CHAPTER 3: METHODOLOGICAL APPROACH

3.1 INTRODUCTION

Walsh (2001:1) argues that a research investigation involves the application of a particular way of thinking and the use of an identifiable range of particular skills and activities. The aim of this chapter is to describe the rationale for the application of the methodologies set out in Chapter 4.

According to Bechhofer (cited in Ali, 1998:3), "the research process is not a clear-cut sequence of procedures following a neat pattern but a messy interaction between the conceptual and empirical world, deduction and induction occurring at the same time". Pettigrew (cited in Ali, 1998:4) describes the research process as "characterised in the language of muddling through, incrementalism, and political process rather than as a rational, foresight, goal-directed activity". It is clear from these statements that research is often not a clear-cut process, neither when appropriate research questions have to be determined nor when an appropriate research methodology is to be chosen. Becker (cited in Ali, 1998:4) believes that "the finished monograph is the result of hundreds of decisions, large and small, made while the research is under way" and that "research is designed in the course of its execution". Despite these views, it is still important to ensure that researchers do their research in as controlled, rigorous and systematic a way as possible (Walsh, 2001:2).

According to Kumar (cited in Walsh, 2001:2), it is therefore important that research investigations should follow a process that

- is undertaken within a clear philosophical framework;
- uses procedures, methods and techniques that are evaluated for their validity and reliability; and
- is designed to be unbiased and objective.

According to Singleton, Straits, Straits and McAllister (1988:94), the following stages are relevant with regard to conducting social research:

- the selection and formulation of the research problem;
- the preparation of the research design;

- measurement;
- sampling;
- data collection;
- data processing; and
- data analysis and interpretation.

The application of these steps is discussed in Chapter 4.

3.1.1 Social science research

According to Singleton *et al.* (1988:7), scientific social research consists of two components, namely social and scientific components. First, the social component exists since the study involves people – how they act, think, feel and interact with one another. Second, it is scientific when the research is empirical (based on observation). On the basis of the nature of the research questions asked in this study, it is fair to argue that this study was conducted in the social science research field.

According to Neuman (1997:62), there are three different approaches to social sciences research, namely **positivism, interpretive social science** and **critical social science**.

Positivist social science is an approach used in the natural sciences. According to Neuman (1997:63), "positivism sees social science as an organized method for combining deductive logic with precise empirical observations of individual behaviour in order to discover and confirm a set of probabilistic causal laws that can be used to predict general patterns of human activity". The same writer defines the **interpretative approach** as "the systematic analysis of socially meaningful action through the direct detailed observation of people in natural settings in order to arrive at understandings and interpretations of how people create and maintain their social worlds" (Neuman, 1997:74). **Critical social science** is the third type of methodology that can be applied. Neuman (1997:74) defines it as "a critical process of inquiry that goes beyond surface illusions to uncover the real structures in the material world in order to help people change conditions and build a better world for themselves". Table 3.1 contains a summary of the differences between the three approaches.

Table 3.1: Comparison between positivism, interpretive social science and critical social science

	Positivism	Interpretive social science	Critical social science
1. Reason for research	To discover natural laws so people can predict and control events	To understand and describe meaningful social action	To refute myths and empower people to radically change society
2. Nature of social reality	Stable pre-existing patterns or order that can be discovered	Fluid definitions of a situation created by human interaction	Conflict fuelled and governed by hidden underlying structures
3. Nature of human beings	Self-interested and rational individuals who are shaped by external forces	Social beings who create meaning and who constantly make sense of their worlds	Creative, adaptive people with unrealised potential, trapped by illusion and exploitation
4. Role of common sense	Clearly distinct from and less valid than science	Powerful everyday theories used by ordinary people	False beliefs that hide power and objective conditions
5. Theory looks like	A logical, deductive system of interconnected definitions, axioms, and laws	A description of how a group's meaning system is generated and sustained	A critique that reveals true conditions and helps people see the way to a better world
6. An explanation that is true	Is logically connected to laws and based on facts	Resonates or feels right to those who are being studied	Supplies people with tools needed to change the world
7. Good evidence	Is based on precise observations that others can repeat	Is embedded in the context of fluid social interactions	Is formed by a theory that unveils illusions
8. Place for values	Science is value free, and values have no place except when choosing a topic	Values are an integral part of social life: no group's values are wrong, values only differ	All science must begin with a value proposition; some positions are right, some are wrong

Source: Adapted from Neuman (1997:83)

This research has a definite bias towards the **interpretative social science methodology,** since it is in essence a study of social behaviour or change dynamics within the context of the project configuration. It is based on the premise that, as Weber (cited in Neuman, 1997:68) argues, the social sciences need to study meaningful social action or social action with a purpose. He emphasised the need to study and learn the personal reasons or motives that shape a person's feelings, which in turn influence a person's decision to act in a particular way.

However, a component of the research can also be considered **positivist** in that deductive logic is used in tandem with empirical research (within the context or relevant theory) with regard to

what constitutes change dynamics in project management and also the design of a measuring instrument for change dynamics in project management.

3.1.2 Empiricism in the social sciences

Empirical research in the social sciences has always been a topic of rigorous debate as to whether social research is indeed on a par with natural sciences research and whether it can be considered objective and scientific. However, Krausz and Miller (1974:3) state that the social research procedure is indeed a scientific enterprise and strives "after objectively derived facts about the real world, and the systematic organisation of these facts into general explanations (theories) of social behaviour".

In Figure 3.1, Cook and Hunsaker (2001:A-8) depict the process of scientific research as applied to the study of organisational behaviour.

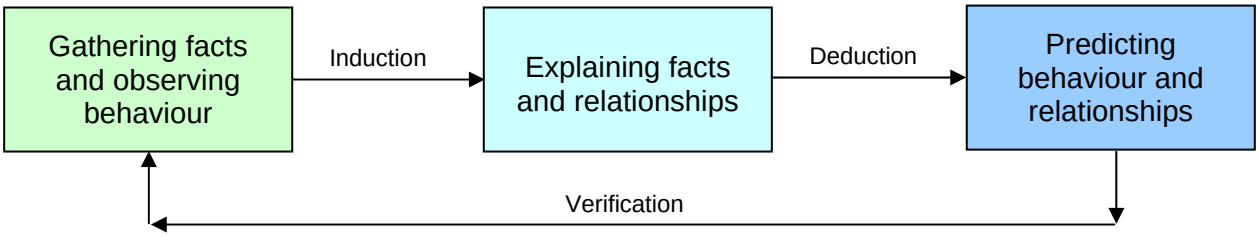

Figure 3.1: Process of scientific behaviour for the study of organisational behaviour
Source: Cook & Hunsaker (2001:A-8)

According to Cook and Hunsaker (2001), the scientific method uses a theory to guide systematic, empirical research from which generalisations can be made to influence the application of the theory. The scientific method therefore draws on facts underpinned by relevant theory, instead of on intuition and *ad hoc* observations. These authors conclude that "although the behavioural sciences may appear to lack the universal precision of the physical sciences, they all embrace the fundamentals of the scientific method" (Cook & Hunsaker, 2001:A-8).

3.2 RESEARCH METHODS

Once the area of study had been chosen, a topic has been selected and research questions have been defined, it is time to decide on an appropriate research approach. Kolb's experiential learning cycle explains the theoretical basis of the research, as is shown in Figure 3.2:

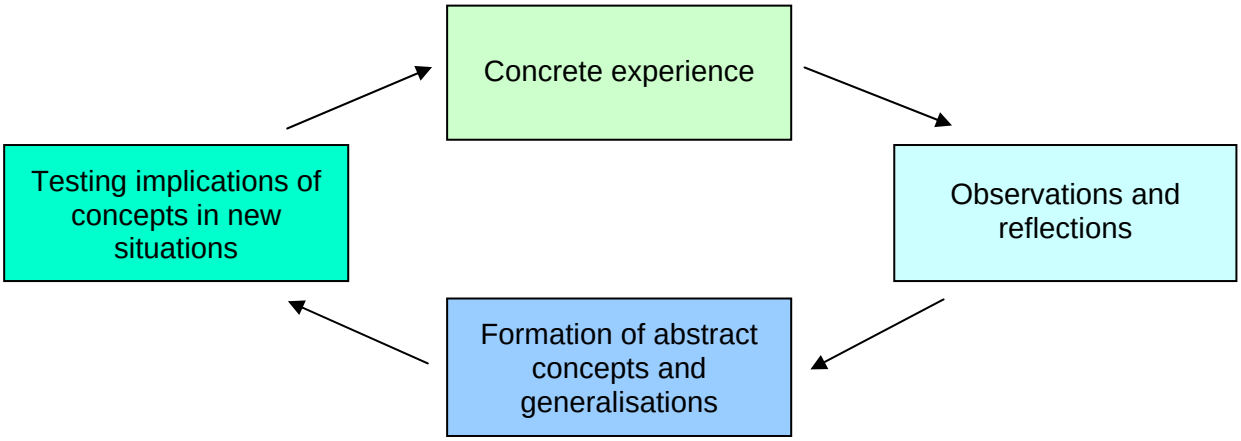

Figure 3.2: Kolb's experiential learning cycle
Source: cited in Ali (1998:5)

This figure suggests that Kolb's processes should be seen as attempts at constructing and evaluating explanatory statements or theories about what is happening around us. This enables us to differentiate between research methods that are deductive (based on logic) and those that are inductive (based on empirical evidence) (Gill & Johnson, cited in Ali, 1998:5).

3.2.1 Inductive and deductive reasoning

According to Neuman (1997:46), researchers normally approach the building and testing of theory from two possible directions. Some theories begin with abstract thinking, relate theoretical ideas to concrete evidence and then test the ideas against evidence. Other researchers start with specific observations based on empirical evidence, generalise and then build abstract ideas on the basis of evidence. He concludes that most researchers are flexible and use both approaches during various stages of the research process.

Ghauri *et al.* (cited in Ali, 1998:5) suggest that a researcher can, through a process of **induction**, draw general conclusions from empirical observations, implying that induction refers to the right side of Kolb's diagram in Figure 3.2.

Deductive research methods require "the development of a conceptual and theoretical structure prior to its testing through empirical observation, corresponding therefore to the left hand side of Kolb's experiential learning cycle" (Ali, 1998:5) in Figure 3.2.

Figure 3.3 indicates the difference between induction and deduction.

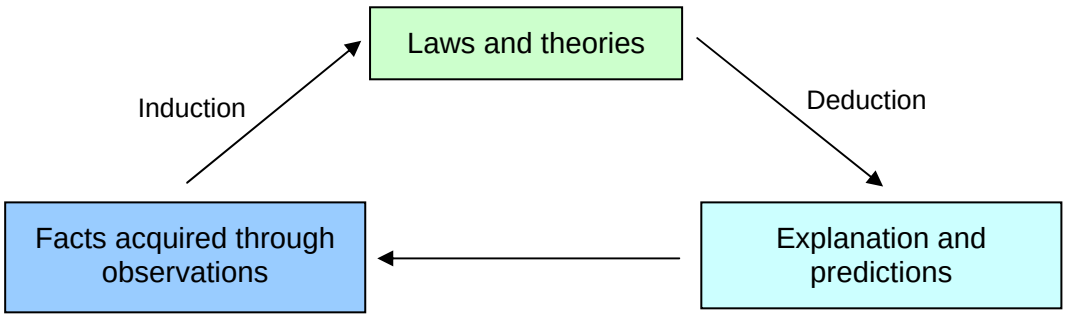

Figure 3.3: Difference between induction and deduction
Source: Chalmers, cited in Ali (1998:6)

The above figure suggests that induction refers to facts that are derived from observations and that lead to theories and hypotheses. Through the process of deduction, hypotheses are either accepted or rejected, resulting in an explanation or prediction. It is clear from Figure 3.3 above, that the research process is started by gathering facts from real-world behaviour and that it then progresses to a stage of inductive reasoning of possible general explanations or theories explaining the cause of behaviour and/or its effects. Alternatively, researchers can apply deductive logic by building on their logical-rational thoughts about phenomena to state testable hypotheses or models of predicted behaviour.

In this study, both inductive and deductive reasoning were used, since the researcher deduced some generalisations from an extensive literature survey and then used inductive reasoning throughout the empirical part of the study, while designing an assessment tool based on empirical research.

3.3 RESEARCH DESIGN

According to Ghauri *et al*. (cited in Ali, 1998:7), "the research design is the overall plan for connecting the conceptual research problems to pertinent (and achievable) empirical research".

They add that that empirical research is undertaken to answer research questions and that the research design that is chosen therefore needs to be appropriate to provide the required answers. They also argue that the research design that is chosen influences the eventual research activities, such as what data is collected and how. Hence, a thorough understanding of the research problem is imperative.

Research can be divided into three main categories, namely exploratory, descriptive and causal research (Ali, 1998:7). Figure 3.4 depicts the relationship between research design and the three research categories.

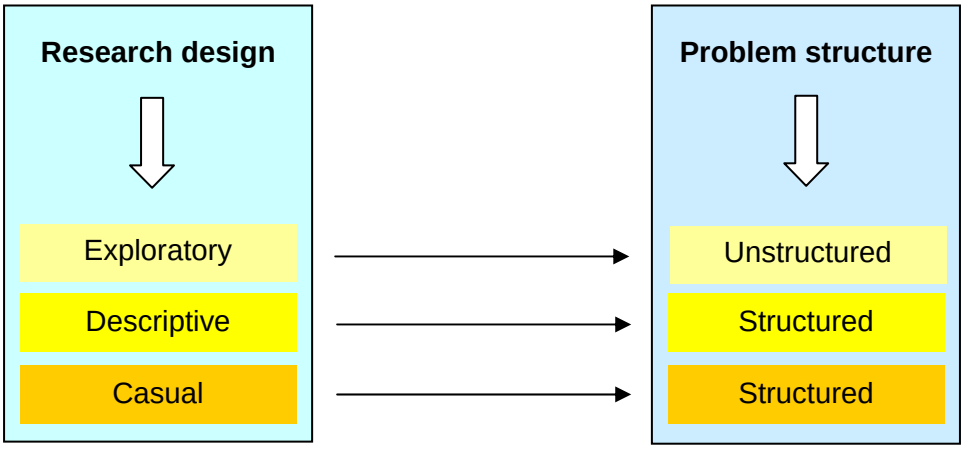

Figure 3.4: Relationship between research design and the three research categories
Source: Ghauri *et al*., cited in Ali, 1998:7)

From the above Figure 3.4 it is clear that as the research varies from exploratory to causal, there tends to be more formality with diminishing flexibility in the way the research is conducted.

Exploratory research was used in the preliminary stages of this study in order to determine the subject of the study, the scope of the study and the research questions through a literature study. It then advanced through to a more structured approach of descriptive research to develop an assessment tool for the measuring of change dynamics within project management through an iterative process of questionnaire or measurement instrument design containing all the relevant constructs and variables.

3.4 TYPE OF INFORMATION SOUGHT

After a research design has been chosen, it is important to decide which methodology to use. According to Adler *et al.* (cited in Ali, 1998:9), "choosing a methodology determines what we can study as well as the range of possible results and conclusions". **Qualitative methods** can be defined as "producing descriptive data that helps in understanding the 'why' of different attitudes and the underlying structures of values and perceptions affecting change which can include group and individual interviews, focus groups, observation, trend analysis and issues monitoring" (Felkins *et al.*, 1993:229). Wright (cited in Ali, 1998) states that qualitative research means "any research where number counting and statistical techniques are not the central issues, where an attempt is made to get close to the collection of data in their natural setting". **Quantitative methods** can be described as "yielding numerical data related to performance that can be analysed through statistical measures which could include surveys, questionnaires, audits, content analysis, and numerical documentation" (Felkins *et al.*, 1993:229).

This study used both qualitative and quantitative approaches to collecting data. The qualitative approach to data collection was in the form of a thorough literature study, and the administration of the Delphi technique in the initial stages of the research. Subsequent to this, a quantitative approach to data collection that included the administration of both the Lawshe (content validity) and DeVellis (scale development) methodologies, was applied. These methods were used as part of a validation or triangulation process (the use of multiple methods in an endeavour to overcome possible deficiencies that stem from one investigator or method), as recommended by Babbie and Mouton (2001:275).

Such an approach is supported by Ali (1998:14), who states that qualitative research should be used in conjunction with quantitative methods in a multi-method fashion. As can be seen from Table 3.2, international management research can benefit from the use of multiple methods, that is, a triangulation of both quantitative and qualitative methods.

Table 3.2: Comparison of methods in international management research

Quantitative methods	Qualitative methods
• Independence	• Interdependence
• Linear	• Linear and non-linear
• Cumulative, additive	• Multiplicative, interactive
• Deriving realities from measures of other realities	• Interdependent measures of the various realities
• Deductive	• Inductive
• Emphasis on testing and verification	• Emphasis on understanding

• Focus on facts and/or reasons of social events	• Focus on understanding from informant's point of view
• Logical and critical approach	• Interpretation and rational approach
• Controlled measurement	• Observation and measurements in natural settings
• Objective "outsider view" distant from data	• Subjective "insider view" and closeness to data
• Hypothetical/deductive focus on hypothesis testing	• Explorative orientation
• Results orientated	• Process orientated
• Particularistic and analytical	• Holistic perspective
• Generalisation by population membership	• Generalisation by comparison of properties and contexts of individual organisms

Source: Summarised from Wright (adapted from Kleiner and Okeke, 1991, cited in Ali, 1998:14) and Gauri *et al*. (adapted from Reichardt and Cook, cited in Ali, 1998:15)

3.5 SOURCE OF DATA

Both primary and secondary sources of data were used in this research project. **Primary data** was obtained by administering the Delphi technique and the Lawshe and DeVellis methodologies to generate data.

Secondary data was gathered through a literature study of previous studies done on some of the constructs applicable to this study.

3.6 RESEARCH DESIGN AND RESEARCH METHOD PER RESEARCH QUESTION

Table 3.3 indicates the research design and research method per research question as it applies to this study.

Table 3.3: Research design and research method per research question

Research question	Approach and method	Reasoning	Data analysis
• What constitutes change dynamics and how does it apply to the project management context?	• Literature study • Descriptive • Qualitative • Qualitative	• Inductive	• Collation, analysis and consolidation of themes in literature

	questionnaire • Quantification of dimensions and elements		• Verification of applicability by sample
• Is there a need for an assessment tool to measure change dynamics in project management?	• Literature study • Descriptive • Qualitative	• Inductive	• Collation, analysis and consolidation of themes in literature
• What process should be followed in developing an assessment tool to assess change dynamics in the context of project management?	• Literature study on measurement development • Design of measuring instrument and verification thereof • Application of the Delphi technique to establish change dynamics constructs • Application of Lawshe's content validity test • DeVellis scale development process	• Inductive	• Collation, analysis and consolidation of literature
• What constitutes the appropriate management of change dynamics in the project management context?	• Administration of assessment tool	• Deductive	• Multivariate statistical techniques such as factor analysis • Factor analysis • Likert scale • Scoring per element

3.7 SAMPLING

According to Singleton *et al.* (1988:69), the entities (objects or events) under review are referred to in social research as units of analysis. In this study, the units of analysis consisted of senior project managers across industries.

In terms of the required sample size for exploratory factor analysis, the likelihood of a reliable factor structure is a function of the sample size used in the analysis. "In general, the factor pattern that emerges from a large sample factor analysis will be more stable than that emerging from a smaller sample" (DeVellis, 1991:106). Both the number of variables to be analysed and the absolute number of subjects should be considered when determining the appropriate

sample size for a study. The following guidelines can be applied to establish whether a study's sample size is sufficiently large:

- there should be a ratio of a minimum of five to (preferably) ten subjects per item, up to about 300 subjects (Tinsley & Tinsley, 1987, cited in DeVellis, 1991; Hair, Anderson, Tatham, and Black (1998:373));
- a sample of 100 is poor, 200 is fair, 300 is good and 500 is very good (Comrey, 1973, cited in DeVellis, 1991);
- a sample size of 200 is adequate for most cases of factor analysis that involve no more than 40 items (Comrey, 1998, cited in DeVellis, 1991); and
- a researcher would not generally factor analyse a sample of less than 50 observations and the sample size should preferably be 100 or larger; but it is not uncommon to see factor analyses used in scale development based on more modest samples of, for example, 150 subjects (DeVellis, 1991:106).

3.8 ERRORS IN HUMAN INQUIRY

According to Babbie (1995:20), a number of errors should be avoided during the process of human inquiry. These are listed below, showing what was done to avoid such errors in this particular study.

- **Inaccurate observation** occurs when a researcher is not vigilant enough in observing – scientific observation should be regarded as a conscious activity and multiple measurement devices should assist in eliminating this error. The application of several different inquiry methods in this study greatly reduced this potential error.
- **Over-generalisation** occurs when a researcher works on the assumption that a few events that are perceived as similar can be generalised. This assumption is misleading. This risk was reduced by the fact that the researcher in this study did a thorough literature study, applied the Delphi technique and administered two rounds of questionnaires.
- **Selective observation** might occur when a researcher over-generalises. Once a researcher has established perceived generalisations, he or she may be tempted to revert to selective information. The number of observations used in this study eliminated this potential problem area.
- **Made-up information** occurs when observations and analyses do not correspond with the expectations of the researcher, creating *ex post facto* hypothesising. Extreme

caution was taken in this research project to remain focused on facts, theory and research conclusions.

- **Illogical reasoning** occurs when a researcher decides that a few observations that appear to contradict the conclusions are mere exceptions, thereby not conscientiously applying systems of logic.
- **Ego involvement in understanding** results when a researcher becomes subjective and personally involved in the conclusions reached in research projects. Extreme caution was taken in the course of this study to remain professional and objective.
- **Premature closure of inquiry** results when all the abovementioned errors occur during the course of research. This can happen if the research is concluded without due consideration being given to properly understanding the research issues. Care was taken to remain open to changes and/or new insights in the course of this research.
- **Mystification** occurs when undue obscure or mysterious causes are attributed to a phenomenon and it is regarded as beyond human understanding, resulting in the phenomenon's being declared incomprehensible or beyond human grasp. Care was taken to be as pragmatic as possible within the research design.
- **Human error is unavoidable,** but extreme caution was taken during this scientific inquiry to take special precautions to avoid making errors.

In this study, multiple method validation or triangulation was used in an endeavour to avoid these potential errors.

3.9 ETHICS

The study was conducted in an ethical manner. The University of Pretoria's ethical committee's approval was sought before the commencement of this study. According to Cooper and Schindler (2003:112), "research must be designed so a respondent does not suffer physical harm, discomfort, pain, embarrassment, or loss of privacy". In order to prevent any such detrimental effects for any subject, the researcher ensured that the context of the research was explained, that participation was voluntary (informed consent was obtained from all participants) and that confidentiality was guaranteed. Neuman (1997:455) adds to these aspects, citing the following principles of ethical social research:

- ethical responsibility rests with the individual researcher;
- subjects or students should not be exploited for personal gain;

- some form of informed consent is highly recommended or required;
- all guarantees of privacy, confidentiality and anonymity should be honoured;
- subjects should not be coerced or humiliated;
- deception should only used when needed and should always be accompanied by debriefing;
- an appropriate research method for the topic should be used;
- undesirable consequences to research subjects should be detected and removed;
- possible repercussions of the publication of the results should be anticipated;
- the sponsor funding the research should be identified;
- cooperation with hosting nations doing comparative research should be instituted;
- the details of the study should be released with the results;
- interpretations of the results consistent with the data should be made;
- high methodological standards should be used and the researcher should strive for accuracy; and
- secret research should not be conducted.

Obviously, not all these criteria apply to this study; however, in the opinion of the researcher, all the relevant requirements mentioned above were met in the execution of this research.

3.10 SHORTCOMINGS OF PREVIOUS STUDIES

As is evident from the literature review, some previous research has been done on a few of the elements of change management, project management and instrument design. There is some evidence that there is a strong correlation between project success and the appropriate management of change. However, it was the view of the researcher that

- an integrated holistic approach integrating these two constructs still needed to be developed; and
- an assessment tool to measure the management of change dynamics in the project realm required further research.

3.11 SUMMARY AND CONCLUDING REMARKS

This study was conducted using a social science paradigm applying both inductive and deductive reasoning. The research design contained both exploratory and descriptive components that informed the use of both qualitative and quantitative information gathering methods, resulting in an assessment tool that can measure change dynamics in project management.