. Conclusion

6.1 Chapter context

"We have not succeeded in answering all our questions. Indeed, we sometimes feel we have not completely answered any of them. The answers we have found only serve to raise a whole new set of questions. In some ways we feel we are as confused as ever. But we think we are confused on a higher level and about more important things."

Anonymous



This chapter aims to draw the thesis together into the summary findings, recommendations and conclusions. It evaluates the study in terms of its contribution as well as its foundation.

6.2 Highlights of the study

The study has highlighted some factors which are worth raising due to their interest to the field under consideration. These are listed as follows:

- Many businesses in South Africa and world-wide are constantly undergoing various forms of business change. A significant number of these changes are unsuccessful and there is an expressed need to use any method that can improve the success of the business change. Many organisations feel that a useful risk management approach will contribute towards this.

- There is a growing desire to use risk management methods like those described in the study. This has been manifested by the use of the methods developed in the study in various consulting engagements.

- It is possible to use a framework generic enough to address the various types of business change, but flexible and powerful enough to meaningfully address the risks under consideration.

- There are some risks themes that are consistent regardless of the type of business change under consideration.

6.3 Appraisal

The appraisal is divided into two areas, namely (1) how were the research questions answered and (2) how does the study address the questions usually asked when evaluating a theoretical contribution.

6.3.1 Compliance with the research questions

The purpose of the study, according to the grand tour question is to understand how to successfully manage risks in business change interventions. This question along with its sub-questions are addressed in detail in paragraph 5.6.1. In summary, each of the sub-questions are answered below:

- **Can the high purported failure rate be substantiated and therefore confirm the need for this study?** Yes, the rate of failure of business change interventions is meaningfully high and there is an expressed need for a risk management framework that will assist with business intervention exercises.

- **What risks occur when a business moves through a change?** There are a large range of risks that are experienced across business change types, industries and intervention techniques. There are however 4 risk themes which are present in every type of change. These are:

    - No reliable methods and tools, accentuated by the lack of understanding regarding the impact of the change on the business.
    - Lack of focus on achieving business results manifested in poor greater organisational involvement.
    - Poor leadership throughout the complete change life cycle.
    - Not having empathy for the stakeholders' needs.

- **What types of business changes occur?** The following five generic types of change are typically experienced by organisations[1]:

    - Strategic visioning
    - Enterprise redesign
    - Value stream reinvention
    - Process redesign
    - Continuous improvement

- **Is there a common thread in risk across business type, industry and type of change?** This is addressed by the answer to question 2 listed above.

- **What management techniques are currently being used to manage the business change?** As with the risks, a wide range of management techniques exist in contemporary business risk management theory. The top nine techniques in terms of use and effectiveness are:

    - Focus on delivering benefits to the customer.
    - Put strong committed leadership into place.
    - Ensure a vision is established.
    - Put performance measures into place.
    - Align initiative with the business strategy.

[1] *Financial optimisation* is another change that affects the bottom-line of the business. Its structural impact is however limited and its cultural impact is minimal if anything.

- Ensure a high level of communication.
- Undertake a cost benefit analysis up front.
- Address employees' needs.
- Establish the correct competencies.

The top four tools in terms of use and effectiveness are:

- Forecasting.
- Scenario planning.
- Return on investment.
- Market research.

- **What techniques in diverse fields hold potential for managing the risks in business change?** The techniques and tools, in addition to those listed in the previous answer, that hold potential are:

  - Standardisation of processes and procedures.
  - Measurement coupled to incentives.
  - Insuring.
  - Delphi.
  - LCA.
  - Markovian modelling.
  - Portfolios.
  - Hedging.

- **How can all the risk management factors be integrated into a framework, if this can indeed be achieved?** It is possible to establish an integrated risk management framework. The framework for this is provided in paragraph 4.5 with the provisos of paragraph (g), p233.

- **Is the risk management framework practicable?** The risk management is practicable. There are however some areas which were not satisfactorily tested. These have been put forward as hypotheses which are listed as follows:

  - "Ensure a high level of communication" is a technique useful for managing risks in a business change project. It plays more of a role in the lower level change interventions than in the higher level interventions.
  - Markovian modelling can be a very useful technique in modelling and understanding the risks in business change interventions. It is however, limited to situations where the change conditions are not too complex.
  - Insuring, portfolios and hedging are also useful techniques in managing the risks in business change interventions.
  - The use of the four quadrant risk profile technique (see Figure 79) is useful in focusing effort and helping to quickly, yet reliably identify risk management interventions.
  - The last two phases of the risk management framework (see Table 54), namely (1) implement and integrate the portfolio and philosophy and (2) phase out the risk management intervention provide a useful framework for dealing with the risks in business change during these phases of the management life-cycle.

6.3.2 Evaluation of theoretical contribution

Whetten [145] indicates that there are seven factors usually considered when reviewing the theoretical contribution of a study. These are listed below along with a summary on how each were addressed during the study.

- **What is new?** The literature and practice is dotted with a range of contributions of different beliefs in how business change should be managed. This is the first integrated approach aimed at putting forward a framework that will manage the risks of business change.

- **Will the theory change the practice in the field of endeavour?** The use of the theory in the application demonstrated how its use changed the behaviour of the individuals involved in the project. Its use has been recognised by other projects and has since been used as an integral part of the business change intervention.

- **Why should the practice change?** There is clearly a case for change. The study puts forward an approach that takes the essence of the problems in risk and risk management from a range of credible sources and tests these using recognised techniques. It builds theory from a substantiated base and tests this against the real world situation and does prove to make a difference.

- **Completeness and thoroughness**? The study was conducted over a period of five years during which significant developments have taken place. In this time, these developments have confirmed some of the bases, but have also changed the way of understanding in other areas. Attempts have been made to use and adhere to recognised scientific precepts where possible. Within the scope of the study as limited in chapter 1, it is felt that the study is complete and sufficiently thorough.

- **Ease of perusal and understanding?** Attempts have been made to lay the thesis out in a manner conducive to ease of understanding. This has been facilitated by providing a path to the research up front, along with schemas indicating the interaction between components. Cross-referencing between sections, diagrams and tables have been made to facilitate limited frustration.

- **Is the material contemporary?** The need for this theory at present has been highlighted during the case for the study as well as the embracing of the use of the theory in practice.

- **Who would be interested in the work?** This study would be of interest for academics in the business management and improvement fields of endeavour. Academics primarily interested in this field would include the business management and industrial engineering fields of endeavour. Practitioners would range from managers in the business themselves to the range of business and management consultants who practise in the business change management fields.

6.4 Recommendations

There are some recommendations that follow for practitioners which result from the study. These are listed as follows:

- There is no hard and fast "recipe" for managing risk in business change. This is a function of a generic process such as that purported in this study and the application of the appropriate experience and intellect.
- Business risk management is a field that is gaining support in the business consulting environment. It is easy for an analysis to continue almost endlessly. It is therefore important that the effort is focused into those areas that really matter, i.e. those few risks that are the most risky and those actions that provide the most benefit.
- It is important that risks are integrated with the business change process in time and not brought in as an after thought. This results in a rushed analysis and the possibility of reduced value from the exercise.
- Once the analysis is done, it is often tempting to feel that the job is done. The analysis is worthless however if its risk management interventions are not indeed enacted and controlled.

6.5 Concluding remarks

In chapter 2, two distinct definitions for risk and uncertainty respectively, were put forward based on broader acceptance in the sciences. The risk management framework is plauseable for not only for situations of risk (as per definition), but to the overarching environment of uncertainty in general as well.

This study investigates the requirements of an integrated framework for the management of risk in business change. It puts forward a model that is feasible in practice, along with a set of hypotheses with potential to significantly contribute to the improvement of the success of business change initiative. If it can reduce the failures of change by only 10% then it will make a significant contribution to the economy alone.

7. Appendices

Appendices

The following appendices are included in this thesis:

Appendix A - Change management approaches
Appendix B - Expected monetary value
Appendix C - Risk analysis worksheets
Appendix D - Markovian theory and application
Appendix E - Application documentation
Appendix F - Steps to developing scenarios
Appendix G - Fastchicks theoretical case study
Appendix H - Competence and an organisation's capability
Appendix I - Covering letter and questionnaire
Appendix J - Detailed descriptive statistics of responses
Appendix K - Question 7 - Contingency table
Appendix L - Question 7 - Correspondence analysis
Appendix M - Question 7 - Transformed data: Descriptive statistics and factor analysis
Appendix N - Products used in risk management practice
Appendix O - Tables for randomised block design on question 7
Appendix P - Software

8. Appendix A - Change management approaches

This list is modified from Schumacher's classification of change management approaches [54]. The summary of the classification is shown in Table 2.

Individual change approaches	Author
Re-engineering Yourself	(Aaroz/Sutton, 1994)
Stewardship	(Block, 1993)
The Seven Habits of Highly Effective People	(Covey, 1989)
The Evolving Self. A Psychology for the Third Millennium	(Csikszentmihalyi, 1993)
How to Stubbornly Refuse to Make Yourself Miserable	(Ellis, 1988)
The Tactics of Change	(Fisch/Weakland/Segal, 1982)
Masterful Coaching	(Hargrove, 1995)
Thriving in Transition	(Perkins-Reed, 1996)

Social psychological change approaches	Author
Knowledge for action	(Argyris, 1995)
Changing the Essence	(Beckhard/Pritchard, 1992)
Leading Self-Directed Work Teams	(Fisher, 1993)
Organisation Development	(French/Bell jr., 1973)
Group's that Work (and those that don't)	(Hackmann, 1990)
Changing Behaviour in Organisations	(Judson, 1991)
Field Theory	(Lewin, 1982)
Change at Work (Action Science Approach)	(Mink/Esterhuysen/Mink/Owen, 1993)
Designing Effective Organisations (Sociotechnically)	(Pasmore, 1988)
Competitive Advantage through People	(Pfeffer, 1994)
Driving Fear out of the Workplace	(Ryan/Oestreich, 1991)

Cultural Change Approaches	Author
Corporate Cultures	(Deal/Kennedy, 1982)
Working the Shadow Side	(Egan, 1994)
Corporate Assessment (A Company's Personality)	(Furnham/Gunter, 1993)
Organisations on the Couch	(Kets de Vries, 1991)
How Leadership Differs from Management	(Kotter, 1990)
Corporate Culture and Performance	(Kotter/Heskett, 1992)
Organisational Behaviour	(Organ/Bateman, 1991)
Organisational Culture and Leadership	(Schein, 1992)
The Re-engineering Alternative	(Schneider, 1994)
Unwritten Rules of the Game	(Scott-Morgan, 1994)

Innovation Approaches	Author
Innovationsmanagement	(Hauschildt, 1993)
Polarity Management	(Johnson, 1992)
Diffusion of Innovation	(Rogers, 1983)
Mastering the Dynamics of Innovation	(Utterback, 1994)

Global Change Approaches	Author
Turning Points	(Fombrun, 1992)
The Unshackled Organisation	(Goldstein, 1994)
Diagnosis for Organisational Change	(Howard, 1994)
Organisational Change and Redesign	(Huber/Glick, 1993)
The Challenge of Organisational Change	(Kanter/Stein/Jick, 1992)
Corporate Transformations	(Kilman, 1988)
Transforming Organisations	(Kochan/Useem, 1992)
Discontinuous Change	(Nadler/Shaw/Walton, 1995)
Creative Destruction	(Nolan/Croson, 1995)
The Fifth Discipline (Learning Organisation)	(Senge, 1990)
Breakpoints	(Strebel, 1992)
Rethinking the Organisation	(Tomasko, 1993)
Sculpting the Learning Organisation	(Watkins/Marsick, 1993)

Practitioner Approaches to Change	Author
Road Map to Corporate Transformation	(Berger/Sikora/Berger, 1994)
Managing the Speed of Change	(Conner, 1995)
Managing Organisational Change	(Connor/Lake, 1994)
Peopleware	(DeMarco/Lister, 1987)
The Limits of Organisational Change	(Kaufmann, 1995)
Changing the Way We change	(LaMarsh, 1995)
Beyond the Wall of Resistance	(Maurer, 1996)
Change Management	(McCalman/Paton, 1992)
Better Change - Best Practices	(Price Waterhouse, 1995)
Taking Charge of Change	(Smith, 1996)
Handbook for Revolutionaries (Jack Welch's Story)	(Tichy/Sherman, 1993)
Reward Systems for Changing the Workplace	(Wilson, 1994)

9. Appendix B - Expected monetary value

This is modified from Moilanen et al [127, pp163-166].

9.1 Risk Assessment

At the time of analysis one cannot measure exact values for all the factors which will affect the investment, e.g. future exchange rates, inflation, production process efficiency etc. However, one can estimate ranges of possible values that each variable may have.

There are various options as to how one may allow for risk in assessing an investment:

a) Sensitivity analysis - this will provide a result for a given change, but it does not consider the likelihood of this change occurring;

b) Descriptive language - "high", "low" risk, "a long shot", etc. This is a purely subjective view, since the definition of risk, and levels, will differ from person to person. The interpretation of this language also differs from person to person;

c) Use higher discounting rate in Discounted Cash Flow (DCF) calculation but this is not appropriate. The discount rate used in evaluating future cash flows should relate to the earnings rate of future invested capital at the company risk level (which is not the risk level of an individual project); the discount factor serves only to tie the value of money at two different points in time together;

d) Quantify the relative likelihood of occurrence of each possible outcome - i.e. risk analysis. One can then weight each outcome's financial value by its likelihood of occurrence, and calculate a "risk-weighted average value" of a project/investment, taking account of all the possible outcomes. This risk-weighted average value is called the Expected Monetary Value (EMV).

In order to derive the EMV one must consider :

- The possible values for the variable parameter in a scenario;
- Their relative likelihood of occurrence (expressed as probabilities summing to one);
- The risk-weighted average value for the parameter derived from this probability series.

The EMV of a range of possible financial values for a parameter is the risk-weighted average of the possible values associated with its probability. To derive the EMV for a total project, one can sum the EMVs of the individual elements within it.

Different scenarios under consideration are not scenarios with differing levels of each parameter but different as to the strategic solution to a problem in a company. Often sensitivity analysis is conducted by varying the expected value of a parameter included in the equation. In EMV scenarios, the scenarios are different in terms of the actual parameters included and the solution they reflect.

Like Net Present Value of a project, EMV or a sum of separate EMVs is not found in company finances later. Both of them depend on the actual outcome of the cash flows and the actual discount rate of the company. These again depend on the operating environment and the financial markets.

9.2 Calculating EMVs

The EMV approach requires the specification of three possible values for each parameter, with their probability given at pre-defined levels:

- the MOST LIKELY value;
- the value which there is a 90% probability of exceeding as the LOWER value;
- the value which there is only a 10% probability of exceeding as the UPPER value.

With these three values it is possible to calculate a factor by which to move the MOST LIKELY value to the RISK- WEIGHTED AVERAGE (mean) value - i.e. the EMV for financial values. This is shown in Figure 60.

The area of the triangle L, VL, PI is 0.1 (if the question is framed to give the "90% probability" value), as is the area of the triangle U, VU, P3. The area of the triangle L, P2, U is equal to 1, since this is the sum of all the probabilities.

We can make five statements about Figure 60:

$$(VL - L)/2 * P1 = 0.1$$

$$(U - VU)/2 * P3 = 0.1$$

$$(U - L)/2 * P2 = 1$$

$$P2/P1 = (VM - L) / (VL - L)$$

$$P2/P3 = (U - VM) / (U - VU)$$

where we know values for VL, VM, VU.

We need to solve these equations to give us values for P1, P2, P3, L and U. With the actual parameters of the triangle known, we can then calculate where the "centre of gravity" is; this is the weighted average point in the probability distribution, and its position on the value axis represents the EMV of the values given for the parameter under inspection. These calculations can be done in a PC spreadsheet application.

9.3 Steps in determining EMVs for project parameters

The following practical steps can be followed when compiling the relevant EMVs of the various parameters in the overall investment evaluation.

1. Determine the parameter.

In most cases this is clear. Sometimes a surrogate measure is needed.

2. Estimate the annual cash flows for each year within the time scale.

The cash flow of a certain parameter may vary from year to year, e.g. the amount needed to invest in capital assets. Calculate the gross cash flow for each year for the parameter. This is easiest done in a spreadsheet where every parameter is listed in the first column. The following columns represent each year in the calculation. In the matrix that is thus formed you need to fill in the relevant gross cash flow.

3. Determine the risk factor for each parameter.

In this stage you need to ask yourself or the person with the best knowledge of the risk profile of the parameter in question the questions outlined in the previous section. Do ask these question exactly as given. Otherwise you may state the questions wrongly and get a wrong answer for your risk factor.

4. Multiply each parameter value in each year with the risk factor.

This is again easiest done in a spreadsheet where you already have the non-risk weighted values of each parameter.

5. Calculate the net risk-weighted cash flow for each year.

6. Discount the net risk-weighted cash flows of each year to the base year using the company discount rate.

10. Appendix C - Risk analysis worksheets

RISK ANALYSIS SUMMARY SHEET

PROJECT: XXX

BASELINE EXPOSURE

	Total	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Period 8	Period 9	Period 10
Baseline Risk Exposure	**63.24**	6.32	6.32	6.32	6.32	6.32	6.32	6.32	6.32	6.32	6.32
Target Improvements (%)											
Target Exposure	**63.24**	**6.32**	**6.32**	**6.32**	**6.32**	**6.32**	**6.32**	**6.32**	**6.32**	**6.32**	**6.32**
Target Cost of Risk Improvement	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Baseline Risk Index **0.00**

Total Number of Risks	**11**

Q2 Q1

4	3
1	3

Q4 Q3

Top 10 risks (By Cost Exposure)
#1 Risk B
#2 Risk G
#3 Risk C
#4 Risk I
#5 Risk E
#6 Risk K
#7 Risk F
#8 Risk J
#9 Risk H
#10 Risk A

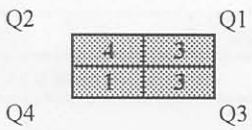
OPTIMISED EXPOSURE

	Total	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Period 8	Period 9	Period 10
Baseline Risk Exposure	**63.24**	**6.32**	**6.32**	**6.32**	**6.32**	**6.32**	**6.32**	**6.32**	**6.32**	**6.32**	**6.32**
New Risk Exposure	**43.52**	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35
Cost of Risk Interventions	**9.70**	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Net Expected Financial Cost	**53.22**	**5.32**	**5.32**	**5.32**	**5.32**	**5.32**	**5.32**	**5.32**	**5.32**	**5.32**	**5.32**
Actual Cost of Risk Improvement	**10.02**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**
Variance: Actual - Target	**10.02**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**

New Risk Index **0.00**

Total Number of Risks*	**11**

* In new portfolio



New Top 10 risks (By Cost Exposure)
#1 Risk B
#2 Risk G
#3 Risk C
#4 Risk I
#5 Risk E
#6 Risk K
#7 Risk F
#8 Risk J
#9 Risk H
#10 Risk A

Top 10 Risk Interventions (By Financial Importance)
#1 Action 2
#2 Action 9
#3 Action 8
#4 Action 11
#5 Action 3
#6 #N/A
#7 #N/A
#8 Action 6
#9 #N/A
#10 Action 1

Risk ID#:			**Name:**					**Category:**						
Significance:	H	M	L	**Likelihood:**	H	M	L	**Method:**	P()	Rating	EMV			
EMV:	H	M	L	**Rating:**	1	2	3	4	5	6	7	8	9	10
				Probability:				**Threshold:**						
Consequence:				**Source/reference:**										
Description/attributes:														

Risk ID#:			**Name:**					**Category:**						
Significance:	H	M	L	**Likelihood:**	H	M	L	**Method:**	P()	Rating	EMV			
EMV:	H	M	L	**Rating:**	1	2	3	4	5	6	7	8	9	10
				Probability:				**Threshold:**						
Consequence:				**Source/reference:**										
Description/attributes:														

Risk ID#:			**Name:**					**Category:**						
Significance:	H	M	L	**Likelihood:**	H	M	L	**Method:**	P()	Rating	EMV			
EMV:	H	M	L	**Rating:**	1	2	3	4	5	6	7	8	9	10
				Probability:				**Threshold:**						
Consequence:				**Source/reference:**										
Description/attributes:														

RISK ESTIMATION WORKSHEET

RISK ESTIMATION SCORECARD

Category ID number	Category	Risk ID number	Baseline Ranking	Baseline Risk	Significance	Likelihood	Portfolio	Threshold	Baseline Consequence	Baseline Probability	Baseline Expected cost	Weight	Baseline Score	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Period 8	Period 9	Period 10
TOTALS				**11**							**63.24**		**0.00**	**6.32**	**6.32**	**6.32**	**6.32**	**6.32**	**6.32**	**6.32**	**6.32**	**6.32**	**6.32**
C1	Strategic	P1.1	10	Risk A	H	L	Q2		3.2	0.05	0.16			0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
		P1.2	1	Risk B	H	L	Q2		85.2	0.20	17.04			1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70
		P1.3	3	Risk C	H	H	Q1		17.3	0.60	10.38			1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
		P1.4	11	Risk D	L	L	Q4		2.0	0.05	0.10			0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
		P1.5	5	Risk E	H	L	Q2		16.0	0.40	6.40			0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64
		P1.6	7	Risk F	L	H	Q3		2.0	0.80	1.60			0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
		P1.7	2	Risk G	H	H	Q1		29.8	0.50	14.90			1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49
		P1.8	9	Risk H	M	L	Q3		9.0	0.05	0.45			0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
		P1.9	4	Risk I	H	H	Q1		11.8	0.80	9.44			0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
		P1.10	8	Risk J	M	L	Q3		4.1	0.20	0.82			0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
		P1.11	6	Risk K	H	L	Q2		13.0	0.15	1.95			0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20

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RISK EVALUATION WORKSHEET

RISK ESTIMATION SCORECARD

Category ID number	Category	Risk ID number	Baseline Risk Ranking	Baseline Risk	Significance	Likelihood	Portfolio	Threshold	Baseline Consequence	Baseline Probability	Baseline Expected cost	Weight	Baseline Score	Intervention ID	Intervention Ranking	Intervention	Responsible	Date	Management Cost	New Consequence	New Probability	New Expected cost	Cost Variance	Financial importance	Net expected financial cost	Weight
TOTALS				**11**							**63.24**		**0.00**						**9.70**			**43.52**	**19.72**		**53.22**	
C1	Strategic	P1.1	10	Risk A	H	L	Q2		3.2	0.05	0.16			I1	10	Action 1	Resource 1	15/03/98	0.1	0.2	0.05	0.01	0.15	0.25	0.11	
		P1.2	1	Risk B	H	L	Q2		85.2	0.20	17.04			I2	1	Action 2	Resource 2	16/03/98	0.4	30.0	0.20	6.00	11.04	11.44	6.40	
			3	Risk C	H	H	Q1		17.3	0.60	10.38			I3	5	Action 3	Resource 3	17/03/98	1	17.3	0.60	10.38	0.00	1.00	11.38	
			11	Risk D	L	L	Q4		2.0	0.05	0.10			I4	11	Action 4	Resource 4	18/03/98	0.2	2.0	0.05	0.10	0.00	0.20	0.30	
			5	Risk E	H	L	Q2		16.0	0.40	6.40			I5	5	Action 5	Resource 5	19/03/98	1	16.0	0.40	6.40	0.00	1.00	7.40	
			7	Risk F	L	H	Q3		2.0	0.80	1.60			I6	8	Action 6	Resource 6	20/03/98	0.1	2.0	0.40	0.80	0.80	0.90	0.90	
			2	Risk G	H	H	Q1		29.8	0.50	14.90			I7	8	Action 7	Resource 7	21/03/98	0.9	29.8	0.50	14.90	0.00	0.90	15.80	
			9	Risk H	M	L	Q3		9.0	0.05	0.45			I8	3	Action 8	Resource 8	22/03/98	2	9.0	0.05	0.45	0.00	2.00	2.45	
			4	Risk I	H	H	Q1		11.8	0.80	9.44			I9	2	Action 9	Resource 9	23/03/98	2	11.8	0.20	2.36	7.08	9.08	4.36	
			8	Risk J	M	L	Q3		4.1	0.20	0.82			I10	5	Action 10	Resource 10	24/03/98	1	4.1	0.20	0.82	0.00	1.00	1.82	
			6	Risk K	H	L	Q2		13.0	0.15	1.95			I11	4	Action 11	Resource 11	25/03/98	1	13.0	0.10	1.30	0.65	1.65	2.30	

					NEW EXPECTED RISK EXPOSURE PER PERIOD										COST OF MANAGEMENT INTERVENTIONS PER PERIOD									
Intervention ID	**Intervention Ranking**	**Intervention**	**New Score**	**Score variance**	**Period 1**	**Period 2**	**Period 3**	**Period 4**	**Period 5**	**Period 6**	**Period 7**	**Period 8**	**Period 9**	**Period 10**	**Period 1**	**Period 2**	**Period 3**	**Period 4**	**Period 5**	**Period 6**	**Period 7**	**Period 8**	**Period 9**	**Period 10**
			0.00		**4.35**	**4.35**	**4.35**	**4.35**	**4.35**	**4.35**	**4.35**	**4.35**	**4.35**	**4.35**	**0.97**	**0.97**	**0.97**	**0.97**	**0.97**	**0.97**	**0.97**	**0.97**	**0.97**	**0.97**
I1	10	Action 1			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
I2	1	Action 2			0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
I3	5	Action 3			1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
I4	11	Action 4			0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
I5	5	Action 5			0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
I6	8	Action 6			0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
I7	8	Action 7			1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
I8	3	Action 8			0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
I9	2	Action 9			0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
I10	5	Action 10			0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
I11	4	Action 11			0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

11. Appendix D - Markovian theory and application

Markovian theory and application is presented by means of an unpublished article included in this appendix for the purpose of illustration.

MARKOVIAN MODELLING IN BUSINESS RISK ANALYSIS

11.1 Introduction

Risk analysis in a business context is largely intangible, allowing limited opportunity for the development of handles - a means by which the risk can be more securely assured, and in the long run, appropriately managed. This text proposes that by means of Markovian analysis a basis can be established for the development of appropriate models. From the analysis, differential equations are established to solve into meaningful formulae for the system and solved via numerical methods. The use and development of this approach is further illustrated by means of example.

11.2 Project risk

Understanding risk inherent in a project[1] is important to the investor as well as the other stakeholders. The investor must thoroughly understand the project's flexibility, while on the other hand the other stakeholders as early as the contemplation stage must make provision for contingencies in order that they do not find themselves in a compromised position due to an oversight on their part. The assumption of the reasonable person is made where the path chosen, is the one not necessarily the most frugal, but the most reliable. Reliability impacts on cost-effectiveness albeit indirectly.

Risk pertains to the chance that an outcome may not prove to be as planned. This definition implies that risk revolves around the concept "planned", all be the occurrence either predominantly unfavourable or coincidentally favourable. This concept of residing in an unplanned state or transferring to another state (or corrective state) is the precept upon which model development presented in this text is based. Markovian analysis is well suited to this type of problem.

11.3 Markovian analysis

The state of a project and its components can be likened to an engineering system. A system's components can each fail at a specific rate (λ_i) or be repaired at a specific rate (μ_i). Depending on the combination of the state of failure and the state of repair of the various components, the system will acquire a profile. This profile will have costs coupled to it as well as decisions regarding re-emergence to the base state of

[1] A business change initiative of significant stature is typically undertaken in project form.

satisfactory repair. Consider the following example. A system comprises of two components providing three states, namely:

- Both components functioning correctly (state S_0).
- One component in a state of failure (state S_1).
- Both components in a state of failure (state S_2)

If both components are repairable, the situation may be modelled as shown in Figure 95:

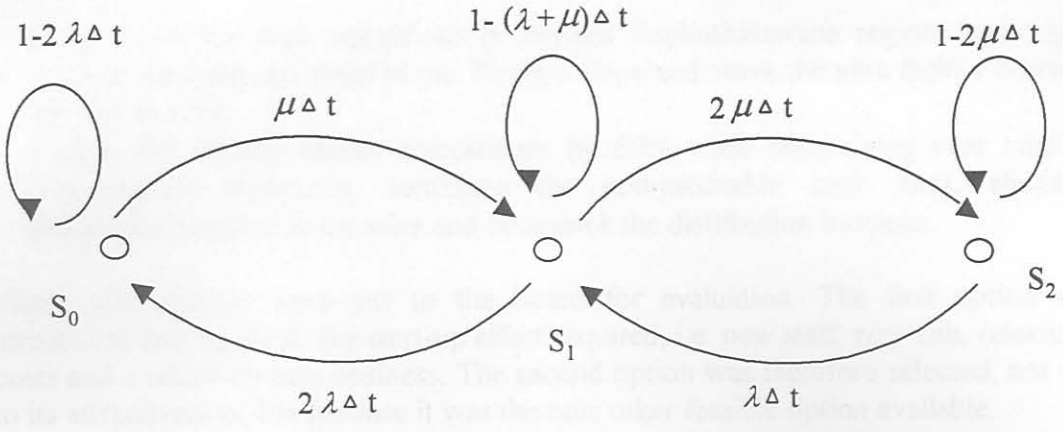


Figure 93 - Simple 3 State Repairable System

The differential equations for the diagram (Figure 95) are:

$$\frac{\delta P_{s_0}(t)}{\delta t} = -2\lambda P_{s_0}(t) + \mu P_{s_1}(t)$$

$$\frac{\delta P_{s_1}(t)}{\delta t} = 2\lambda P_{s_0}(t) - (\mu + \lambda) P_{s_1}(t) + 2\mu P_{s_1}(t)$$

$$\frac{\delta P_{s_2}(t)}{\delta t} = \lambda P_{s_1}(t) - 2\mu P_{s_2}(t)$$

By means of Laplace transforms (or other appropriate means) $P_{s_0}(t)$, $P_{s_1}(t)$ and $P_{s_2}(t)$ can be solved. The reliability of the system is:

$R_s(t) = P_{s_0}(t)$ for a series system, and

$R_p(t) = P_{s_0}(t) + P_{s_1}(t) + P_{s_2}(t)$ for a parallel system

$R_{s/p}(t)$ implies the expected reliability of the system at a specific point in time taking into account the distribution governing the hazard or repair rate of the various components. In project terms, the hazard rate addresses the probability of a project task falling into an undesirable state, while the repair rate performs the actions (and

naturally the cost incurred) taken to place the project into a position where it can be successfully continued.

11.4 Application

11.4.1 Case background

Consider a South African based textile business producing yarn and socks[1]. With the previous dispensation, it was reasonably lucrative to establish a labour intensive business in one of the homelands like Bophuthatswana. The reason for this was the incentives that the administrations put forward to encourage economic development and employment. This form of aid was further assisted by the banning of union activity, even in the light of minimal wages and poor related measures of remuneration.

The breaking up of the previous regions and the reunification of the country has resulted in the elimination of these business "privileges". The business is now subject to a uniform labour law with higher minimal wage and remuneration levels. This can indeed now be enforced by either law or legalised collective labour action.

The textile industry in South Africa is under strain, facing competitive pressures particularly from the so-called Asian tigers. They are able to produce at huge volumes with cost structures lower than locally available. For example the Asian labour cost is generally lower than the local total cost attributable to labour.

The company has already been struggling to maintain market share, but with the two new business drivers, i.e. the higher labour cost pressures and the increased Asian competition, it faces no alternative but to make a fundamental change to the way that business is done. The company brought in a business consultancy who assessed the current operations in addition to the alternatives available. Two clear options emerged, namely:

- Close down the sock operations in the old Bophuthatswana region, open up a material weaving operation in the Western Cape and move the yarn facility down to this site as well.
- Reduce the current labour complement by 60% while maintaining near minimal remuneration structures, terminate the non-profitable sock lines, eliminate preferential internal stock sales and outsource the distribution business.

These two options were put to the board for evaluation. The first option was terminated due mainly to the start-up effort required, i.e. new staff, new site, relocation costs and a relatively new business. The second option was therefore selected, not due to its attractiveness, but because it was the only other feasible option available.

Management involved labour where the future was laid out. The deal was that if they received a particular target of improvement (35%) on a sustainable basis, then after

[1] While this application is based on realistic events, individuals and organisations, it in no way refers to any particular individual or organisation.

two years, it would be possible, not only to improve the remuneration base, but also pay out meaningful bonuses. Negotiations with the shop stewards was very difficult for two reasons, namely (1) management still had a bias for the pre-unionised paradigm and (2) labour was immature in union business politics. Nevertheless, the targets were set amidst a feeling from labour that they were on the wrong end of a win-lose situation.

11.4.2 Application modelling

Input for the following mathematical modelling is from Claasen [146] and Billinton, et al [133].

In order to analyse the dynamics of the possible business states at the macro level, Markovian models were employed. The state diagram is shown in Figure 94.

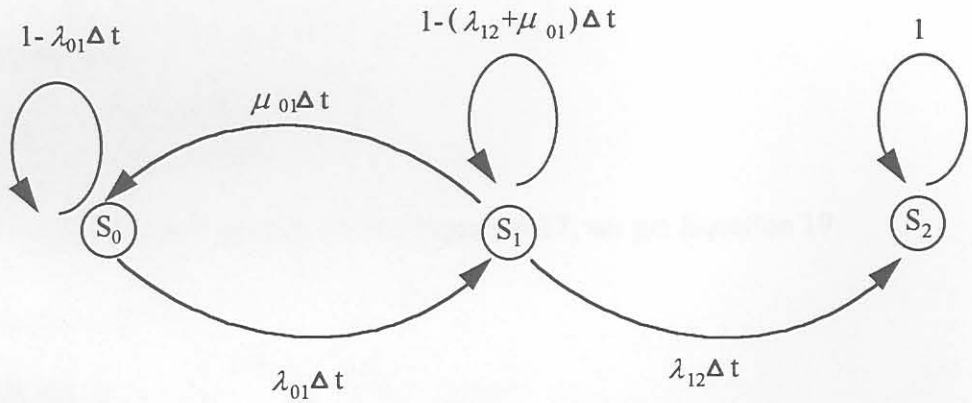


Figure 94 - Textile Business State Change Diagram

From Figure 94:

- State S_0 refers to the starting state of the business before any change takes place.
- State S_1 refers to the state of the company in the event of major labour problems, strikes etc. which will cause significant damage to the business.
- State S_2 refers to the business being liquidated due to irreparable damage from the labour problems. This is an absorbing state as indicated.
- μ_{01} refers to the "repair rate" between states S_0 and S_1.
- λ_{01} refers to the "hazard rate" between states S_0 and S_1.
- λ_{12} refers to the "hazard rate" between states S_1 and S_2.

The following equations follow:

Equation 13

$$\frac{\delta P_{s_0}(t)}{\delta t} = -\lambda_{01} P_{s_0}(t) + \mu_{01} P_{s_1}(t)$$

Equation 14

$$\frac{\delta P_{s_1}(t)}{\delta t} = \lambda_{01} P_{s_0}(t) - (\mu_{01} + \lambda_{12}) P_{s_1}(t)$$

Equation 15

$$\frac{\delta P_{s_2}(t)}{\delta t} = \lambda_{12} P_{s_1}(t)$$

This can be solved by means of Laplace transformations, where Equation 13 is rewritten as Equation 16:

Equation 16

$$sP_{s_0}(s) - P_{s_0}(0) = -\lambda_{01} P_{s_0}(s) + \mu_{01} P_{s_1}(s)$$

As the business change starts at state S_0, $P_{S0}(0) = 1$, $P_{S1}(0) = 0$ and therefore:

Equation 17

$$P_{s_0} = \frac{1 + \mu_{01} P_{s_1}(s)}{s + \lambda_{01}}$$

Similarly,

Equation 18

$$P_{s_1} = \frac{\lambda_{01} P_{S0}(s)}{s + (\mu_{01} + \lambda_{12})}$$

By substituting Equation 18 into Equation 17, we get Equation 19:

Equation 19

$$P_{s_0}(s) = \frac{s + \mu_{01} + \lambda_{12}}{s^2 + s(\mu_{01} + \lambda_{12} + \lambda_{01}) + \lambda_{01}\lambda_{12}}$$

If we let the roots of the equation be x and y respectively, we get:

Equation 20

$$P_{S_0}(s) = \frac{s+\mu_{01}+\lambda_{12}}{(s-x)-(s-y)} = \frac{A}{s-x} + \frac{B}{s-y}$$

By substitution we solve for A and B respectively as shown in Equation 21 and Equation 22:

Equation 21

$$B = \frac{y+\mu_{01}+\lambda_{12}}{y-x}$$

Equation 22

$$A = \frac{x+\mu_{01}+\lambda_{12}}{x-y}$$

Applying the inverse Laplace transform:

Equation 23

$$P_{S_0}(t) = Ae^{xt} + Be^{yt}$$

Solving for x and y results from Equation 24 and Equation 25:

Equation 24

$$s^2 + s(\mu_{01}+\lambda_{12}+\lambda_{01}) + (\lambda_{01}\lambda_{12}) = 0$$

Equation 25

$$s = \frac{-(\mu_{01}+\lambda_{12}+\lambda_{01}) \pm \sqrt{{\mu_{01}}^2 + 2\mu_{01}\lambda_{12} + 2\mu_{01}\lambda_{01} - 2\lambda_{01}\lambda_{12} + {\lambda_{01}}^2 + {\lambda_{12}}^2}}{2}$$

It is now possible to derive the value of $P_{S0}(t)$ for various values of t, hazard rates and repair rates. Analysing the sensitivity of the hazard and repair rates provides insight into those types of risk management actions that can be put into place as illustrated in Table 67 and Figure 95.

Table 67 – Scenarios Using Various Repair and Hazard Rates

	$P_{S0}(1)$	$P_{S0}(2)$	$P_{S0}(3)$
λ_{01}	0.05	0.025	0.05
λ_{12}	0.05	0.05	0.05
μ_{01}	0.5	0.5	0.75
Ps(1 day[1])	0.96	0.98	0.97
Ps(1 week)	0.90	0.95	0.93
Ps(1 month)	0.81	0.90	0.86
Ps(6 months)	0.43	0.65	0.56
Ps(1 year)	0.20	0.43	0.32
Ps(2 years)	0.04	0.20	0.11
Ps(3 years)	0.01	0.09	0.04
Ps(5 years)	0.00	0.02	0.00
Ps(10 years)	0.00	0.00	0.00

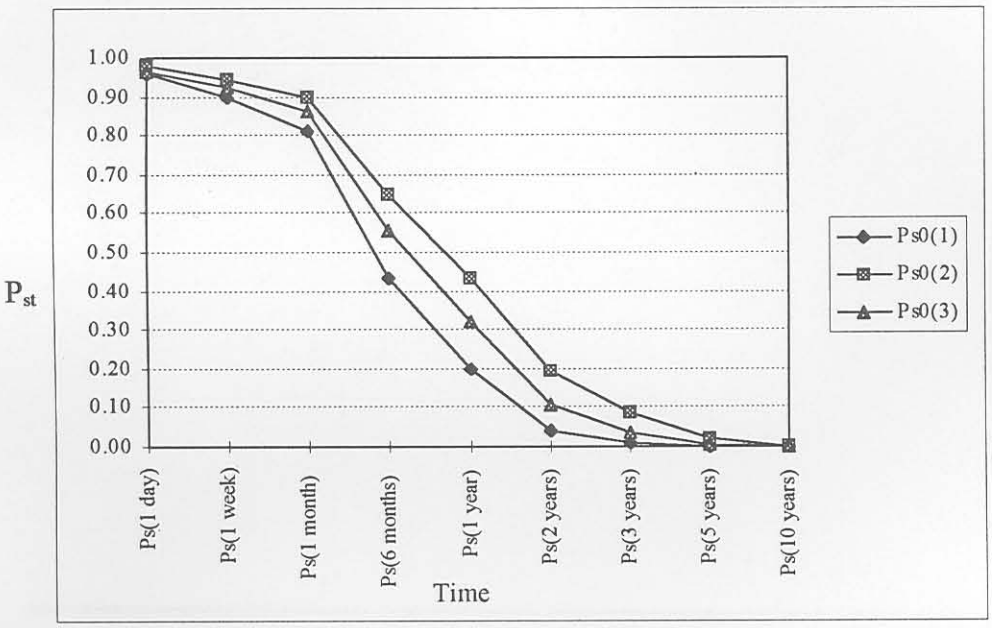


Figure 95 - Scenarios Using Various Repair and Hazard Rates

From Table 67, $P_{S0}(1)$ refers to a situation where the two "hazard rates" are equal and the "repair rate" is 0.5. This is also used as the control values in the sensitivity analysis. In order to determine the requirements of risk management, both the "hazard rate" (λ_{01}) [$P_{S0}(2)$] and the "repair rate" (μ_{01}) [$P_{S0}(3)$]is improved by 50% (or the values of 0.025 and 0.25). From Figure 95, it is clear that more leverage can be gained from addressing the "hazard rate", than by addressing the "repair rate". This would imply that appropriate pro-active risk management would be a better strategy for lengthening the life of a business intervention solution.

[1] 1 day = 1 time unit.

11.5 Conclusion

Markovian modelling provides useful means for the analysis of business related risks. It not only provides the ability to understand the probabilities attributable to the risks of various business states, but also gives insight into their progression over time. The disadvantage however is the mathematical computational effort required which increases directly in relation with the system complexity under consideration.

12. Appendix E - Application documentation

RISK	POSSIBLE	CRITICAL	THRESH.	FREQ. (F)	CONSEQ. (C)	PROB. (P)	WEIGHT (W)	SCORE (S)	COST (R)
RISK CATEGORY RISK A RISK B RISK C	Y/N?					0-10	0-100 0-100		
RISK EXPOSURE								X	Y

CRITICALITY:
- CRITICAL
- STRATEGIC
- FULL ABSORPTION
- PARTIAL ABSORPTION
- LOW IMPACT

THRESHOLD:
- VALUE
- QUALITY

PER YEAR

RAND (ZAR)

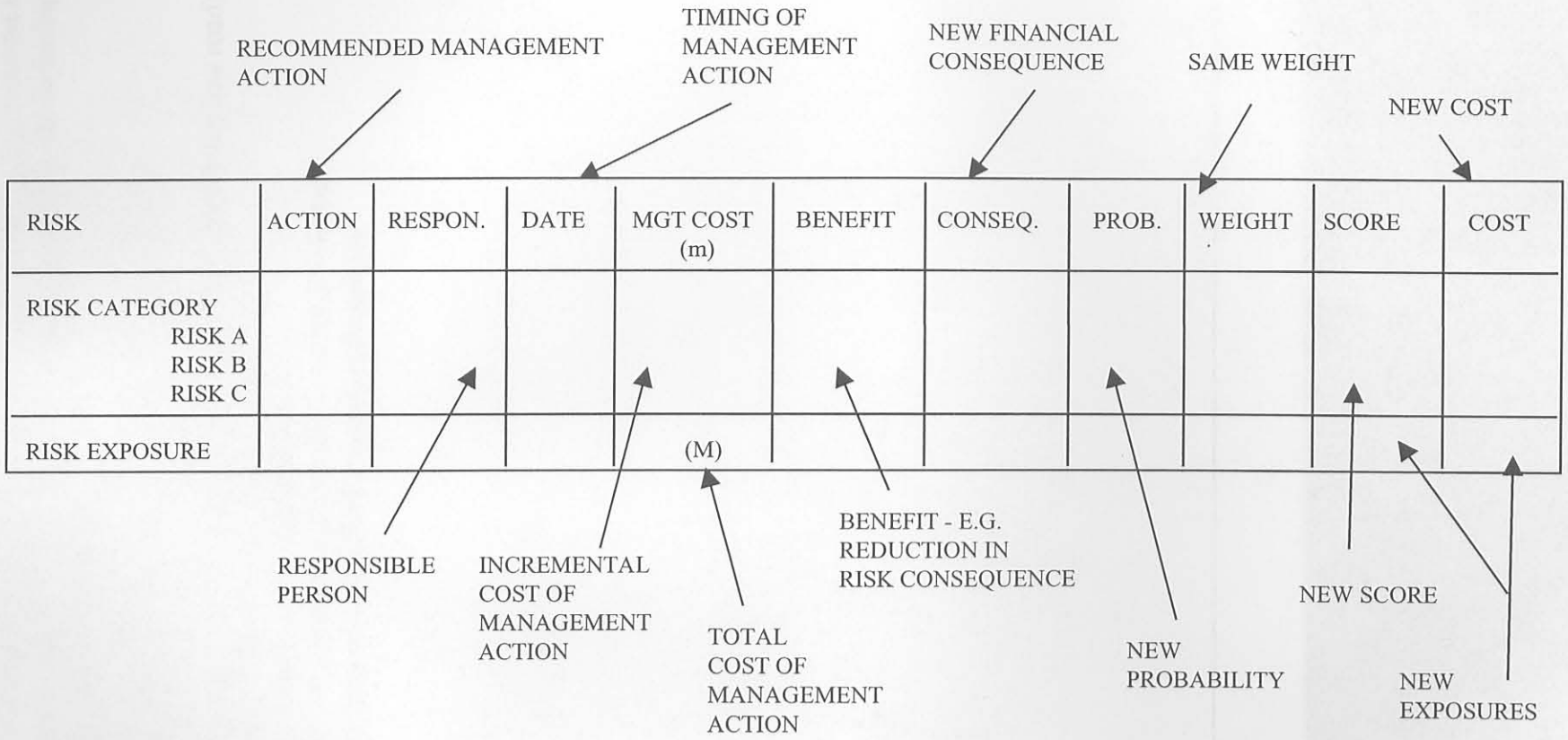
PROBABILITY: FUNCTION

SCORE:
S = W x P

BUSINESS EXPOSURE:
X = SUM(Si)

EXPECTED COST:
R = F x C

FINANCIAL EXPOSURE:
Y = SUM(Si)



13. Appendix F - Steps to developing scenarios

The following steps are recommended to derive scenarios (Schwartz ,[135, pp241-248]):

- Identify the focal issue or decision.
- Determine the key forces in the local environment.
- Determine the drivers in the macro-environment that impact on the forces identified in the preceding step.
- Rank the forces and the drivers according to uncertainty and importance.
- Select the scenario logics based on the axes of the preceding step.
- Flesh out the scenarios.
- Evaluate the decision (identified during step 1) using each of the scenarios as basis.
- Select leading indicators and signposts in order to identify the unfolding of the future against the individual scenarios.

The following should also be considered when deriving scenarios:

- Do not pre-empt to the obvious three scenarios (high, middle and low road).
- Do not assign probabilities to the various scenarios.
- Provide the scenarios with useful names.
- The scenario development team should be carefully selected.
- Scenario development should be intensely participatory.

14. Appendix G - Fastchicks theoretical case study

Fastchicks Limited is a chicken processor. Its end product includes whole chickens (fresh and frozen), and chicken parts (fresh or frozen). The company consists of the following entities, namely the farms, the processing plants a packaging material company and a pension fund. This relationship is shown in Figure 96.

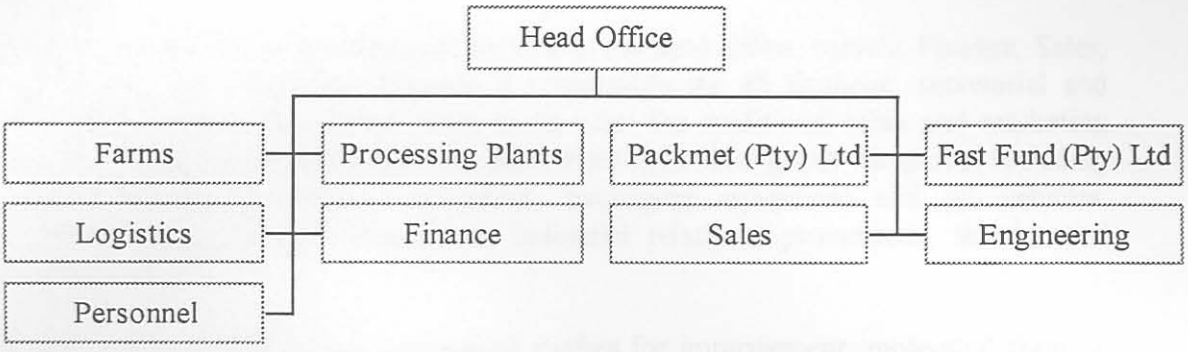


Figure 96 - Entities of Fastchicks Limited

There are three farms growing the chickens for the processing plants. The farms are all situated within a 150 km radius of the two processing plants. Plant A is 30 years old and has been maintained on a fix when broken approach to date. The technology is ageing along with the equipment. Plant B is only 10 years old and is situated 8 km away from plant A. Both plants produce the same products with the same inputs. While plant A uses ageing technology, it tends to operate below capacity approximately 40% of the time. It is however labour intensive when compared to plant B. Plant B having newer equipment is more automated, but has a capacity limitation in the ratio of 2.3:1 in relation to Plant A. The chicken processing process is shown in Figure 6.

The three farms were cloned 30 years ago, each operating under similar profit conditions today. Farm C has however been producing results consistently better than the other farms, which has generally been attributed to the dynamic management of that particular farm. The head office is situated just outside the nearest city, originally for marketing purposes. The geography of Fastchicks is shown in Figure 97.

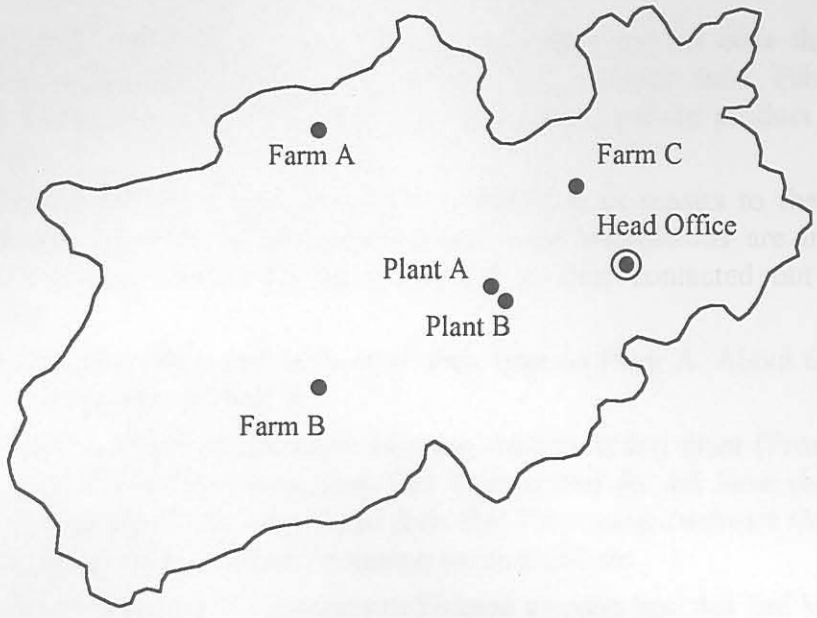


Figure 97 - Geographical Distribution of Fastchicks

Fifteen years previously, a study was done which alluded to the cost-effectiveness of Fastchicks owning their own packaging material plant. A wholly owned subsidiary was formed (Packmet (Pty) Ltd) which produces approximately all of Fastchick's packaging needs. At approximately the same time, a pension fund was formed (Fast Fund (Pty) Ltd) which provides for the pension needs of the group. This business has however proved to be quite a lucrative income generator via its various investment forms, from speculation with shares to property development deals. The assets controlled by the pension fund are worth approximately twice that of the rest of the group. Both these subsidiaries are situated in the same building as the head office.

Four other head office functions are located at the head office, namely, Finance, Sales, Engineering and Personnel. Finance is responsible for all financial, secretarial and information technology duties. Sales looks after the traditional sales and marketing functions. Engineering looks after the equipment used throughout the group, including chicken houses, processing equipment, packaging equipment and all vehicles. Personnel takes care of recruitment, industrial relations, promotions, salaries and housing issues.

Traditionally, the group had undertaken studies for improvement, motivated these to the head office, had them approved on their respective budgets and then implemented these accordingly. Due to the extreme competitive pressure both locally, in addition to the dramatic increase in imported birds, the board decided that the traditional series of disjointed actions would not be enough to turn the company around. They commissioned an external consultant to evaluate the situation from a holistic perspective and make recommendations regarding what should be done.

14.1 Consultant's findings

The consultants on a thorough analysis found the following:

- The recent plague of Newcastle disease ravaged the chicken stock to the extent that breeding stock had been slaughtered to prevent the company from disastrous financial performance (i.e. cash flow in lieu of long term investment).
- The farms operate as isolated entities producing as many birds as possible on the basis that the plant will consume all birds available. Various customers however require certain types of birds. If a farm provides the wrong birds, the production line needs to be adjusted accordingly, the customers contacted and arrangements made to consume the available birds, while postponing current schedules.
- Farms A and B seem to be cost intensive, consuming more resources, while yielding fewer chickens than farm C. The additional resources include higher veterinary costs, labour, feed and utilities. Farm C run by a dynamic manager seems to have a more productive culture, but can flare up in labour problems in solidarity with the other farms when problems occur over there.
- All transport is owned by the group. This provides control over the deliveries which are inevitably late and the expedition of the logistics chain. This means the delivery trucks are often in the "hot seat" trying to speed the product to the irate customers.
- Transport have found Engineering to be ineffective as repairs to the processing plant always takes precedence. Sometimes when breakdowns are inspected by Engineering, they cannot do the job and it is then contacted out to a local contractor.
- Engineering currently spend 50% of all their time on Plant A. About 60% of their budget is consumed by Plant A.
- A significant level of tension exists between the processing plant (Processing) and Engineering where Processing feels that Engineering do not have their needs at heart. Engineering on the other hand feels that Processing mistreats the equipment and often call them in to repair "common sense problems".
- Information technology (IT) reports to Finance as years ago this had been the data processing function, used primarily to do the monthly and annual financial number crunching. Many in the production areas feel that IT can provide more than financials and schedules, but Finance has a hands-off approach, justified by "watching costs".
- Five years ago an accounting consulting firm was commissioned to undertake a study that determined the right product mix and number of chickens required to be produced every day. The consultant indicated that the unit cost would be reduced if the machinery could be better utilised in the processing of the birds. The plant managers are required to keep the equipment and staff running all the time, but the overheads continue to provide a barrier, and hence diminishing margins. This case is even worse with equipment breakdowns as this mode of operation cannot afford scheduled maintenance.
- While production seems to be near maximum capacity, inventory levels constantly appear excessive, particularly in areas where product and work in process (WIP) is

undesirable. As the shelf life of the product and WIP is low, slow moving material (WIP or product) must be frozen. This creates 2 problems; (1) the product mix is incorrect, and (2) margins are reduced due to product with lower value.

- There has been a high turnover of staff in the specialist areas, namely IT, Engineering and Transport. This has been more prominent with the more promising staff. Reasons cited include that there is limited scope for promotion as they do not really understand the chicken business and cannot hope to climb the corporate ladder.
- The deregulation of the chicken industry has resulted in new entrants to the market where chickens are being imported at R1.20 per bird (average) cheaper that they can be produced and processed by Fastchicks.
- An evaluation of people in the organisation was undertaken. A benchmark was undertaken against the best producers in the world. This evaluated against the relative productivity of each function is shown as an index. The results are shown in Table 68.

Table 68 - Results of Fastchicks Benchmarking Performance

Function	# of People	Benchmark Rating[1]
Farm A	65	0.34
Farm B	59	0.29
Farm C	31	0.57
Plant A	109	0.24
Plant B	63	0.62
Engineering	5	0.71
Logistics	6	0.48
IT	10	0.42

The consultant found that while the normal labour rate is relatively inexpensive, the cost of engagement and employment[2] makes the intensive use of labour generally unattractive.

- An environmental analysis yielded interesting results. Some of the peer producers had similar maintenance, transport and IT problems. They felt that the value derived from these functions did not justify the overhead they bore. Some independent farms are providing types of birds complementary and desirable to what Fastchicks are trying to achieve.
- In the more successful plants of the world, chicken processors have tended to focus on the principle of adding as much value as possible to the product. This has resulted in higher utility for the consumer and as a result been more of a niche product, out of the reach of the mass producers. Products of this nature include

[1] This rating indicates if > 1, then better than world class, < than 1, then behind world class. This metric provides an indication of the cost-effectiveness and productivity in general.

[2] This cost takes the energy required in union related strikes, stay-aways, non-production, poor quality, pilferage, overtime for catching up lost time, etc. into consideration.

chicken kiev, kebabs, schnitzels, stir fry's, marinated, etc. The limitations have generally been technology and the accompanying equipment. This is however unexplored territory for the processor.

- One of the components of the benchmarking metrics (Table 68) is yield. Calculations were done indicating that improving the yield by 1% would on average result in R1million additional income. It was found that the processing variability, the mean as well as the distribution of the final product were undesirable when compared against the benchmarks. The current situation as opposed to the benchmark is graphically illustrated in Figure 98[1].

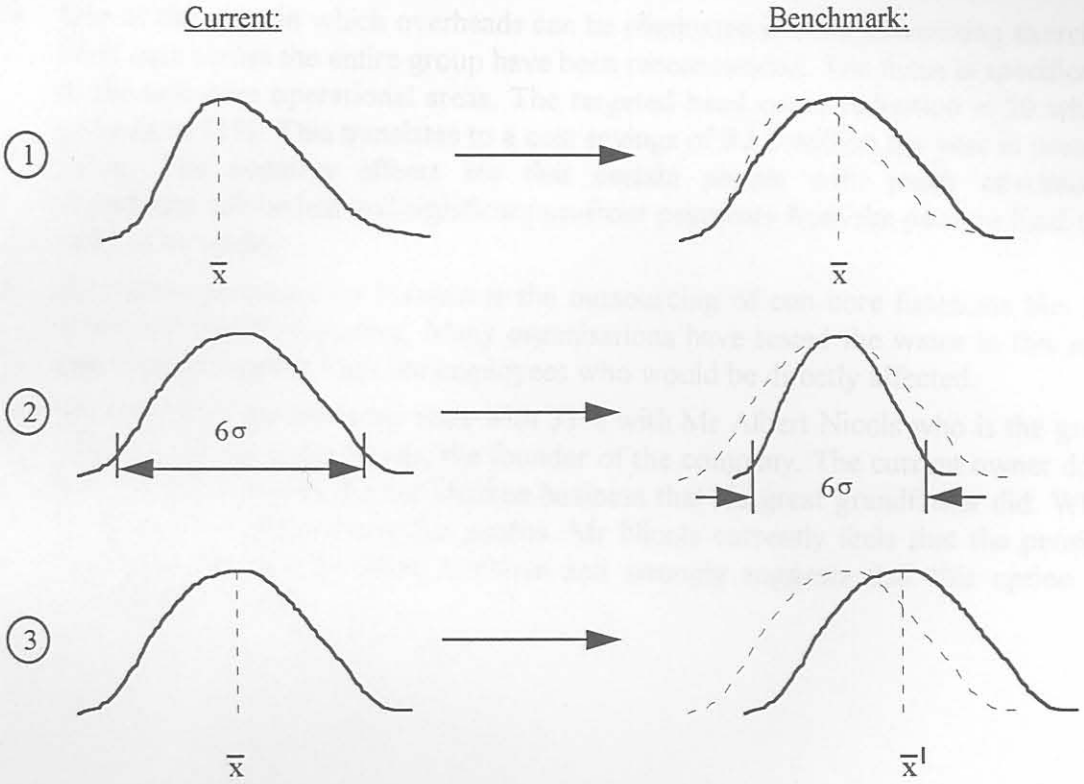


Figure 98 - Current vs. Benchmark Product Quality of Fastchicks

14.2 Alternatives for improvement

Based on various discussions, analyses, calculations, etc., the following opportunities emerged for improvement in the business environment of Fastchicks.:

- One of the most attractive areas for providing the breakthrough required by Fastchicks is via a BPR exercise. One of the plant managers is very keen to do this as it should provide the much needed integration he has been campaigning for in the last 5 years. All levels of the group are however sceptical about the changes and purported benefits that a BPR exercise can bring about.
- Another option for improvement is to embark on a continuous improvement programme, typically via the implementation of a TQM/TPM philosophy. A

[1] This problem is similar for both plants.

rigorous programme of action aimed at improving quality while reducing costs then needs to be carried out.

- The independent farms indicated an interest in exploring a strategic alliance of sorts with Fastchicks. They can provide the types of birds that improve that total bird mix as well as against a schedule very favourable to Fastchicks. There are however risks that the meagre areas of competitive advantage can be lost if not managed properly.
- The option of changing strategic direction into providing value added products seems promising. This will require new technology, equipment and skills. While indicating a possible barrier to entry to competition due to the high cost, complexity and new markets captured, the risk and resulting rewards appear high. Fastchicks does not have theoretical depth or experience in this area. Market research did however indicate a potentially high demand.
- An alternative was developed proposing the automation of slaughtering, evisceration and packaging of the chickens, parts and gizzards. The anticipated benefits include a reduction in labour while resulting in an increase in product yield as well as quality. Problems could however include cost, labour unrest and market loss[1].
- Another option is to increase the processing capacity of plant B. This includes upgrading and replacing some of the equipment. A system that dynamically optimises the plant set-up based on the incoming birds is included. This will accommodate the unreliable delivery of birds from Fastchick's 3 farms.
- One of the ways in which overheads can be eliminated is via a downsizing exercise. Staff cuts across the entire group have been recommended. The focus is specifically in the non-core operational areas. The targeted head count reduction is 50 which equates to 11%. This translates to a cost savings of R1.8 million per year in present value. The negative effects are that certain people with much operational experience will be lost and significant up-front payments from the pension fund will need to be made.
- An option proposed by Finance is the outsourcing of con-core functions like IT, Transport and Engineering. Many organisations have tested the water in this area and there is support from the employees who would be directly affected.
- Ownership of the company rests with 51% with Mr Albert Nicols who is the great grandson of Mr Colin Nicols, the founder of the company. The current owner does not share the passion for the chicken business that his great grandfather did. What he does share is the desire for profits. Mr Nicols currently feels that the pension fund business may be more lucrative and strongly suggests that this option be considered.

[1] A significant proportion of the chicken market is halaal based. This means that their throats need to be slit in order that they bleed for religious purposes. Automation does not currently support this on a cost-effective basis.

15. Appendix H - Competence and an organisation's capability

This appendix is adapted from material made available by Paras Africa.

Organisations today are experiencing increasing pressure to clearly demonstrate value added to all its stakeholders. This value is shown by tangible as well as intangible means. An organisation achieves this by means of processes that collectively aim to satisfy the need of the customer by means of a product or service or a combination of the two. This is typically one way being used to differentiate the provision of solutions.

The processes are however only the structure or a component of the business architecture that enables the delivery mechanism for the product and or service. Certain competencies are required in order to affect the execution of these processes. The relationship between these two facets are therefore analogous to an electronic circuit. The processes provide the structure (physical circuit) while the competencies provide the potential (potential difference) in order for the organisation to perform in its determined form. Together, these along with the resources such as people, technology, capital, etc. (electronic components) are able to achieve a particular goal. Value is attributable by stakeholders to the achievement of this goal as it fulfils their needs and they in turn are enabled to add value in their intersecting systems of endeavour. This relationship between an organisation's strategic processes and its core competencies are shown in Figure 99 [49].

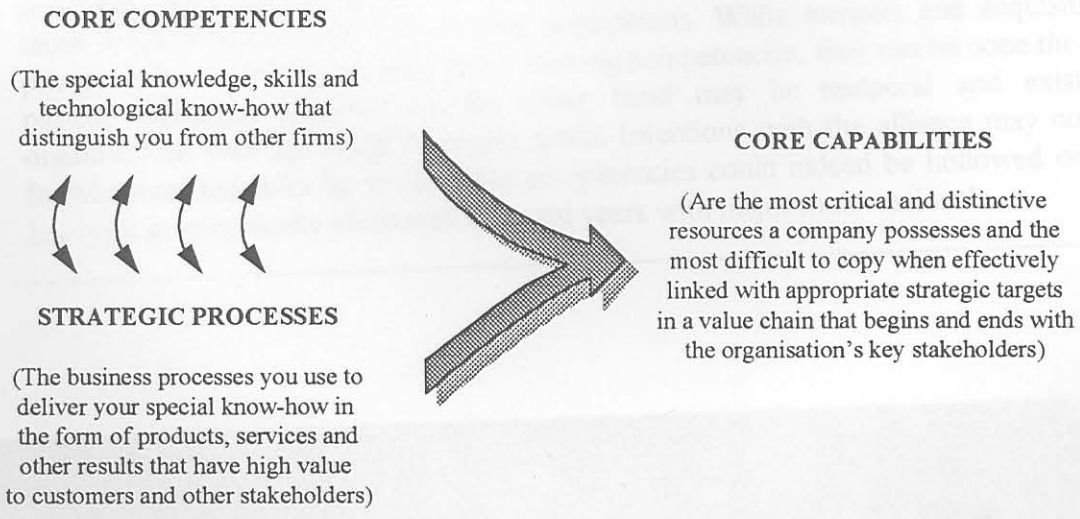


Figure 99 - Relationship between Core Competencies, Strategic Processes and Core Capabilities

The core competencies are the special knowledge, skills and technological know-how that differentiates the organisation from others [6]. It is these core competencies that an organisation requires in order to effect its strategic processes. The strategic processes are the mechanisms the organisation uses to deliver the value by means of the interaction between the skill exploitation and the resources. The core capabilities are the synergistic and intelligent accumulation of the competencies and processes into

the distinctive resources required to add value. This forms the organisation's "footprint", very difficult to emulate, but which translates into the organisations value at any particular point in time.

This is where the organisation value is reflected and where its stakeholders evaluate it. It is therefore in understanding this and breaking it up into its components that it is possible to build and leverage value, or indeed fall short of realising this.

This holistic approach forms the basis for understanding an organisation's requirements in order that its actions do not fall short of what it is able to achieve.

From this approach it becomes clear that having the desired competencies cannot be achieved by the establishment of a training programme aimed at acquiring clearly needed skills. If an organisation wishes to mobilise for effectiveness and efficiency on a sustainable basis, it needs to align with the strategic requirements of the organisation - in the short, medium and long term. The organisation therefore needs to understand what these strategic processes are and how they will contribute on a sustainable basis to the organisation's wealth. This wealth is measured in traditional as well as intangible terms like the intellectual capital that forms the fabric of the organisation's value delivery fabric. The basis for understanding and exploiting these strategic processes is necessarily the business strategy. This is translated into the strategic processes, which requires the following dimensions:

- Process structure.
- Responsibility/accountability/authority.
- Process results.
- Performance measures.

It is noted that "process results" and "performance measures" are not necessarily the same, nor are they mutually exclusive. Process results infer the desired outcome from the stakeholders' perspective of the accumulated processes under consideration. Performance measures on the other hand are those metrics reflecting along the length of the various processes that ensure the achievement of the process results. Process results could be likened to the traditional business goals, although goals are not always directed at the achievement of strategic process orientated measures.

As described earlier, these strategic processes are only the structure. They are enabled by means of the core competencies. The competencies are achieved via two approaches, either organically or inorganically. Organic orientated mechanisms include training, education, recruitment and experience. The importance of learning as an organisation therefore becomes pertinent. Inorganic approaches involve the acquisition of competencies and then the focused deployment of these in line with the strategic processes. This may be achieved via the various forms of strategic alliances or the more forceful method of mergers and acquisitions. While mergers and acquisitions provide a limited threat towards losing existing competencies, they can be none the less painful. Strategic alliances on the other hand may be temporal and exist of organisations with generally divergent goals. Intentions with the alliance may not be forthcoming and risks lie in that core competencies could indeed be hollowed out as has been so graphically illustrated in recent years with major multi-nationals.

The relationship between strategic processes and competencies need therefore to be clearly understood particularly in a dynamic environment where decisions have to be taken carefully yet paradoxically need to be quick and decisive. It is worth taking the time to map the requirements of the strategic processes onto the current and future required competencies as shown in Figure 100.

The advantage of this is that gaps are highlighted in terms of the current competence set and what is required of the organisation in the short, medium and long term. It further assists in indicating whether competencies are redundant or soon to be redundant. This helps to link the mobilisation of activities aimed at enriching the competencies with the timeous enactment of the individual strategic processes. It assists in the following instances:

- Does not invest in trying to upgrade competencies where they add no strategic value currently or in the short term.
- Identifies the competencies that are aligned with the business activities where leverage is actually achieved.
- Highlights a path to the attainment of the required competencies.
- Sequences the activities and timing thereof in the attainment of these identified competencies.

The relationship from an organisational perspective of how all these components function in their environment is illustrated in Figure 101.

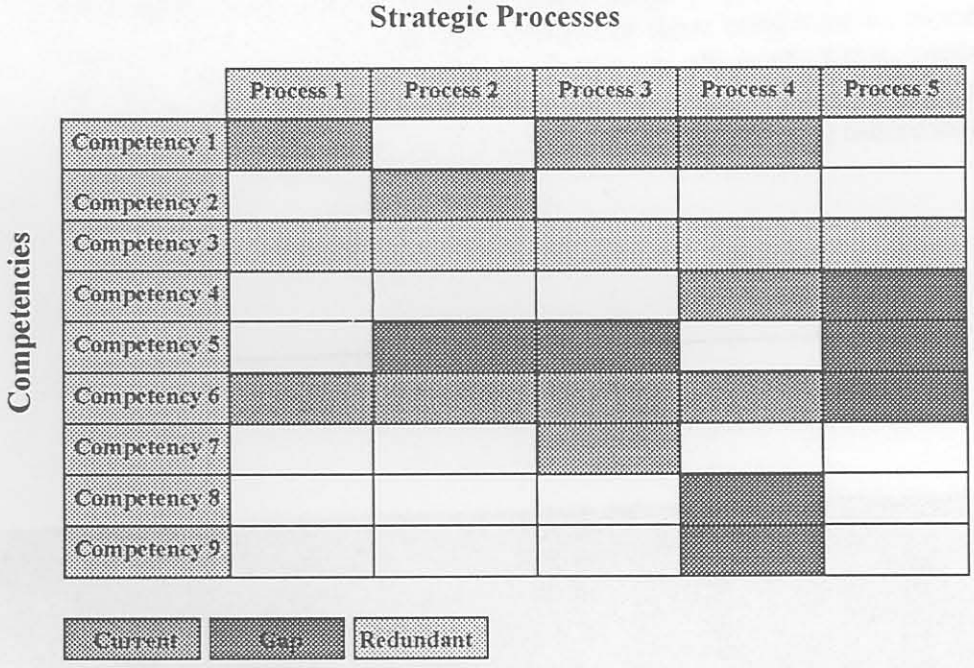


Figure 100 - Competencies / Process Matrix

The environment determines how the organisation is going to function, be this internal or external. An organisation senses (gets feedback) its performance in the market at the operational level as it is this point where it interacts with its world, both internally and externally. It is the reflection on this that results in strategy which in turn can direct the organisation and change its behaviour at the operational level.

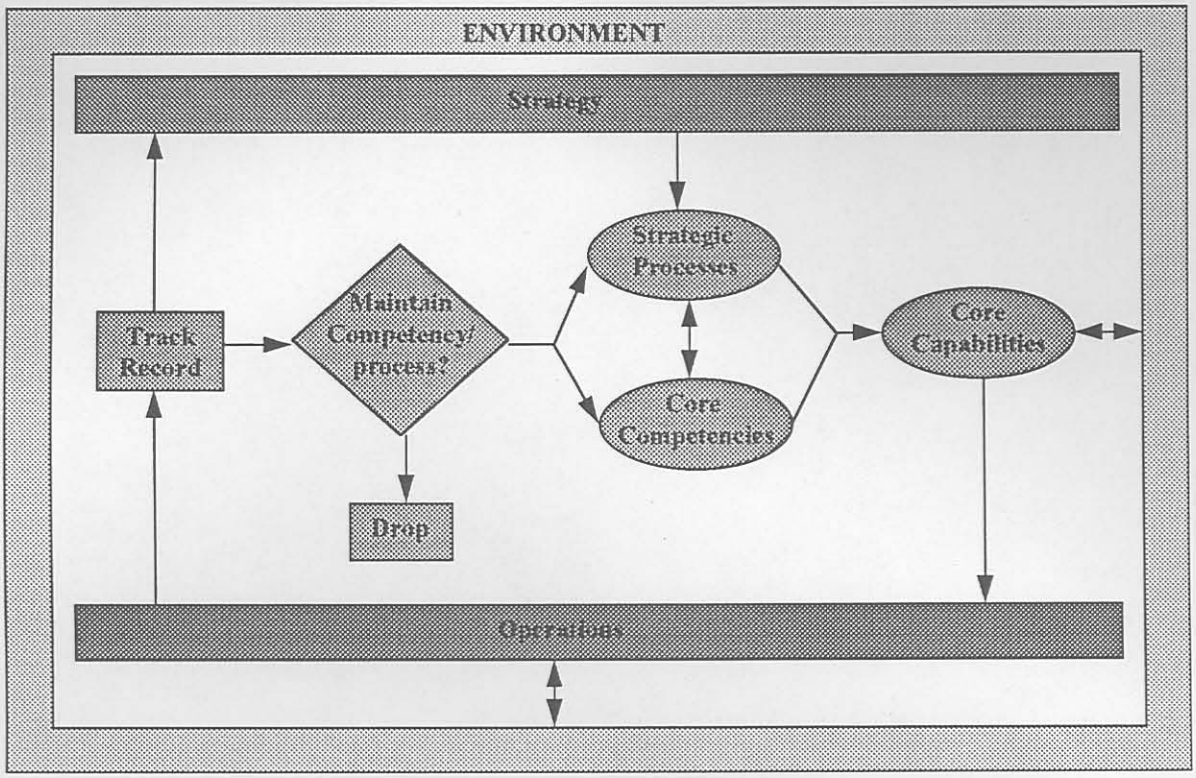


Figure 101 - Organisational Dynamics, Competencies and Processes

This is achieved by means of the derivation of strategic processes which are mechanisms for value accumulation, adding value to all its stakeholders. It is these strategic processes, working complimentary with the right core competencies that determine its core capability. It is this core capability which at the coal face determines the nature and behaviour of the organisation in operations and hence its interaction with the environment. It is also this capability on which an organisation is valued by its environment.

The environment provides feedback to operations in terms of its success or indeed failure in terms of its set out strategic aims. It is this dynamic feedback which assists an organisation in determining whether its strategic processes are achieving their aims or whether they require attention. The same position is true for the competencies. It can be a brutal awakening to realise a particular competence has become redundant and needs no further pursuit. Energy needs therefore to be focused on acquiring and deploying the new competencies and resources.

The management of knowledge assets plays a particularly important role in the acquisition, deployment and maintenance of these competencies especially in the light of the role that technology is playing in all competitive organisations today. Technology is not limited to information technology, rather it is encompassing of the application of knowledge for the betterment of business and indeed mankind.

16. Appendix I - Covering letter and questionnaire

The following questionnaire was used for the market research:

Dear Participant

RE: The Management of Risks in Business Change

South Africa has entered into the global village with the result that its markets have opened up to the competition and the pressures that accompany this. The rest of the world has been exploiting various contemporary world class management techniques and improvement initiatives. Many of these have however failed, resulting in less than expected results or even financial disaster.

While many management gurus have started writing about the risks, no formal integrated approach is available that attends to the appropriate management of business change, whether it be process re-engineering, TQM, downsizing and so on.

This questionnaire forms part of a doctoral research project aimed at formulating an appropriate model for managing the risks of business change. The purpose of this questionnaire is to provide insight into the relationship between business change and risk, understand the different types of risk and the way these risks are analysed and managed.

It is in this regard that I would be very grateful if you could complete the attached questionnaire and return it in the envelope provided. It is not necessary to divulge any confidential information and no reference will be made to any particular organisation arising from the results of the questionnaire.

Your co-operation will contribute to the growing body of knowledge aimed at improving the competitiveness of local companies in the light of international competition.

Yours faithfully

S. Bosman

I confirm that Stephen Bosman is a registered student at the University of Pretoria and that the information he requests is for research purposes. Your assistance is appreciated.

Professor P.S. Kruger
Promoter
Department of Industrial and Systems Engineering

THE MANAGEMENT OF RISKS IN BUSINESS CHANGE

PLEASE ANSWER THE FOLLOWING QUESTIONNAIRE IN LIGHT OF THE FOLLOWING DEFINITION OF BUSINESS CHANGE:

Business change refers to the change in the way a business is conducted in order to improve the financial attractiveness of that company. This change could involve corporate restructuring or the optimisation of financing mechanisms.

Section 1: Information regarding respondent

PLEASE PROVIDE THE FOLLOWING INFORMATION ABOUT YOURSELF AND YOUR ORGANISATION.

A. Position in the organisation: _____

B. Organisation: _____

C. Telephone No.: _____

(Questions B & C are optional and will not be used to reveal specific responses from your organisation).

NOTE:

You organisation may be an entire company, a division, branch or plant. Please answer for the highest business level with which you are most familiar. Whichever you select, please answer the questionnaire consistently.

Some questions may have more than one answer.

Section 2: Demographic Information

1. What is the number of employees in your organisation?

Less than 100	101 to 500	501 to 1000	1001 to 5000	Over 5000

2. What is the primary nature of your business?

Manufacturing	Distribution	Retail	Mining	Financial services	Computer & associated services	Engineering & construction	Other

Please elaborate on "Other": _____

Section 3 - Organisation's experience with business change

3. How recently has your organisation undertaken a major business change initiative?

Have not	Less than 6 months ago	Less than 1 year ago	Less than 2 years ago	Less than 5 years ago	Longer than 5 years ago

If "Have not" go to question 7.

4. How many significant business change initiatives did your organisation undertake during this period?

1	2	3	4	5	6	7	8	9	10	More than 10

5. How would you rate the success of these initiatives in general?

Disaster	Failure	Inadequate	Success	Resounding Success

6. What type of change initiative was undertaken? Indicate more than 1 where relevant.

Continuous improvement: (A range of small improvements across the company, including products, services, production, marketing, etc., e.g. TQM)	
Procedure redesign: (The change in the way certain processes are executed, aimed at problem solving and cost-cutting.)	
Value-stream reinvention: (Replacement/redesign across the organisation's value chain. Involves organisational change, resulting in time and cost savings and improving quality and service e.g. BPR)	
Enterprise Redesign: (Holistic redesign of the enterprise, e.g. new business units, strategic alliances etc.)	
Strategic visioning: (Ongoing cycle where direction is defined or redefined, e.g. markets, technologies, products, etc.)	
Financial optimisation: Changing the financial characteristics of an organisation (e.g. different financing mechanisms, tax breaks, etc.)	
Other (1):	
Other (2):	

7. What business change initiatives are your organisation currently involved with?

Total Quality Management (TQM)	
Business process re-engineering (or variant) (BPR)	
Theory of constraints (TOC)	
Just-in-time (JIT)	
Downsizing/rightsizing	
World class manufacturing	
Total productive maintenance (TPM)	
Strategic alliances	
Reduce overheads	
Streamline the organisation	
Benchmarking	
Outsourcing	
Increase sales	
Activity based costing	
Empowerment	
Change in business direction	
Intrapreneuring	
Management by walking around	
Empowerment	
Teamwork	
Learning organisation	
Strategic management	
One-minute managing	
Other (1)	
Other (2)	

8. Please rate (A) the following list of risks that a business may face during a business change initiative. Indicate whether the risk is generic and attributable to business change initiatives in general (B), unique to the type of change initiative (C), and or particular to your industry or business (D). Use the following scale for (A):

Not a factor	Unimportant	Indifferent	Important	Critical
1	2	3	4	5

	(A)					B	C	D
Mis-use/misinterpretation of business improvement technique.	1	2	3	4	5			
Too much time is spent understanding the current situation.	1	2	3	4	5			
No or inadequate top management commitment and action.	1	2	3	4	5			
Implementing modern management techniques but using traditional management paradigms.	1	2	3	4	5			
Innovation is not cultivated and exploited.	1	2	3	4	5			
Implement solution without proper testing.	1	2	3	4	5			
Undertake the initiative too slowly.	1	2	3	4	5			
Limit the scope of the change initiative without taking the holistic consequences into account.	1	2	3	4	5			

	(A)					B	C	D
Use an inappropriate implementation method.	1	2	3	4	5			
Use inappropriate tools.	1	2	3	4	5			
Ignore the concerns of employees.	1	2	3	4	5			
Do not take the financial implications of the initiative into account up-front.	1	2	3	4	5			
No, lack, or unsuitable vision.	1	2	3	4	5			
Activities/initiatives are misaligned with the strategy.	1	2	3	4	5			
Not focusing on the needs of the customer	1	2	3	4	5			
Not using experienced specialists, e.g. consultants.	1	2	3	4	5			
Aim for minimal gains.	1	2	3	4	5			
Failure to appreciate the risks.	1	2	3	4	5			
Failure to anticipate the energy and their resources required by the initiative	1	2	3	4	5			
Attempt to achieve too much with the project.	1	2	3	4	5			
No or poor communication.	1	2	3	4	5			
Insufficient change management attention.	1	2	3	4	5			
No sense of urgency.	1	2	3	4	5			
Not planning for short term successes.	1	2	3	4	5			
Declaring success too soon.	1	2	3	4	5			
Not anchoring changes in corporate culture.	1	2	3	4	5			
Other.	1	2	3	4	5			
Other.	1	2	3	4	5			

Section 4 - Organisation's approach to risk management

9. Does your business formally practice risk management in business change initiatives?

YES	NO

If **YES** then answer question 11 and all subsequent questions.
If **NO** then answer questions 10, 18 and all subsequent questions.

10. Do you intend to introduce a formal risk management practice in your business?

YES	NO

11. Does someone in your organisation have specific responsibility for managing the risks in business change?

YES	NO

12. Do you intend training more resources in business change risk management?

YES (Within the next 12 months)	YES (Sometime in the future)	NO

13. The following describes a generic life-cycle of a business improvement initiative. Please indicate whether a formal approach is currently used (YES or NO) to manage the risk in each phase or whether you believe there should be (Should). Leave blank otherwise.

Need for improvement	YES	NO	Should
Generate alternatives for improvement	YES	NO	Should
Assess the alternatives	YES	NO	Should
Select solution(s)	YES	NO	Should
Develop the solution	YES	NO	Should
Provide contingencies	YES	NO	Should
Implement solution	YES	NO	Should
Operate solution	YES	NO	Should
Phase-out	YES	NO	Should

NOTE:

A solution may be derived using techniques like BPR, TQM, overhead cost reduction, acquisition, sell-off, etc.

14. Please indicate the importance that your organisation currently (A) places on the following factors. Also indicate the importance (in your opinion) that they should (B) have in managing the risks or business change. Use the following scale:

Not a factor	Unimportant	Indifferent	Important	Critical
1	2	3	4	5

	Current					Should				
Risk analysis is done in parallel which business change analysis.	1	2	3	4	5	1	2	3	4	5
Benefits and risks are known and quantified before the change solution is selected and implementation commences.	1	2	3	4	5	1	2	3	4	5
Formal, clear implementation plans exist and are accepted.	1	2	3	4	5	1	2	3	4	5
A contingency plan clearly mapped to the implementation plan exists and is accepted.	1	2	3	4	5	1	2	3	4	5
Benefits and risks are made known to all being affected indirectly or directly by the execution of change.	1	2	3	4	5	1	2	3	4	5
Implementation of the change is manage, with the benefits and risks being reviewed regularly.	1	2	3	4	5	1	2	3	4	5
Sufficient resources for implementation and contingencies exist.	1	2	3	4	5	1	2	3	4	5

	Current					Should				
Post implementation risk management plans are drawn up.	1	2	3	4	5	1	2	3	4	5
Use is made of carefully selected qualitative and quantitative methods to manage the risks of business change.	1	2	3	4	5	1	2	3	4	5

15. What techniques does your organisation use (A) to minimise the risks in business change? Please rate (B) those that your organisation uses on a scale of 1 to 5. Also indicate if you believe your organisation should (C) use the technique. If your organisation does not use the technique, or you don't think they should, please leave blank. Use to following scale to rate the techniques your organisation currently uses (B):

Inappropriate	Some Use	Useful	Very Useful	Excellent
1	2	3	4	5

	Use	Rate Use					Should
Ensure that a vision is established.	YES	1	2	3	4	5	YES
Manage risks through the complete life-cycle (including phase-out).	YES	1	2	3	4	5	YES
Ensure the technique is fully understood.	YES	1	2	3	4	5	YES
Train resources in all the skills required for the project.	YES	1	2	3	4	5	YES
Align initiatives with the business strategy (goals, etc.).	YES	1	2	3	4	5	YES
Empower employees.	YES	1	2	3	4	5	YES
Limit the time spent on understanding the current situation.	YES	1	2	3	4	5	YES
Plan for the change management.	YES	1	2	3	4	5	YES
Begin and end exercise with strong committed leadership.	YES	1	2	3	4	5	YES
Encourage creativity.	YES	1	2	3	4	5	YES
Use experienced consultants.	YES	1	2	3	4	5	YES
Test solutions before implementation.	YES	1	2	3	4	5	YES
Plan for results within 12 months.	YES	1	2	3	4	5	YES
Prevent scope creep.	YES	1	2	3	4	5	YES
Use a holistic approach.	YES	1	2	3	4	5	YES
Use implementation methods suitable to the initiative.	YES	1	2	3	4	5	YES
Address employees needs during and after the process.	YES	1	2	3	4	5	YES
Undertake cost-benefit assessments up-front.	YES	1	2	3	4	5	YES
Understand the risks and develop contingencies.	YES	1	2	3	4	5	YES
Change the management paradigms to suit the new initiative.	YES	1	2	3	4	5	YES
Put performance measures in place.	YES	1	2	3	4	5	YES
Focus on delivering benefits to the customers.	YES	1	2	3	4	5	YES
Focus on changing behaviour.	YES	1	2	3	4	5	YES
Articulate compelling need to change.	YES	1	2	3	4	5	YES
Ensure a high level of communication.	YES	1	2	3	4	5	YES
Use modelling and simulation tools.	YES	1	2	3	4	5	YES
Nurture and use leadership.	YES	1	2	3	4	5	YES

	Use	Rate Use					Should
Plan for short term wins.	YES	1	2	3	4	5	YES
Institutionalise new approaches.	YES	1	2	3	4	5	YES
Other:	YES	1	2	3	4	5	YES
Other:	YES	1	2	3	4	5	YES

16. Do you use (A) any of the following tools to assist in the management of risk in business change initiatives? If not leave the box blank. If you use the technique for this purpose, please rate its effectiveness as shown (B). Us the following scale:

Inappropriate	Some Use	Useful	Very Useful	Excellent
1	2	3	4	5

	Use	Effectiveness				
Scenario planning	YES	1	2	3	4	5
Net present value (NPV)	YES	1	2	3	4	5
Internal rate of return (IRR)	YES	1	2	3	4	5
Expected monetary value (EMV)	YES	1	2	3	4	5
Return on net assets (RONA)	YES	1	2	3	4	5
Return on investment (ROI) (variants)	YES	1	2	3	4	5
Mathematical modelling of processes	YES	1	2	3	4	5
Simulation	YES	1	2	3	4	5
Linear programming.	YES	1	2	3	4	5
Forecasting	YES	1	2	3	4	5
Utility theory	YES	1	2	3	4	5
Capital asset pricing model (CAPM)	YES	1	2	3	4	5
Arbitrage pricing theory (APT)	YES	1	2	3	4	5
Option pricing theory	YES	1	2	3	4	5
Burke-Litwin change management model	YES	1	2	3	4	5
Option pricing theory	YES	1	2	3	4	5
Unwritten rules change management model	YES	1	2	3	4	5
McDonald Gandz change management model	YES	1	2	3	4	5
Insurance	YES	1	2	3	4	5
Hedging	YES	1	2	3	4	5
Systems reliability analysis	YES	1	2	3	4	5
Portfolio management	YES	1	2	3	4	5
Hold excess liquid assets	YES	1	2	3	4	5
Contingency management	YES	1	2	3	4	5
Life cycle analysis (LCA)	YES	1	2	3	4	5
Market research	YES	1	2	3	4	5
Value engineering	YES	1	2	3	4	5
Ring-fencing	YES	1	2	3	4	5

	Use	Effectiveness				
Contracting	YES	1	2	3	4	5
Outsourcing	YES	1	2	3	4	5
Other:	YES	1	2	3	4	5
Other:	YES	1	2	3	4	5

17. What product do you use to support the tools and techniques described above. Please indicate, what technique or tool this supports and who the vendor is (indicate internal if this is internal).

No.	Product	Tool/technique	Vendor
1			
2			
3			
4			
5			
6			
7			
8			

Section 5 - Respondent's opinion of risk management in business change

18. Do you feel that all modern-day change initiatives are aimed at changing the behaviour of people?

YES	NO	Unsure

19. Do you feel that the failure of business change initiatives are largely attributable to the lack of thorough management of risks associated therewith.

YES	NO	Unsure

20. What do you believe the <u>benefits</u> of a formal risk management approach are? Please rate using the following scale.

No benefit	Minor	Moderate	Significant	Major benefit
1	2	3	4	5

The possible problems of the initiative are identified and contingencies put in place.	1	2	3	4	5
Facilitates understanding of the complexity of the business.	1	2	3	4	5
Facilitates the change management process.	1	2	3	4	5
Provides an unbiased, holistic evaluation of a solution.	1	2	3	4	5
A responsible risk-taking culture is developed.	1	2	3	4	5
Provides a longer term focus.	1	2	3	4	5
Minimises exposure to failure.	1	2	3	4	5
Provides an audit trail for reviewing decision-making.	1	2	3	4	5

Encourages an average higher level of risk taking.	1	2	3	4	5
Other:	1	2	3	4	5
Other:	1	2	3	4	5

21. What do you believe the <u>problems</u> of a formal risk management approach are? Please rate using the following scale.

No problem	Minor	Moderate	Significant	Major problem
1	2	3	4	5

Too formal an approach could limit creativity.	1	2	3	4	5
Some high yielding solutions may not be selected due to unacceptable risk levels.	1	2	3	4	5
It requires time, effort and additional skills.	1	2	3	4	5
It adds another dimension of complexity to business change management.	1	2	3	4	5
There are currently no suitable, integrated methods and tools to assist in managing the risks.	1	2	3	4	5
Other	1	2	3	4	5
Other	1	2	3	4	5

22. Do you believe that a generic approach can be used for the management of risks in business change?

YES	NO	Unsure

23. Please indicate any other important factor(s) to be taken into account in managing the risks in business change.

_____
_____
_____
_____
_____
_____
_____

THANK YOU FOR YOUR VALUABLE TIME AND EFFORT

17. Appendix J - Detailed descriptive statistics of responses

Question 1

C1

Mean	3.571429		
Median	4		
Standard Dev	1.15067		
Variance	1.324042		
Bin	1	<100	1
	2	101 to 500	9
	3	501 to 1000	7
	4	1001 to 5000	15
	5	Over 5000	10

Question 2

C2

Mean	3.738095		
Median	3		
Standard Dev	2.767931		
Variance	7.66144		
Bin	1	Manufacturing	17
	2	Distribution	2
	3	Retail	3
	4	Mining	2
	5	Financial Services	6
	6	Computer & Associated Services	2
	7	Engineering & Construction	3
	8	Other	7

Question 3

C3

Mean	3.095238		
Median	3		
Standard Dev	1.20587		
Variance	1.454123		
Bin	1	Have not	2
	2	<6 months	14
	3	<1 year	11
	4	<2 years	9
	5	<5 years	5
	6	>5 years	1

Question 4

C4

Mean	3.609756		
Median	4		
Standard Dev	0.7706507		
Variance	0.5939025		
Bin	1	Disaster	0
	2	Failure	3
	3	Inadequate	14
	4	Success	20
	5	Resounding Success	4

Question 5

Initiative Type	C7 Value-stream reinvention	C5 Continuous improvement	C6 Procedure redesign	C9 Strategic visioning	C8 Enterprise redesign	C10 Financial optimisation	C11 Other	C12 Other
Observations	22	20	20	19	18	7	5	1
Total	41	41	41	41	41	41	41	41
%	54%	49%	49%	46%	44%	17%	12%	2%

Question 6

Question 6

Initiative	C21 Reduce Over-heads	C14 BPR	C22 Stream-lining	C27 Empower-ment	C33 Strategic Manage-ment	C24 Outsour-cing	C23 Bench-markin g	C17 Right sizing	C25 Increas e sales	C20 Strategic Alliances	C31 Team work
Obser-vations	24	23	21	21	21	20	19	18	18	17	17
Total	41	41	41	41	41	41	41	41	41	41	41
%	59%	56%	51%	51%	51%	49%	46%	44%	44%	41%	41%

Question 6 continued

C13 TQM	C18 WCM	C32 Learning organi-sation	C26 ABC	C16 JIT	C30 MBWA	C28 Change in business direction	C19 TPM	C35 Other	C15 TOC	C29 Intrapre-neuring	C36 Other	C34 One-minute manag-ing
13	12	12	11	10	10	9	5	5	3	2	1	0
41	41	41	41	41	41	41	41	41	41	41	41	41
32%	29%	29%	27%	24%	24%	22%	12%	12%	7%	5%	2%	0%

Question 7 - see appendices L, M, N

Question 8

C65		
Mean	1.404762	
Median	1	
Standard Dev	0.4967958	
Variance	0.246806	
Bin	1 Yes	25
	2 No	17

Question 9

C66		
Mean	1.470588	
Median	1	
Standard Dev	0.5144957	
Variance	0.2647059	
Bin	1 Yes	9
	2 No	8

Question 10

C67		
Mean	1.44	
Median	1	
Standard Dev	0.5066228	
Variance	0.2566667	
Bin	1 Yes	14
	2 No	11

Question 11(A)

	C68 Need for improve-ment	C69 Generate alterna-tives	C70 Assess alterna-tives	C71 Select solution	C72 Develop solution	C73 Provide contin-gencies	C74 Implemen t solution	C75 Operate solution	C76 Phase-out
Yes	21	23	24	24	24	22	22	20	15
No	4	1		1	1	3	2	4	7
Should	4	1	1	0	1	3	2	4	7

Q11(B)	C77	C78	C79	C80	C81	C82	C83	C84	C85

Question 12(A)
Contingency Table

	(i)	(ii)	(iii)	(iv)	(v)	Total	Factor	Weight	Rank
C86	0	1	5	16	3	25	Risk analysis done in parallel with change analysis	96	3

Question 12(A)
Contingency Table

	(i)	(ii)	(iii)	(iv)	(v)	Total	Factor	Weight	Rank
C87	0	0	5	14	6	25	Use is made of appropriate qualitative and quantitative techniques	101	1
C88	0	0	3	18	4	25	Sufficient resources for implementation and contingencies	101	1
C89	1	4	9	10	1	25	Contingency plan(s) are accepted	81	7
C90	0	3	5	12	5	25	Regular review of benefits and risks during implementation	94	4
C91	1	4	5	11	4	25	Formal clear implementation plans are accepted	88	6
C92	1	0	9	13	2	25	Post implementation risk management plans	90	5
C93	4	2	13	4	2	25	Benefits and risks are known up-front	73	9
C94	2	2	11	8	2	25	Benefits and risks are clearly communicated	81	7
	9	16	65	106	29				

Question 12(B)
Contingency Table

	(i)	(ii)	(iii)	(iv)	(v)	Total	Factor	Weight	Rank
C95	0	0	0	15	10	25	Risk analysis done in parallel with change analysis	110	5
C96	0	0	0	12	13	25	Use is made of appropriate qualitative and quantitative techniques	113	1
C97	0	0	1	11	13	25	Sufficient resources for implementation and contingencies	112	2
C98	0	2	2	10	11	25	Contingency plan(s) are accepted	105	7
C99	0	0	1	11	13	25	Regular review of benefits and risks during implementation	112	2
C100	0	1	1	8	15	25	Formal clear implementation plans are accepted	112	2
C101	0	0	1	14	10	25	Post implementation risk management plans	109	6
C102	0	1	3	11	10	25	Benefits and risks are known up-front	105	7
C103	0	1	4	12	8	25	Benefits and risks are clearly communicated	102	9
	0	5	13	104	103				

Question 13(A)

	C125	C104	C112	C120	C124	C108	C128	C121	C107
Use of technique	Focus on delivering benefits to is	Ensure a vision	Strong committed leadership	Address employees' needs	Put performance measures	Align initiatives with	Ensure high level of	Up-front cost	Train resources in the required

Question 13(A)

	C125 customers	C104 establi-shed	C112	C120	C124 in place	C108 business strategy	C128 communi-cation	C121 benefit analysis	C107 skills
Observations	25	24	24	24	24	23	23	22	21
Total	25	25	25	25	25	25	25	25	25
%	100%	96%	96%	96%	96%	92%	92%	88%	84%

Question 13(A) continued

C109 Empower employees	C111 Plan for change manage-ment	C106 Ensure the techniqu e is fully under-stood	C119 Use suitable impleme ntation methods	C123 Change manage-ment paradigm s to suit new	C122 Under-stand risks and develop contin-gencies	C126 Focus on changing beha-viour	C130 Nurture and use leader-ship	C114 Use experien ced consul-tants	C127 Articulate compelling need for change
21	21	20	20	20	19	19	19	18	18
25	25	25	25	25	25	25	25	25	25
84%	84%	80%	80%	80%	76%	76%	76%	72%	72%

Question 13(A) continued

C113 Encourage creativity	C105 Manage risks through the complete life-cycle	C115 Test solutions before implemen tation	C132 Institu-tionalise new approaches	C131 Plan for short term wins	C118 Use a holistic approach	C116 Plan for results in 1 year	C129 Use modelling and simulation tools	C110 Limit time spent on understan-ding current situation	C117 Prevent scope creep
17	16	16	15	14	13	12	12	11	8
25	25	25	25	25	25	25	25	25	25
68%	64%	64%	60%	56%	52%	48%	48%	44%	32%

Question 13(B)

Contingency Table

	(i)	(ii)	(iii)	(iv)	(v)	Total	Factor	Weight	Rank
C125	0	0	3	13	9	25	Focus on delivering benefits to customers	106	1
C112	1	0	1	10	12	24	Strong committed leadership	104	2
C104	0	0	4	12	8	24	Ensure a vision is established	100	3
C124	0	2	3	11	8	24	Put performance measures in place	97	4
C108	0	0	5	9	9	23	Align initiatives with business strategy	96	5
C128	0	3	3	7	10	23	Ensure high level of communication	93	6
C121	0	2	2	10	8	22	Up-front cost benefit analysis	90	7
C120	0	1	10	9	4	24	Address employees' needs	88	8
C107	0	2	4	10	5	21	Train resources in the required skills	81	9
C111	0	1	5	11	4	21	Plan for change management	81	9
C119	0	0	5	11	4	20	Use suitable	79	11

Question 13(B)

Contingency Table

	(i)	(ii)	(iii)	(iv)	(v)	Total	Factor	Weight	Rank
C123	0	3	3	7	7	20	implementation methods Change management paradigms to suit new	78	12
C130	0	2	2	8	7	19	Nurture and use leadership	77	13
C126	0	1	4	8	6	19	Focus on changing behaviour	76	14
C127	0	1	1	9	7	18	Articulate compelling need for change	76	14
C109	0	2	7	10	2	21	Empower employees	75	16
C122	0	4	3	6	6	19	Understand risks and develop contingencies	71	17
C106	0	3	6	9	2	20	Ensure the technique is fully understood	70	18
C114	1	0	6	4	7	18	Use experienced consultants	70	18
C113	0	1	2	9	5	17	Encourage creativity	69	20
C115	0	1	3	7	5	16	Test solutions before implementation	64	21
C105	0	3	3	7	3	16	Manage risks through the complete life-cycle	58	22
C132	0	0	5	7	3	15	Institutionalise new approaches	58	22
C118	0	1	0	5	7	13	Use a holistic approach	57	24
C131	0	0	7	5	2	14	Plan for short term wins	51	25
C116	0	0	5	5	2	12	Plan for results in 1 year	45	26
C129	0	2	6	1	3	12	Use modelling and simulation tools	41	27
C110	0	3	4	4	0	11	Limit time spent on understanding current situation	34	28
C117	1	1	3	3	0	8	Prevent scope creep	24	29
Total	3	39	115	227	155	539			

Question 14(A)

Tool Type	C135 Scenario planning	C136 NPV	C137 IRR	C138 EMV	C139 RONA	C140 ROI	C141 Mathematical process modelling	C142 Simulation	C143 Linear programming
Observations	17	14	12	8	15	17	6	12	4
Total	24	24	24	24	24	24	24	24	24
%	71%	58%	50%	33%	63%	71%	25%	50%	17%

Question 14(A) continued

C144 Forecasting	C145 Utility theory	C146 CAPM	C147 APT	C148 OPT	C149 Burke-Litwin	C150 OPT	C151 Unwritten rules	C152 McDonald	C153 Insurance
22	0	5	2	2	3	2	1	1	11
24	24	24	24	24	24	24	24	24	24
92%	0%	21%	8%	8%	13%	8%	4%	4%	46%

Question 14(A) continued

C154 Hedging	C155 Systems reliability analysis	C156 Portfolio management	C157 Excess liquid assets	C158 Contingency management	C159 LCA	C160 Market research	C161 Value engineering	C162 Ring-fencing	C163 Contracting	C164 Outsourcing
8	4	11	1	8	2	21	7	1	12	14
24	24	24	24	24	24	24	24	24	24	24
33%	17%	46%	4%	33%	8%	88%	29%	4%	50%	58%

Question 14(B)

Contingency Table (Refitted)

	(i)	(ii)	(iii)	(iv)	(v)	Total	Tool	Weight	Rank
C160	0	1	2	5	13	21	Market research	93	1
C144	0	0	5	10	7	22	Forecasting	90	2
C135	0	0	4	7	6	17	Scenario planning	70	3
C140	0	4	1	3	9	17	ROI	68	4
C139	0	0	1	12	2	15	RONA	61	5
C136	0	2	1	8	3	14	NPV	54	6
C164	0	1	5	6	2	14	Outsourcing	51	7
C163	0	0	2	8	2	12	Contracting	48	8
C137	0	2	1	5	4	12	IRR	47	9
C156	0	0	1	6	4	11	Portfolio management	47	9
C142	0	0	4	8	0	12	Simulation	44	11
C153	0	0	3	5	3	11	Insurance	44	11
C138	0	0	0	6	2	8	EMV	34	13
C158	0	0	2	5	1	8	Contingency management	31	14
C154	0	0	3	4	1	8	Hedging	30	15
C161	0	0	1	4	2	7	Value engineering	29	16
C141	0	0	2	3	1	6	Mathematical process modelling	23	17
C146	1	0	0	3	1	5	CAPM	18	18
C155	0	0	2	1	1	4	Systems reliability analysis	15	19
C143	0	1	2	0	1	4	Linear programming	13	20
C149	0	0	1	1	1	3	Burke-Litwin	12	21
C159	0	0	0	0	2	2	LCA	10	22
C148	0	0	0	1	1	2	OPT	9	23
C147	1	0	0	1	0	2	APT	5	24
C151	0	0	0	0	1	1	Unwritten rules	5	24
C152	0	0	0	1	0	1	McDonald	4	26
C157	0	0	0	1	0	1	Excess liquid assets	4	26
C162	0	0	1	0	0	1	Ring-fencing	3	28
C145	0	0	0	0	0	0	Utility theory	0	29
	2	11	44	114	70				

Question 15 - See appendix N

Question 16

C167

Mean	1.619048
Median	1
Standard Dev	0.7635725

Question 17

C168

Mean	1.571429
Median	1
Standard Dev	0.8006966

Question 16

Variance	0.583043	
Bin	1 Yes	23
	2 No	12
	3 Unsure	7

Question 17

Variance	0.641115	
Bin	1 Yes	26
	2 No	8
	3 Unsure	8

Question 18

Contingency Table

	(i)	(ii)	(iii)	(iv)	(v)	Total	Benefit	Weight	Rank
C171	1	3	6	14	18	42	Facilitates change management	171	1
C169	1	1	7	20	13	42	Problems identified and contingencies put in place	169	2
C174	1	0	5	29	7	42	Provides longer term focus	167	3
C175	2	2	12	9	17	42	Minimises exposure to failure	163	4
C170	1	2	11	23	5	42	Facilitates understanding of complexity	155	5
C173	1	5	9	20	7	42	Develops responsible culture	153	6
C172	1	3	19	13	6	42	Provides unbiased holistic evaluation	146	7
C176	3	9	12	12	6	42	Audit trail for decision-making	135	8
C177	3	7	14	16	2	42	Encourages higher level of risk taking	133	9
	14	32	95	156	81				

Question 19

Contingency Table

	(i)	(ii)	(iii)	(iv)	(v)	Total	Problems	Weight	Rank
C181	0	2	8	29	3	42	Lost solutions due to high risk	159	1
C182	0	2	14	18	8	42	Additional effort, skills, time	158	2
C180	0	3	17	20	2	42	Limit creativity	147	3
C184	2	5	13	16	6	42	No suitable integrated methods and tools	145	4
C183	1	7	11	21	2	42	Another dimension of complexity	142	5
	3	19	63	104	21				

Question 20

C187

Mean	1.690476	
Median	2	
Standard Dev	0.7804969	
Variance	0.6091754	
Bin	1 Yes	21
	2 No	13
	3 Unsure	8

18. Appendix K - Question 7 - Contingency table

	(i)	(ii)	(iii)	(iv)	(v)	Total (n)
C37	1	3	9	25	4	42
C38	1	8	13	18	2	42
C39	0	0	2	5	35	42
C40	0	2	8	24	8	42
C41	0	0	10	22	10	42
C42	0	2	6	13	21	42
C43	1	2	11	23	5	42
C44	0	0	9	19	14	42
C45	0	1	7	19	15	42
C46	0	1	9	24	8	42
C47	0	0	4	15	23	42
C48	0	1	3	11	27	42
C49	0	2	1	14	25	42
C50	0	1	4	20	17	42
C51	0	1	4	10	27	42
C52	2	3	15	15	7	42
C53	1	3	22	15	1	42
C54	0	2	3	21	16	42
C55	0	0	6	22	14	42
C56	0	2	11	24	5	42
C57	0	0	0	15	27	42
C58	0	0	3	17	22	42
C59	0	1	4	25	12	42
C60	1	1	14	20	6	42
C61	1	7	19	11	4	42
C62	0	0	4	23	15	42
Total	8	43	201	470	370	

19. Appendix L - Question 7 - Correspondence analysis

Eigenvalue Report

Variables:	#1:#5			
Coord	Eigenvalue	Percent Individual	→ Cumulative	Histogram
1	0.25094	73.12	73.12	
2	0.06003	17.49	90.61	
3	0.024132	7.03	97.65	
4	0.008078	2.35	100	
Total	0.34318			
Root	0.585816			

Detail Report - Rows

Variables: #1:#5								
		Co-ordinate		Contribution		Sq. Correl.		
Label	Wght	F1	F2	CTR1	CTR2	COR1	COR2	
Row 1	38	473	184	34	22	731	110	
Row 2	38	810	-324	100	67	688	110	
Row 3	38	-944	-431	136	119	813	169	
Row 4	38	220	238	7	36	401	469	
Row 5	38	133	243	3	38	158	525	
Row 6	38	-286	-202	13	26	635	318	
Row 7	38	455	145	32	13	841	85	
Row 8	38	-32	124	0	10	19	290	
Row 9	38	-84	82	1	4	409	390	
Row 10	38	212	281	7	50	346	608	
Row 11	38	-473	-31	34	1	969	4	
Row 12	38	-605	-235	56	35	869	131	
Row 13	38	-552	-156	47	16	835	67	
Row 14	38	-229	126	8	10	710	214	
Row 15	38	-580	-276	52	49	810	184	
Row 16	38	574	-275	50	48	645	148	
Row 17	38	904	-235	125	35	822	55	
Row 18	38	-186	123	5	10	367	160	
Row 19	38	-107	248	2	39	150	807	
Row 20	38	400	234	25	35	694	237	
Row 21	38	-713	-26	78	0	986	1	
Row 22	38	-463	51	33	2	982	12	
Row 23	38	-54	327	0	69	23	837	
Row 24	38	462	65	33	3	756	15	
Row 25	38	857	-569	113	208	679	300	
Row 26	38	-192	291	6	54	302	691	

Note: All numbers were multiplied by 1000 .

Detailed Report - Columns

Variables: #1:#5								
		Co-ordinate		Contribution		Sq. Correl.		
Label	Wght	G1	G2	CTR1	CTR2	COR1	COR2	
C1	7	1275	-655	47	52	531	140	
C2	39	815	-610	104	244	473	265	
C3	184	644	-167	305	86	846	57	

Variables:	#1:#5							
		Co-ordinate		Contribution		Sq. Correl.		
Label	**Wght**	**G1**	**G2**	**CTR1**	**CTR2**	**COR1**	**COR2**	
C4		430	117	260	23	484	162	801
C5		339	-621	-154	520	134	941	58
Note: All numbers were multiplied by 1000 .								

20. Appendix M - Question 7 - Transformed data: Descriptive statistics and factor analysis

Descriptive Statistics

Variable	Mean	Standard Deviation	Communality
C37	3.189619	0.864007	0.38492
C38	2.834214	0.836421	0.39859
C39	4.687547	0.736969	0.56789
C40	3.457619	0.905496	0.10426
C41	3.548953	0.938817	0.44337
C42	3.9925	1.104161	0.53791
C43	3.20881	0.906984	0.54036
C44	3.723714	1.009211	0.47729
C45	3.778667	1.017614	0.63913
C46	3.466214	0.892653	0.67851
C47	4.189738	0.953606	0.49794
C48	4.329429	0.966921	0.43533
C49	4.273167	0.953003	0.5539
C50	3.932238	0.9662	0.56374
C51	4.302953	1.006211	0.54657
C52	3.282738	1.184644	0.39808
C53	2.734215	0.715777	0.30183
C54	3.886572	0.969955	0.65381
C55	3.803143	0.935887	0.42333
C56	3.266976	0.837554	0.25687
C57	4.443928	0.755092	0.44413
C58	4.179142	0.914424	0.47362
C59	3.746881	0.887975	0.7631
C60	3.201523	0.956952	0.45597
C61	2.784571	0.938856	0.4176
C62	3.893167	0.894408	0.57514

Eigen Value Summary

No.	Eigenvalue	Percent	Cumulative Percent
1	6.107	23.49	23.49
2	2.7612	10.62	34.11
3	1.9932	7.67	41.77
4	1.6719	6.43	48.2
5	1.5598	6	54.2
6	1.3417	5.16	59.36
7	1.3165	5.06	64.43
8	1.1976	4.61	69.03
9	1.0337	3.98	73.01
10	0.9143	3.52	76.53
11	0.85	3.27	79.8
12	0.8303	3.19	82.99
13	0.7646	2.94	85.93
14	0.6043	2.32	88.25
15	0.5313	2.04	90.3
16	0.5198	2	92.3
17	0.4002	1.54	93.84

No.	Eigenvalue	Percent	Cumulative Percent
18	0.3669	1.41	95.25
19	0.2995	1.15	96.4
20	0.2489	0.96	97.36
21	0.231	0.89	98.24
22	0.1398	0.54	98.78
23	0.1106	0.43	99.21
24	0.0957	0.37	99.58
25	0.0699	0.27	99.84
26	0.0404	0.16	100

Rotated Factor Loadings

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Communality
C37	0.3518	0.1261	0.393	-0.3013	0.3849
C38	0.0924	0.1176	-0.1744	0.5881	0.3986
C39	0.099	0.2315	0.6827	-0.1962	0.5679
C40	0.0115	-0.054	0.3178	0.0151	0.1043
C41	-0.221	0.3992	0.3404	0.3454	0.4434
C42	0.6785	0.19	0.1452	0.1429	0.5379
C43	-0.0334	0.6715	-0.0244	0.2962	0.5404
C44	0.1152	0.4138	0.2256	0.4919	0.4773
C45	0.7792	0.1179	0.09	0.0999	0.6391
C46	0.7443	0.1748	-0.2595	-0.1633	0.6785
C47	0.1771	0.4167	0.3322	0.4273	0.4979
C48	0.4777	0.1055	0.4059	0.1769	0.4353
C49	0.1638	0.0892	0.7075	0.1362	0.5539
C50	0.5154	-0.2696	0.3325	0.339	0.5637
C51	0.1285	0.0667	0.3449	0.6377	0.5466
C52	0.5542	0.1292	0.2641	0.0675	0.3981
C53	0.278	-0.0125	0.3604	0.3074	0.3018
C54	0.7535	-0.1115	0.2702	0.0259	0.6538
C55	0.4499	0.1781	-0.16	0.4044	0.4233
C56	0.0871	0.0548	-0.0569	0.493	0.2569
C57	0.3467	0.5187	0.23	0.0442	0.4441
C58	0.4365	0.0121	0.5316	-0.0208	0.4736
C59	0.0925	0.8618	0.0453	-0.0993	0.7631
C60	0.1882	0.6053	0.0384	0.2295	0.456
C61	-0.2467	0.1523	0.2611	0.5152	0.4176
C62	0.0694	0.2395	0.6962	0.168	0.5751

21. Appendix N - Products used in risk management practice

The following is a list of products that respondents indicated were used in support of their risk management practices:

Product[1]	Tools/methods[2]
• Internally developed • SAP • Lotus • Sims, Soprano • Use consultants • MS Excel • Rochade Repository • Super Project • MS Project • IAA • Various software packages	• Source co. • McKinsey methods • Forecasting • Market research • Outsourcing • Value engineering • NPV/RONA • Simulation • Market research (Perry & Associates) • Scenario planning (Pierce & Robertson) • IRR • ROI • Insurance (Ratio: internal to external) • Portfolio management (BCG) • Linear modelling • Financial modelling • Proudfoot methods and tools • Delloite and Touche methods and tools • Strategic planning • Hedging • Business modelling

[1] Many respondents indicated that supporting systems were internally developed. These have not been repeated.

[2] This list is the union of all methods and tools provided by respondents. Similar replies have not been repeated.

22. Appendix O - Tables for randomised block design on question 7

The following table summarises the cross tabulation of the risks per sector. The values have been averaged to do a sector on sector comparison.

RISK	SECTOR								
Norm:	Manufacturing	Distribution	Retail	Mining	Financial	Computers	Engineering	Other	Totals
Mis-use of technique	3.6	3.5	2.7	4.0	3.8	4.0	4.0	3.9	29.4
Too much time analysing current	3.2	2.0	3.7	2.0	3.7	3.0	4.3	3.4	25.3
Lack of top management commitment	4.9	4.5	4.3	4.5	5.0	5.0	4.3	4.9	37.4
Mis-alignment of technique and paradigm	3.8	3.5	4.0	4.5	3.8	3.5	4.3	4.1	31.6
Poor attention to innovation	4.0	4.0	3.7	3.5	4.5	3.5	3.7	4.1	31.0
Implement without testing	4.4	3.5	4.7	4.5	4.2	5.0	3.7	4.1	34.0
Initiative too slow	3.9	3.5	3.0	2.5	4.0	3.0	3.7	3.9	27.4
Not consider holistic issues	4.1	3.5	4.0	3.5	4.7	3.5	4.0	4.3	31.6
Inappropriate implementation method	4.4	3.5	4.0	4.0	4.0	4.5	3.3	4.0	31.7
Inappropriate tools	3.9	3.5	4.3	4.0	3.7	4.0	4.3	4.3	32.1
Ignore employee concerns	4.4	4.5	4.7	4.0	4.8	4.5	3.7	4.7	35.2
No focus on financial implications	4.6	3.5	4.7	4.0	4.7	5.0	3.7	4.7	34.9
Poor vision	4.5	3.5	3.7	4.5	4.8	4.5	4.3	4.9	34.7
Mis-alignment with strategy	4.3	4.0	5.0	3.5	4.3	5.0	3.3	4.3	33.7
Lack of customer focus	4.5	3.5	5.0	3.5	4.8	5.0	4.3	4.6	35.2
No use of experienced specialists	3.7	3.0	3.3	4.0	3.5	4.5	3.0	3.1	28.2
Aim for minimal gains	3.1	2.5	3.3	3.0	4.0	3.5	3.3	3.6	26.3
Failure to appreciate risks	4.2	3.5	4.7	3.5	4.3	5.0	3.7	4.3	33.2
Not anticipating effort and energy	4.2	4.0	4.3	3.5	4.8	3.5	3.7	4.1	32.2
Take on too much	4.0	3.0	3.7	3.5	4.0	3.5	3.0	3.7	28.4
Poor communication	4.6	4.5	4.7	4.5	4.8	4.0	4.0	5.0	36.1
Poor change management attention	4.4	4.0	4.7	4.0	4.5	5.0	4.3	4.6	35.5
No sense of urgency	4.2	4.5	4.0	3.5	4.2	3.5	4.0	4.3	32.2
No plan for short term success	3.8	4.0	3.7	2.5	3.7	3.0	3.0	3.9	27.5
Declaring success too soon	3.1	4.0	3.3	2.5	4.3	2.5	2.3	3.1	25.3
Not anchoring changes in culture	4.2	4.5	3.7	3.5	5.0	4.5	4.0	4.1	33.5
	106.1	95.5	104.7	94.5	112.0	105.5	97.3	108.0	823.6

The following table summarises the cross tabulation of the risks per business change. The values have been averaged to do a business change on business change comparison.

	SECTOR						
Norm:	Continuous improvement	Procedure redesign	Value-stream reinvention	Enterprise redesign	Strategic visioning	Financial optimisation	Totals
Mis-use of technique	4.0	4.1	3.9	3.7	3.5	3.7	22.9
Too much time analysing current	3.2	3.4	3.3	3.6	3.4	3.9	20.7
Lack of top management commitment	4.9	5.0	4.9	4.7	4.8	4.6	28.8
Mis-alignment of technique and paradigm	4.0	3.3	3.9	3.8	3.9	3.9	22.6
Poor attention to innovation	4.1	4.0	3.9	4.2	4.1	4.1	24.4
Implement without testing	4.1	4.5	4.5	4.4	4.2	4.9	26.6
Initiative too slow	3.8	3.7	3.7	3.6	3.5	3.4	21.6
Not consider holistic issues	4.2	4.1	4.2	4.3	4.1	4.6	25.4
Inappropriate implementation method	4.1	4.4	4.4	4.3	4.0	4.4	25.6
Inappropriate tools	3.9	4.1	3.0	3.8	3.8	4.0	22.5
Ignore employee concerns	4.6	4.5	4.5	4.5	4.6	4.7	27.3
No focus on financial implications	4.3	4.6	4.7	4.9	4.7	4.9	28.1
Poor vision	4.4	4.7	4.5	4.7	4.6	4.6	27.4
Mis-alignment with strategy	4.1	4.4	4.4	4.3	4.5	4.6	26.2
Lack of customer focus	4.2	4.6	4.7	4.6	4.7	4.7	27.4
No use of experienced specialists	3.2	4.0	3.8	3.1	3.3	3.9	21.2
Aim for minimal gains	3.3	3.6	3.5	3.3	3.5	3.7	20.8
Failure to appreciate risks	4.1	4.4	4.6	4.2	4.4	4.6	26.3
Not anticipating effort and energy	4.3	4.3	4.2	4.4	4.4	4.9	26.3
Take on too much	3.9	3.7	3.7	4.1	3.9	4.0	23.1
Poor communication	4.7	4.7	4.7	4.7	4.7	4.7	28.1
Poor change management attention	4.4	4.6	4.5	4.5	4.6	4.6	27.2
No sense of urgency	4.3	4.2	4.2	3.9	3.9	3.9	24.4
No plan for short term success	3.5	3.8	3.7	3.6	3.5	3.7	21.7
Declaring success too soon	3.1	3.3	3.3	3.4	3.3	3.4	19.9
Not anchoring changes in culture	4.3	4.4	4.3	4.4	4.3	4.3	26.0
	104.4	107.9	106.8	107.2	106.2	110.4	642.8

23. Appendix P - Software

The research has put forward a framework for the management of risk in business change. As this theory has new requirements it is important to understand what support is available regarding the successful implementation of the framework. This thesis provides the method, but computer support is required to accelerate the process as well as provide the appropriate level of information management assistance.

This appendix aims to disseminate the information system requirements of the purported framework, evaluate software products commercially available and put forward the ideal software profile.

23.1 Overview design

The ideal software environment for a risk management system is shown in Figure 102.

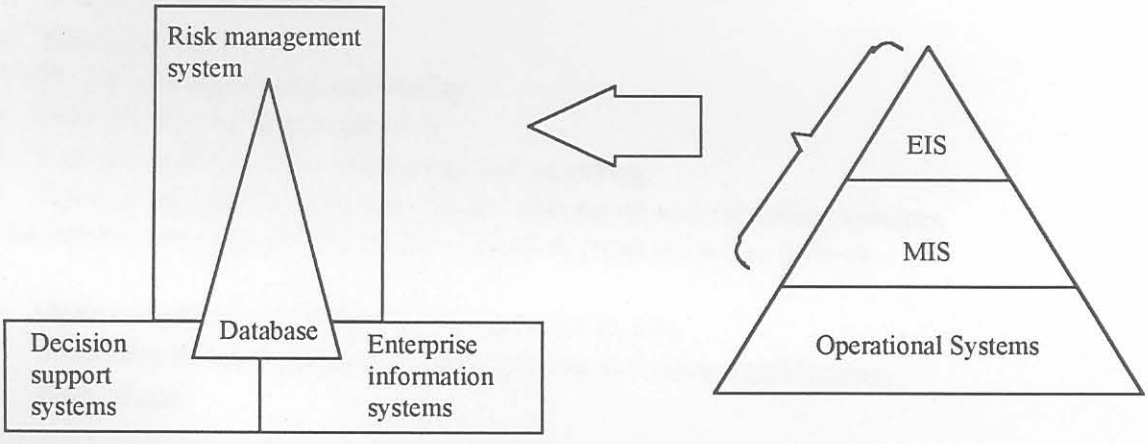


Figure 102 - Ideal Software Architecture for Risk Management System

From Figure 102 the enterprise information systems provide the management information from the various areas internally and externally to the organisation. These represent the management information systems (MIS) and the executive information systems (EIS). Modelling for decision support is achieved by the decision support systems (DSS) which integrate with the enterprise information systems. Integration is typically achieved via a database or other form of sophisticated data warehouse. This provides the "bus" for integration sharing with a range of specialised systems, such as a risk management system.

The risk management system in itself is constituent of a management information system and a set of decision support systems. In terms of the framework requirements as set out in this study, the risk architecture of the risk management system should be comprised as shown in Figure 103.

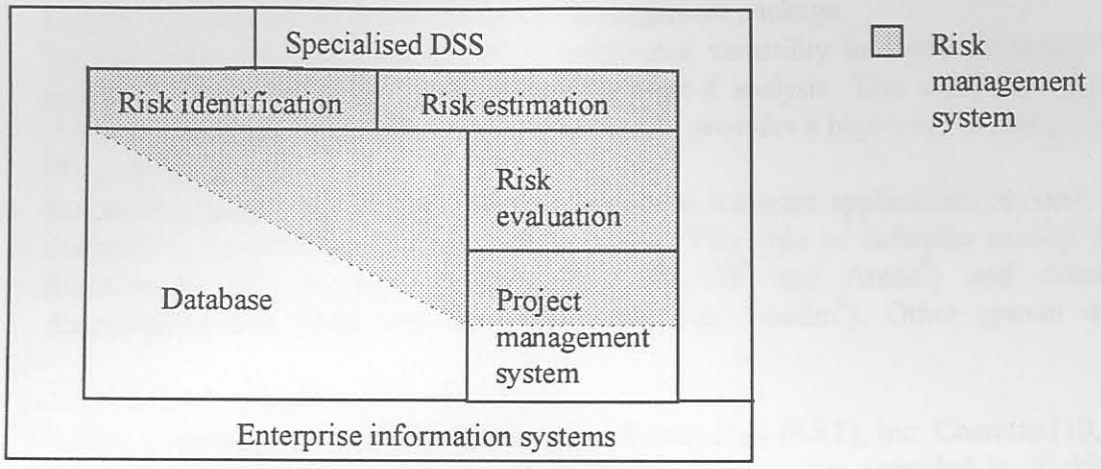


Figure 103 - Composition of the Risk Management System

The core of the risk management system is shown in Figure 103. In general, the core system includes the framework components as described in chapter 4, while the more specialist components e.g. simulation modelling should be left to specialist software packages.

23.2 Criteria

The major areas of functionality required by the risk management system are:

- Documentation of strategic architecture.
- Stakeholder analysis.
- Scenario documentation.
- Business driver analysis.
- Causal loop analysis.
- Stock and flow analysis.
- Listing of risks.
- Problem/opportunity definition.
- Project definition.
- Risk estimation scorecard.
- Life cycle analysis.
- Rating functions.
- Risk management action descriptions.
- Risk evaluation scorecard.
- Risk portfolios
- Project management functionality.
- Risk philosophy documentation
- Executive information monitoring and reporting.
- Open to integration with specialised information and modelling systems.

The functionality requirements of the auxiliary modules are as follows:

- Open integration with the risk management system.
- Suitability of tool/system to model the situation under consideration.
- Ease of use.

23.3 Available software

As the framework presented in chapter 4 has not been put forward previously, it follows that it is unlikely that an appropriate integrated system exists which will support this framework. This section therefore aims to describe the types of available software and highlight examples where appropriate. These types are listed and described as follows:

- **Risk management software**: During this study very few risk management software offerings were found. Risk management software refers to software that caters for the full compliment of management actions from analysis through to monitoring and control. RiskPro[1] is the only comprehensive package that was found during this study. RiskMetrics[2] is specialist software that focuses on global market risk. It is therefore an analysis application and not an integrated management package.
- **Spreadsheets**: Spreadsheets provide considerable versatility in terms of modelling and reporting. It is also powerful in performing what-if analysis. This study used Excel[3] to model the estimation and evaluation scorecards. It provides a high-level of integration with PC based products.
- **Simulation software**: A wide range of simulation software applications abound. System dynamics software is included in this grouping. This type of software usually provides functionality like process modelling (e.g. SLAM[4] and Arena[5]) and causal loop diagramming and stock and flow modelling (e.g. Vensim[6]). Other system dynamics

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[1] RiskPro is the trademark of Risk Services and Technology (RST), Inc. Charette [10, 65, 66] is a specialist consultant associated with RST. The functionality provided by RiskPro is as follows:

- Analysis:
  - Identify potential risks through a knowledgebase of risk factors
  - Estimate risks and their magnitude
  - Evaluate the consequence of risk, including prioritisation
- Reports:
  - Root cause analysis
  - Cost benefit analysis
  - Risk alternatives reporting
  - Risk management planning
  - Schedule impacts
  - Risk breakdowns by phase, organisation and severity
- Managing:
  - Standards against which performance can be measured
  - Information to monitor actual performance
  - A database of risk aversion strategies and tactics

[2] © JP Morgan
[3] © Microsoft corporation.
[4] © Pritsker and Associates.
[5] © Systems Modelling Corporation.
[6] © Ventana Systems, Inc.

modelling packages include Stella[1], Ithink[2], Dynamo[3] and Powersim[4]. A spreadsheet add-in package @Risk[5] specialises in risk analysis and limited simulation.

- **Mathematical modelling**: Some advanced analysis can be undertaken using mathematical modelling packages like Mathematica[6]. An example is the use of Markovian modelling where partial differential equations need to be resolved.
- **Statistical packages**: Statistical packages are used extensively in the analysis of risks. They are applied primarily for forecasting, market research and the derivation of probabilities for analysis like decision trees. NCSS[7] is an example of a functionally rich statistical package.
- **Cultural assessment software**: In recent times a range of cultural assessment packages have emerged. These are typically aimed at analysing the organisation in order to facilitate the change management process. Examples of these analyses include organisational readiness assessments for change. They tend to have a human resources slant[8].
- **Process modelling software**: A very broad range of business process modelling software exists. The primary reason behind this is that business process models form the core of many types of analysis. This includes activities as diverse as BPR, simulation modelling, information systems modelling, embedded systems modelling, business analysis, etc. The format of the models are usually dependent on the use of the models. A typical format could be based on IDEF rules. An example of process modelling is BDF[9].
- **Project management software**: Project management systems range significantly in complexity. In the risk management environment only elementary project management functionality is required and a software package like MS-Project[10] would be suitable.
- **Programming languages**: Programming languages are always a last option of ensuring an application suits the needs of the method. This as an intermediate measure is undesirable. It may however, be feasible if developed for long term and recursive use applications.
- **Database management systems** (DBMS): These systems are strong in the database intensive environment, but usually provide a limited account of functional capability. An example of this is Access[11].
- **Management information systems**: These are the enterprise information systems that accumulate corporate information in order to provide for management monitoring and reporting as shown in Figure 102. SAP[12] is an example of an enterprise requirements planning (ERP) system used by a respondent (see market research) to help manage risk.
- **Executive information systems**: EIS is the high level information system that provides for executive level information both [67] internally and externally to the organisation. It is

[1] © High Performance Systems.
[2] © High Performance Systems.
[3] © Pugh-Roberts Associates.
[4] © Powersim AS (Norway).
[5] © Palisade Corporation (@Risk is a spreadsheet add-in).
[6] © Wolfram Research.
[7] © Dr Jerry L Hintze.
[8] Wizdom Systems, Inc.
[9] BDF from James Martin and Company not only models processes, but does elementary simulations as well.
[10] © Microsoft Corporation.
[11] © Microsoft Corporation.
[12] © SAP AG.

typically the system ideal for the monitoring of the risk management portfolio, its exposure and its progress against targets and objectives.

- **Diagramming software**: While having no or very limited intelligence, diagramming software allows for the visual representation of mindsets and logic. An example of this is the use of PowerPoint[1] to represent cause-effect relationships.

The above list reveals the wide range of software that could be utilised. While it is possible to use software in isolation, this will be sub-optimal. The ideal situation will be the development of software better suited to the framework purported in the study.

23.4 Software development

Since the development of the framework, it has been applied in another consulting engagement. In order to facilitate its execution, the development of some supporting software was required. This was achieved using a combination of Access[2], Visual Basic (VB)[2], Excel[2] and Word[2]. The database and key risk management components (see Figure 102) were developed with the aide of Access and VB. Reporting and data manipulation for summary purposes is done via Excel. The detailed risk profiles are maintained in Word. Vensim is used for modelling the relationships between risks, but this is not integrated.

The system currently provides key support but is not robust enough for commercial purposes or to provide advanced levels of assistance. A need for a more advanced development is still therefore required. It is recommended that specialist analysis software should be employed, but this must also seamlessly integrate with the risk management software.

23.5 Conclusion

This appendix identified the overview requirements of a supporting computer system that will address the information management and advanced analysis needs of the integrated risk management framework. Current commercial offerings were reviewed and assessed against these requirements. It was found that no single package is able to provide a solution, but that a combination of packages and system development is required.

The researcher has developed a system that supports the required functionality. It is not sufficiently robust for commercial purposes and some work in this regard would therefore be required.

[1] © Microsoft Corporation.
[2] © Microsoft Corporation.

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