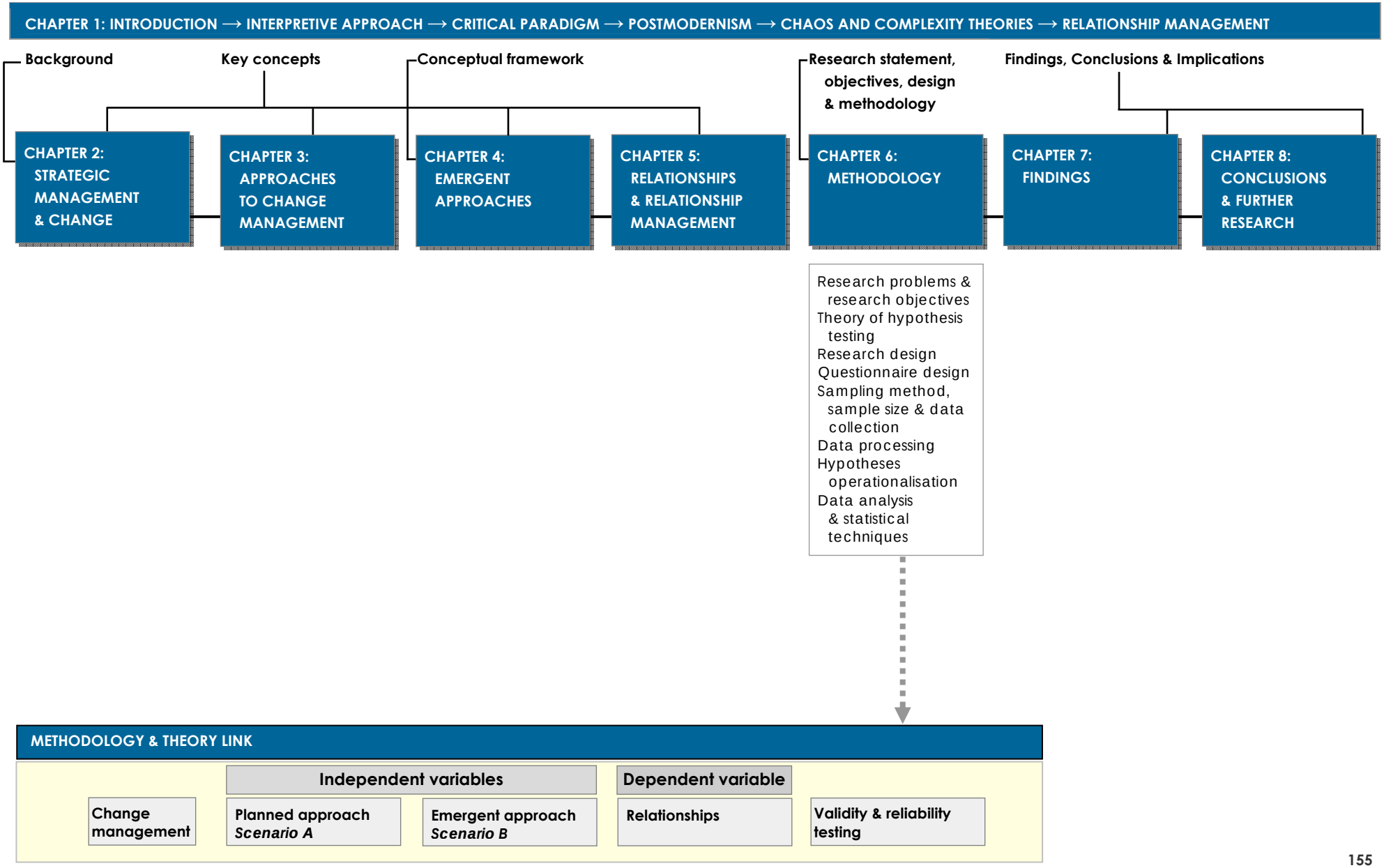
OVERVIEW OF CHAPTER 6: *Methodology*



CHAPTER 6:

Methodology

6.1 Introduction

This Chapter describes the methodology applied in this study to address the research question. The literature review in the previous chapters provided the input for the methodology discussed in this chapter. The research objectives and hypotheses will be outlined first, followed by the research design, measuring instruments, sample design, data collection method, and the statistical analysis techniques.

6.2 Research problems and research objectives

6.2.1 Research problem

In 1998, Beer & Nohria (2000) organised a research conference at the Harvard Business School, then subsequently edited a book that contained all contributions made at the conference by prominent researchers and academics in the field of change management. Here, Beer & Nohria had requested Roger Martin (2000) to write an observation and critique about the conference in the concluding chapter. What came as a surprise was Martin's conclusion that the conference did not provide any real answers in terms of:

> *developing and integrative conceptual framework that would inform the question being asked by managers around the world: How do I go about managing change effectively?(Beer & Nohria, 2000, p. xi)*

He suggested that a "testable causal model" (p. 450) for change should be created, which would explain

> *why change doesn't happen now and how to make positive change actually happen (p. 450).*

Furthermore, Martin (2000) adds that Beer & Nohria have taken the

> *first step towards creating such a model with their Theory E and Theory O concepts (p. 451).*

From such a causal theory, Martin (2000) believes that guidelines can be set that could produce desired change effects. This study attempts to make such a contribution by specifically examining the role of the communication strategy followed during change in order to achieve the desired outcome (positive relationships and changed behaviour). As a result the research statement of this study is:

An experimental study of:

> (1) the connection between the communication management strategy followed during change in organisations and the relationship and behavioural effects on internal stakeholders (employees); and
>
> (2) the effects of the communication management strategy followed during high change on relationships and behaviours with the internal stakeholders (employees).

6.2.2 Research objectives

The main research objective of this study was to ascertain the relational, communication, and behavioural outcomes of different communication strategies during change in organisations.

The secondary research objectives were:

> (1) To compare the different communication strategies followed in order to establish a causal relationship between:
>
> (i) the strategy followed and the relationship between the organisation and its publics; and
> (ii) the strategy followed and the change effects achieved.
>
> (2) To establish a strategic communication management strategy that builds positive relationships with publics, thus achieving the desired change effects during high change.

The research objectives has already been summarised in Chapter 1 in Table 1.1. The propositions led to the hypotheses discussed in the next section.

6.3 Theory of hypothesis testing

When researchers want to test a theory, they usually make predictions or hypothesise that a particular variable will have an affect, cause, or certain outcome (Stacks, 2002). Thus a specific independent variable (output) will have a relationship (or make a change) in the dependent variable (outcome). This prediction is called a research hypothesis. There are two types of research hypothesis: non-directional, which predicts differences in the relationships between two variables; and directional, which predicts a specific direction or nature of the relationships or of the differences. Both directional and non-directional hypotheses were stated for this particular study.

6.3.1 Procedure of statistical testing

Hypothesis testing begins with theory. In this thesis, the theory of change management and relationships was explored in Chapter 2 to 5. In this chapter, the hypotheses derived from the theory are explained and formulated. The null hypothesis in any study is always stated in terms of no difference between variables, or as the status quo (Levine et al., 1998). The alternative hypotheses are stated from the theory and are the opposite of the null hypotheses, as Levine et al. (1998) note,

> *The alternative hypothesis represents the conclusion that would be reached if there were sufficient evidence from sample information to decide that the null hypothesis is unlikely to be true and we can therefore reject it (p. 341).*

However, if the null hypothesis is not rejected it can never be assumed that it is true. A failure to statistically reject the null hypothesis can only indicate that there is not enough evidence to warrant its rejection.

The following procedure is suggested for statistical testing (Cooper & Schindler, 2001, p. 493; Argyrous, 2000, p. 268):

- State the null hypothesis.
- Choose the relevant statistical test. The choice of test depends on the power efficiency of the test, the way the sample was drawn, the nature of the population, and type of measurement scale used.
- Select the desired level of significance. This is usually an α-level of .05 or smaller and is determined by how much α risk one is willing to tolerate in terms of rejecting the null hypothesis when it is in fact true.
- Compute the calculated difference value by using the appropriate significance test to obtain the calculated value.
- Obtain the critical test value from the appropriate table. The critical test value defines the acceptable region from the rejection region of the null hypothesis. This step is only important when one is not using computer analysis.
- Interpret the test by making the decision to reject the null hypothesis and to support the alternative hypothesis. This happens if the calculated value is larger than the critical value.

6.3.2 Formulation of the research hypotheses

In the next paragraphs, the theoretical justification for the hypotheses will be discussed in detail.

6.3.2.1 Theoretical justification of each hypothesis

As discussed in Chapter 4, chaos and complexity theories suggest that the interaction between people in an organisation create relationships that are necessary for the organisation to survive major changes. During change, meaning is derived from relationships (McDaniel, 1997) between all the entities and parties involved. This meaning-creation through relationships is necessary to keep the organisation 'together' and provides a 'strange attractor' during extreme change. In Chapter 5, the importance of participation in relationship management is further emphasised. Deetz (1995) questions whether meaning is in people, and suggests

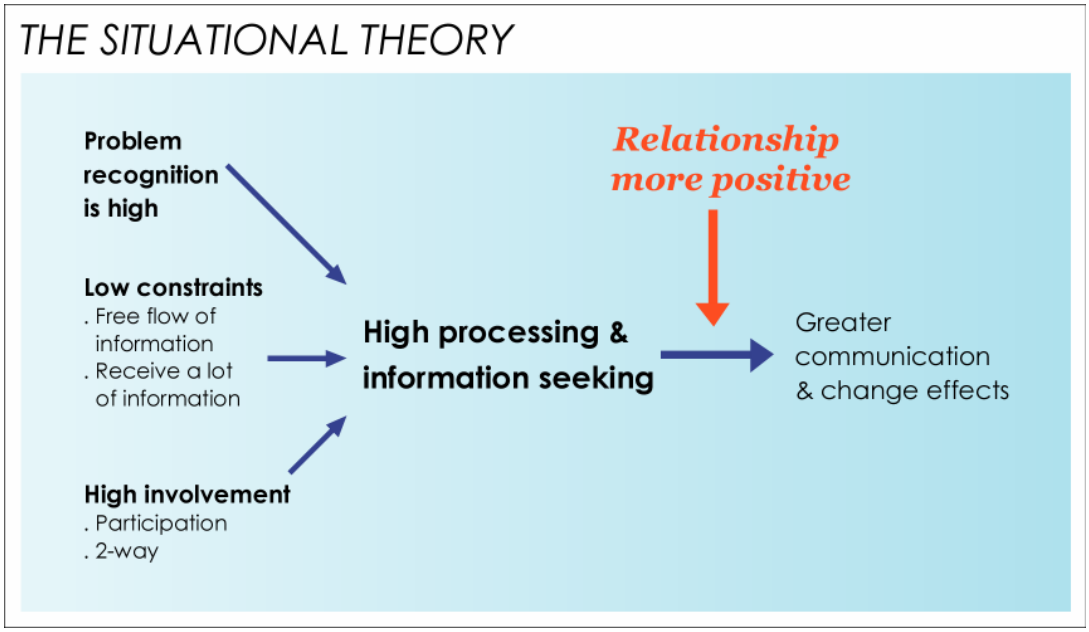
that it would be more appropriate to think of meaning as being created through participation in communication processes. Emergent approaches to change management (discussed in Chapter 2) state that organisations that follow high participatory approaches to change have higher levels of involvement from all concerned (Beer & Nohria, 2000), and the more people contribute to solving complex problems, the better the solutions to these problems will be (Dunphy, 2000). J. Grunig's (1997) situational theory also implies that publics should participate in decision-making, as these publics are relevant because of their perceptions and behaviours towards the organisation, and not because the organisation chooses to build a relationship with them. The Excellence study showed that good communication changes the way publics and management behave and result in good relationships between them (Hon & Grunig, 1999).

The relationships model of Grunig & Huang (2000) identify the main relationship outcomes relevant to healthy relationships as *trust, control mutuality, commitment* and *relational satisfaction*.

From the above, it can be derived that the higher the participation of stakeholders during change, the more likely a positive relational outcome of trust, commitment, control mutuality and satisfaction will be. According to the situational theory of J. Grunig (1997), as stakeholders become aware of issues that might influence them, they get involved and search for information regarding those issues; and depending on the constraints present, they participate in the communication surrounding the issue. This level of involvement and the severity of constraints will thus determine the relationships between the organisation and the specific stakeholders.

Contrary to this, the planned approach to change specifies that only leaders of organisations can really make decisions regarding change as they are in the position to have access to the information and knowledge necessary (Conger, 2000). According to this approach participation of all parties involved would just take up too much time and valuable resources, and would not be practical. However, this thesis sets out to show that this planned approach would not lead to positive relationships, and would thus cost more time and money over the long term because negative relationships would have an ultimate negative effect on the

bottom line of the organisation and does not make any financial sense (Post et al., 2002).



Adapted from J. Grunig (1997)

In the above diagram, adapted from the situational theory of J. Grunig (1997), high involvement (high participation and two-way symmetrical communication) and low constraints (free flow of open and transparent information) lead to high seeking and processing of information, which in turn leads to more positive relationships and greater communication and change effects.

The following table illustrates how each of the elements of this theory, as well as the literature discussed in Chapters 3 and 4, contribute to the relationships indicators (Chapter 5), and how each of these relate to the research hypotheses derived.

Table 6-1: Explanation of how hypotheses were derived

High participation during change (Emergent participatory approach to change): →	**High Relationship indicators** →	**Research Hypotheses: Overall hypothesis 6**
Change is flexible and continuous (Burnes, 1996) Vision set by all involved (Burnes, 1996; Johnson & Scholes, 1999) Dialogue and two-way symmetrical approach (Beer & Nohria, 2000) Employee driven (Weick, 2000; Grunig et al., 2002; Dunphy, 2000) Open and transparent communication in all directions (Dunphy, 2000; Deetz, 1995) Socially constructed relationship culture (Hirschhorn, 2000) Compensation as lag system with emphasis on working environment benefits and peer evaluation (Ledford & Heneman, 2000) Conflict creation and conflict management (Holtzhausen & Voto, 2002) Learning environment (Senge et al., 1999; Burnes, 1996) Socially responsible (Senge, 2000)	Trust →	Research Hypothesis 1
	Control mutuality →	Research Hypothesis 2
	Commitment →	Research Hypothesis 3
	Satisfaction with the relationship →	Research Hypothesis 4
	Greater change effects and goal attainment →	Research Hypothesis 5
Chapter 3 & 4	**Chapter 5**	**Chapter 6**

Research hypotheses 1 to 6 are all directional/causal because they predict the specific direction from the change communication strategy followed (emergent participatory approach) to relationship indicators (trust, control mutuality, commitment and mutual satisfaction) between an organisation and its employees.

Research hypothesis 7 is derived from the same theoretical base, but is non-directional because it aims to predict differences in the relationships between the two variables of change strategy and relationship indicator. Thus, the alternative hypothesis in this case states that there will be a significant difference between a planned, structured (modernistic) change approach followed and a postmodern participatory change approach followed, that is, in terms of the relationships employees will have towards their employers.

6.3.2.2 Summary of research hypotheses

There were two sets of hypotheses tested in this study. The first set related to the experimental validation and control measures (discussed in detail in the next section), and the second set related to the research questions and theory as described above. In order to ease discussion and understanding, the alternative hypotheses are stated. The null hypotheses in each of these cases imply no difference or relationship between the variables.

Table 6-2: Summary of research hypotheses

Research Hypotheses (H):		
H1	=	High participatory communication and change strategy will lead to significantly more *trust* between an organisation and its employees than with a lower degree of participation and a planned approach.
H2	=	High participatory communication and change strategy will lead to significantly more *control mutuality* between an organisation and its employees than with a lower degree of participation and a planned approach.
H3	=	High participatory communication and change strategy will lead to significantly higher *commitment* between an organisation and its employees than with a lower degree of participation and a planned approach.
H4	=	High participatory communication and change strategy will lead to significantly more *satisfaction* with the relationship between an organisation and its employees than with a lower degree of participation and a planned approach.
H5	=	High participatory communication and change strategy will lead to significantly more positive goal attainment and change behavioural *effects* between an organisation and its employees than with a lower degree of participation and a planned approach.
H6	=	High degree of participation during high change in organisations will lead to significantly more positive relationship between an organisation and its internal publics than with lower degrees of participation and a planned approach.
H7	=	There is a meaningful difference between Scenario A (planned approach) and Scenario B (participatory approach) in terms of the relationships with internal stakeholders.

6.4 Research design

A research design is a plan or framework for the procedures to be followed in the implementation of a research project (Malhotra, 1993). Typically, a research design would consist of the following components (Bless & Higson-Smith, 1995; Malhotra, 1993; Sarantakos, 1998):

- an exploratory and preparation phase
- the research design phase
- data collection phase
- data processing and analysis
- interpretation of results
- the conclusions and recommendations.

The preparation phase involves the selection and formulation of the research problem, which would include acquiring knowledge on recent theory through a literature review. This process assists in the identification of constructs and explores possible theoretical relationships between variables. In this study, the first five chapters serve this purpose. The next step usually involves the exploratory phase of establishing operational definitions and formulating the theory into hypotheses.

6.4.1 Exploratory phase

The research design of this study was executed in two broad phases, namely, the exploratory phase (literature and preparation) and the descriptive-empirical phase.

A literature study provided a background on all related theories and information that are relevant to the study in question. Aspects relating to change management, relationship management and other theories relevant to this study were investigated.

Apart from an extensive database search for relevant literature on change management and relationship management, the exploratory phase of the project involved testing of the constructs used in the questionnaire.

6.4.1.1 Qualitative testing and operationalisation of the independent variables

The independent variables, namely, the two change scenarios, were put together, firstly, by extracting the characteristics of the two change approaches from the theory. The planned approach to change consists of the following characteristics derived from the theory (previously discussed in Chapter 3):

- A focus on economic value and the change should focus on the shareholders, customers, products and services (Beer & Nohria, 2000; Jensen, 2000);
- Top-down approach, where leaders and management set the goals and objectives and drive the change strategy (Conger, 2000);
- Focus on structural and systems change that would yield much quicker financial results (Galbraith, 2000);
- Changes are clearly planned in an organised and sequential way (Beer & Nohria, 2000);
- Financial incentives are used to motivate people to change (Wruck, 2000);
- Large firms with the experienced knowledge and tested systems are usually appointed to lead large change (Neill & Mindrum, 2000).

The characteristics from theory for the emergent approaches are listed in Table 6.1.

In order to gain insight into how people understand the differences between these two approaches to change, two groups of delegates in change management training were asked how they would describe each approach. The first group consisted of 24 delegates and the second group consisted of 16 delegates. The delegates were from middle to upper management levels in their organisations.

They were from a wide variety of South African organisations. The delegates worked in different areas and fields, which ranged from engineers, sales and marketing managers, human resource managers, business analysts, technical managers, micro laboratory managers, and the like. The delegates were given a very brief description of the change strategy, and then split into three smaller discussion groups.

The planned approach was explained in the following way:

> *Change is structured and consists of specific goals and objectives. It is tightly controlled by management. Management sees its role within this approach as reducing conflict, creating order, controlling chaos and simplifying all complexities created by the environment. Possible outcomes are predicted and alternatives for action are planned. Structures determine the information needed, and perceptions are managed by feeding the right information or withholding information which might give rise to disorder and chaos.*

The emergent participative change approach was described as:

> *Organisations are approached as living and holistic systems with a more organic and ecological approach. There is less structure and control, and more freedom for creativity. Strategies are flexible and adaptable to the environment. Scenario planning is used and participation of all stakeholders is encouraged. There are no control systems, and information is not channelled by or to anyone in particular.*

Care was taken to have no values attached to any of the descriptions. The groups were then asked to have an open discussion about these two approaches and to compile a list of characteristics that would describe the culture and climate in the two change situations. The following lists are characteristics that were ascribed to each situation:

Table 6-3: Group 1, team 1 description of change approaches

High change and planned approach	High change and emergent approach
"Uncertainty, conflict, confusion, loss of staff, loss of key skills, resistance, gap between management and staff gets bigger, suspicion, mistrust, decline in profit, decline in productivity, internal competition, turbulent environment, gossiping and active grapevine."	"Open communication, transparency, access to information, trust, more meaning, creativity, more diversity, greater sense of ownership, feedback, consultation, increased productivity – profits, greater sense of belonging, more change."

Table 6-4: Group 1, team 2

High change and planned approach	High change and emergent approach
The team described the emergent approach, and said that the planned approach was just the opposite (had the opposite characteristics of those mentioned in the emergent approach)	"Enthusiasm, uncertainty, trust, openness, flexibility, sense of worth, diverse inclusiveness, stimulating, dynamic team, consensus, joint decision-making, ongoing dialoguing, creative, networking, benchmarking, relationship mapping."

Table 6-5: Group 1 team 3

High change and planned approach	High change and emergent approach
"Stressful, high energy, challenging, scary, uncertainty, non-directional, high productivity/low value, lots of activity/ not much value, organisation flexible, conflict, volatile, high emotions, workforce angry, exciting, stimulating."	"Everybody deciding – not just representatives, consulting, representation, same goals, same vision, high level of meaning, dialogue, profit share."

Table 6-6: Group 2 team 1

High change and planned approach	High change and emergent approach
"Structured, negative climate, fixed results orientated, more manageable, easy to monitor, lack of creativity, downward buy-in, one way communication."	"Participative, socialist, positive climate, maverick, time consuming, risk, empowering, openness, two way communication, upward buy-in."

Table 6-7: Group 2 team 2

High change and planned approach	High change and emergent approach
Structure	Flexible
Forced	Buy in
Non-participative	Participative
Top down approach	Bottom up approach
Change	Change and transformation
Predictable	Risky
Ceiling	Continuous
Defined objectives	Unlimited goals
Expected recognition	Outcomes based
High risk climate	360 degree entrepreneurial
Low risk culture	Low risk climate
Management	Leadership

From these characteristics derived from the many discussion groups, and the theoretical descriptions of the two different approaches, various elements were identified and the characteristics were grouped within these elements:

Table 6-8: Characteristics derived from discussion groups

Elements	Planned approach	Emergent approach
Change	Structured	Flexible and continuous
Managed by	Process with set goals	Outcomes based
Communication	Downward	All directions
Decision-making	Management	Employees
Change type	Change – structural	Transformation – culture
Environment	Predictable	Fast changing
Top management	Management orientated	Leadership orientated
Change managers	Change management team assigned by management	Employees assign change leaders
Monitoring	Tightly and easily monitored according to goals	Employees give feedback and share information
Problems managed	Controlled	Managed constructively
Conflicts	Avoided	Allowed and creativity
Time and money	No waste	Long-term view
Information	Management control – only relevant and essential information communicated	Complete openness and transparency of information
Driven by	Goals	Vision
Evaluation	Management measures against set goals and provides recognition	Peer evaluation provides award system for changes in behaviour

The characteristics were put together into two distinct scenarios to explain the two approaches, and care was again taken not to include or insinuate any values within the descriptions. In other words, the scenarios were not presented as negative or positive; rather they described each of the elements identified by the theory and discussion groups.

Table 6-9: Scenario A — Low participation, high constraints, planned approach

This organisation is going through a major change process. The change is structured, the process is planned in detail with specified objectives to be reached within a given time span, and a carefully planned budget. The decisions surrounding the changes are made by top management and communicated to all employees. The changes are mostly infrastructural/tangible changes. Top management are management-orientated, so a change management team is assigned by management to manage the process. The process is monitored throughout by management, measuring performance against strictly set goals. Problems associated with the changes are controlled immediately to avoid unnecessary conflicts and waste of money. Management gives recognition for the achievement of set goals. Management controls all information and only relevant and essential information is communicated.

Table 6-10: Scenario B — High participation, low constraints, emergent approach

This organisation is going through a major change process. The change is flexible and continuous the process is managed according to desired outcomes and a vision is set by all those involved in the process. The decisions surrounding the changes are made by relevant employees involved in the changes and communicated freely in all directions. The changes are mostly transformational involving cultural intangible changes. Top management are leadership-orientated so a change management team is assigned by employees to lead the process. The process is monitored through feedback and information-sharing with all parties involved. Conflicts associated with the changes are allowed and managed creatively. Peer evaluation provides the award system for changes in behaviour. The process is characterised by complete openness and transparency.

Each of the scenarios was then put into a questionnaire and was tested for manipulation success within the given elements identified above (Refer also to Appendices A & B). There were 15 elements as specified in the Table 6.8 (above), and each element was measured on a scale from 1 to 7, where one end of the scale reflected a characteristic of the planned approach under that element, and the other end represented a characteristic of the emergent approach under the same element. The response category was thus set as a continuum, with two opposite

adjectives at each end and the range of numbers in between, one of which had to be crossed or circled by the respondent. For example, the scale under the element of C*ommunication* would range from a '1' for 'downward' (reflecting downward communication as described in the planned approach to change), to a '7' for 'all directions' (in the emergent approach to change).

This pre-test of the scenarios was given to 14 delegates of another change management training group. The delegates read the scenario, then rated the organisation in that scenario according to the elements, then read the second scenario and repeated the process.

The detailed results of this test can be seen in Chapter 7. The results showed a meaningful difference between the ways that the respondents understood and perceived the two scenarios in relation to the elements.

After the two scenarios were tested, the list of characteristics was given to the next group of delegates in a change management training course who listed the elements in order of importance. Based on this feedback and a general discussion of the elements in terms of comprehension and clarity, as well as the standard deviations of each characteristic in the pre-test, a list of 7 characteristics were subsequently extracted and used in the final questionnaire as manipulation check for the scenarios.

One final aspect that had to be covered by all of the discussion groups was the identification of any variables which they thought could have an influence on the way people would perceive change management strategies. The groups identified 3 issues which could be considered important variables:

- The types and sizes of organisations: it would be more difficult to use participative approaches in large, bureaucratic organisations.
- The educational levels of the people involved in the change management processes: this could influence how people approached change. It was thought that people with lower educational levels need more guidance and leadership, and that they might not be capable of high level decision-making during change processes.

- The level within which people functioned: this could influence whether they would prefer a top-down or a bottom-up approach to change management.

6.4.2 Descriptive empirical phase

The phase following the exploratory step in the research design (Bless & Higson-Smith, 1995; Malhotra, 1993; Sarantakos, 1998) is the research method design phase where the selection of the research methodology takes place. More specifically, this includes the choice of research design, creation of the questionnaire, selection of the sampling procedure, method of data collection, and the method of data analysis.

As most of the hypotheses in this study aimed to infer a specific cause-and-effect relationship, and thus turned out to be directional, an experimental design was therefore appropriate, as observed by Malhotra (1993)

> *Experimentation is commonly used to infer causal relationships (p. 219)*

6.4.3 Experimental design

Stacks (2002) states that the only way to determine actual cause-and-effect relationships is through true experimentation. Experiments involve some degree of manipulation of a particular variable and an assessment of the effect that this manipulation had (Sarantakos, 1998). The manipulation takes place in a very systematic and structured fashion. The aim is to show a causal relationship between the variable that has been manipulated and the variable that is affected. The 'logic' here, as Sarantakos (1998) observes, is

> *that if a certain type of behaviour changes after the introduction of a variable, the change has been caused by this variable (p. 171).*

There are three conditions for causality (Malhotra, 1993; Stacks, 2002):

- concomitant variation (the way in which a cause and an effect occur together in the way predicted by the hypothesis);
- time order of occurrence (the cause must occur before or at the same time as the effect, not afterwards);

- any other possible causes should be eliminated.

Experiments can appear in three different forms (Sarantakos, 1998):

- laboratory experiments that are usually performed in a closed environment where all external factors are controlled;
- field experiments that are performed in natural environments;
- and demonstration experiments. Demonstration experiments are experiments performed with one experimental group only. They are not true experiments because they do not have a control group and subjects are not selected randomly. There is no timing issues involved in the experimental treatment and they can continue for as long as the subjects are available.

In this study, the experiment was conducted in the organisations where the subjects worked, and they were asked to fill in a questionnaire that contained the independent variables in the form of scenarios. There was no control group; however, statistical control and analysis of external variables were used.

There are several types of experimental designs to establish the relationships between variables. The differences between them lie in the use of pre-tests, the number of experimental and control groups employed, and in the way the independent variable is introduced to a group or groups (Sarantakos, 1998). True experimental designs – the pre-test–post-test control group design, the post-test-only control group design, and the Solomon four-group design (which usually has a single independent variable). But often, as in this case, the researcher has the need to study multiple independent variables at once. These types of designs are called factorial experimental designs (Baxter & Babbie, 2004).

Factorial experiments are usually a variation of one of the true experimental designs (Baxter & Babbie, 2004). Factorial experiments are a variation of the pre-test–post-test control group design but with multiple independent variables instead of one. It is possible to have even more advanced and complex designs; for instance, to combine a repeated measures design with the factorial design (Keppel, 1991). Repeated measure factorial designs are sometimes called a within-subject

design because a given participant is measured twice or more times (Baxter & Babbie, 2004). Any variation in the experimental results is thus based on the same group's different responses to different observations.

Malhotra (1993) explains that randomised block design is useful when there is only one major extraneous variable that could have an effect on the dependent variable. The test units are grouped on the basis of this extraneous blocked variable, which the researcher identifies and measures. When there is more than one variable to be controlled, the researcher must use Latin square, factorial designs, or factorial design with repeated measures. The principles of advanced complex experiments allow for much more room for creativity (creating experimental designs to fit each unique situation) and scientific reasoning (Keppel, 1991).

The decision made for this study was a mixed, two-factor experiment with repeated measure variables. The use of projective experimental scenarios is a common way for researchers to manipulate the operationalisation of independent variables. A group of randomly assigned subjects (R) were given a scenario where the change management strategy was planned (X1) – independent variable A. At the same time, the same group of subjects (R) was given a second scenario where the organisation had followed a participatory approach to change (X2) – independent variable B. The relationship outcomes that this group feels that they have towards the organisation described in scenario 1 (X1) was then measured (O1, where O is the measurement of the dependent variable). The relationship outcomes that the subjects feel towards the organisation in the second scenario (X2) were also measured (O2). This resulted in an experimental design where factor A is the independent randomised block variables on the change strategy, which were operationalised by 2 levels depicting a ***low participation, high constraints, planned approach*** (**Scenario A**) and a ***high participation, low constraints, emergent approach*** (**Scenario B**). The two scenarios of change were treated as a fixed variable in the organisations selected so as to ensure that the independent variable did not rely merely on a single stimulus, thus minimising experimental error (McGuigan, 1990, p. 232). A variable is fixed when the selection of the factor levels is arbitrary or systematic, and it can only be generalised to the contextualised scope of the specific factor level (Keppel, 1991).

Furthermore factorial experiments allow for multiple independent variables to function in combination and this is known as the interaction effect (Baxter & Babbie, 2004). The research area of this study has many dimensions, which expands the independent variables and the repeat measures of different scenarios also contribute to interactive effects. Respondents are inclined to think of more aspect than what they would have done had they only read a single scenario. Table 6.11 explains the model of this experimental design.

Table 6-11: A model for the experimental design of randomised block design with repeated measures

			DEPENDENT VARIABLES – FACTORS TO BE MANIPULATED				
			Relationship characteristics				***Behavioural effects***
			Trust	Control Mutuality	Commitment	Satisfaction	
INDEPENDENT VARIABLES – FIXED	***Change strategy followed***	**Low participation & high constraints** *– Scenario A: Planned Approach*	–	–	–	–	–
		High participation & low constraints *– Scenario B: Emergent Approach*	+	+	+	+	+

6.4.4 Limitations of experimental design

As mentioned above, in order to infer causal relationships between independent and dependent variables, the researcher should ensure that no other factors could influence this causality. If it is not possible for the experimenter to control for extraneous variables, these factors should be tested for in order to assess their possible influence on the experimental process (Sarantakos, 1998).

Because this study was conducted in the field, it was very difficult to control for all possible external variables. Statistical design allows for statistical control and analysis of variables that could not be checked in the field (Malhotra, 1993). Statistical design furthermore allows for causal testing of more than one independent variable, and possible extraneous variables can be statistically

controlled. In this case, the statistical design tested for possible influences of variables such as type and size of the organisation, level in the organisation, educational level, and the real change situation in the employer of the respondent.

Although repeated measures (or within-subject design) require fewer participants than with factorial designs between different participants, they also hold many limitations and become very complicated to execute. Participants can become bored, the order in which they read the scenarios could affect their responses, and respondents have to be assigned randomly to the scenarios. There are also several limitations, or threats to internal validity, with experimental testing (Baxter & Babbie, 2004).

Because it is important to control for extraneous factors, a researcher limits the findings of experiments. Strictly controlled experiments do not allow for generalisation to other situations or to the broader population (Stacks, 2002). Nevertheless, the most important reason for using experiments is to test, create, or extend theoretical assumptions and relationships.

Before discussing the ways in which this study was designed to control for experimental rigour, it is necessary to discuss the design of the final questionnaire.

6. 5 Questionnaire design

As discussed previously, the first part of the questionnaire consisted of the scenarios. Both scenarios were given to the respondents in order to prevent bias towards any specific scenario. The order of the scenarios was changed in half of the questionnaires, and these were given randomly to the respondents. They were coded to ensure that the researcher could distinguish between them to test this order difference as an extraneous variable.

The respondents were then given the first scenario of their specific questionnaire and were requested to answer a list of statements in terms of their relationship with the organisation portrayed in the scenario. The operationalisation of the relationship measure (dependent variable) will now be discussed.

6.5.1 Operationalisation of the measurement construct and dependent variable

In 1999, The Institute for Public Relations formed a special United States Commission on public relations measurement and evaluation, and put together a booklet for the measurement of relationships in public relations under the authorship of Linda Hon and James Grunig (Hon & Grunig, 1999). In the model of relationships by Grunig & Huang (2000), relationship outcomes pertain to the measurement of the long-term value of public relations to the organisation as a whole. Apparently, the best way to measure the longer term relationships with key stakeholders is to measure the outcomes of good organisation-public relationships, namely, trust, control mutuality, commitment, and mutual satisfaction. As explored in Chapter 5, numerous studies have shown high inter-correlations among these four dimensions of relationships (Grunig & Huang, 2000, p. 47; Ledingham, 2000, p. xiii) and the measuring instrument has been tested numerously for reliability and validity (Hon & Grunig, 1999; Huang, 1997; Huang, 2001).

This relationship scale distributed by the Institute of Public Relations (Hon & Grunig, 1999) consists of 21 items measuring ***trust*** (six items), ***control mutuality*** (five items), ***commitment*** (five items), and ***satisfaction*** (five items). The elements under each of these are:

Control mutuality (items 7–11):

- This organisation and people like me are attentive to what each other say
- This organisation believes the opinions of people like me are legitimate
- In dealing with people like me, this organisation has a tendency to throw its weight around (Reversed)
- This organisation really listens to what people like me have to say
- The management of this organisation gives people like me enough say in the decision-making process

Trust (items 1–6):

- This organisation treats people like me fairly and justly (Integrity)

- Whenever this organisation makes an important decision, I know it will be concerned about people like me (Integrity)
- This organisation can be relied on to keep its promises (Dependability)
- I believe that this organisation takes the opinions of people like me into account when making decisions (Dependability)
- I feel very confident about this organisations' skills (Competence)
- This organisation has the ability to accomplish what it says it will do (Competence)

Commitment (items 12–16):

- I feel that this organisation is trying to maintain a long-term commitment to people like me
- I can see that this organisation wants to maintain a relationship with people like me
- There is a long lasting bond between this organisation and people like me
- Compared to other organisations, I value my relationship with this organisation more
- I would rather work together with this organisation than not

Mutual satisfaction (items 17–21):

- I am happy with this organisation
- Both the organisation and people like me benefit from the relationship
- Most people like me are happy in their interactions with this organisation
- Generally speaking, I am pleased with the relationship this organisation has established with people like me
- Most people enjoy dealing with this organisation

For this study, it was important to measure the quality of organisation-stakeholder relationships, but not specifically the kinds of relationships that change programs attempt to achieve. For this reason, the items for measuring whether relationships are exchange or communal relationships in the Institute for Public Relations Commission questionnaire (Hon & Grunig, 1999) were not used in this study.

The maintenance strategies suggested by the relationship model (Grunig & Huang, 2000) include many of the characteristics that form part of the scenarios created for this study, such as participation in decision-making, openness, and conflict management. Relationship maintenance strategies are important in terms of the strategies followed in change management and the outcomes pertaining to the effects of the strategies. However, the most meaningful way to measure relationships is by measuring their outcomes.

6.5.2 Overall questionnaire design

Every questionnaire was accompanied by an introductory letter which thanked the respondents for their participation in the study. The purpose of the study was explained in this letter, as well as a short description of the possible benefits of the research. The questionnaire was printed in A5 size in booklet format to easy distribution and use.

Both scenarios were placed in the beginning of the questionnaire to ensure that the respondents were exposed to the experimental stimuli before the dependent measure of relationships were performed. The respondents were requested to consider the scenarios carefully, and then to answer the questions by circling the appropriate number that best described the reaction to the various statements of the relationship scale.

Each of the 21 items on the relationship scale was set out to be measured as a seven-point Likert scale as this was useful to measure attitudes (Sarantakos, 1998). The response categories ranged between the extreme positions on a verbal-numerical scale. The respondents were asked to answer each statement according to how much they agree to each item describing their relationship with the organisation portrayed in the accompanying scenario, where 1 = 'Don't agree at all with this statement' and 7 = 'Totally agree with this statement'.

As behaviour change was the ultimate desired outcome, and formed the last part of the model based on Grunig's situational theory (1997), the researcher set out to measure the respondents' willingness to change their behaviour within each of the different scenarios. The theory behind this is that when there is a problem, information seeking behaviour will follow. If there is open communication with free

flow of information and participation in the information-seeking process, the relationship will be positive, and change behaviour will follow. The alternative resistance to behaviour change will be the effect of controlled information, many barriers to information retrieval, one-way communication with little feedback opportunities, and unhealthy relationships.

Therefore, the next part of the questionnaire requested the respondents to indicate on another continuum scale how they would describe their behaviour in each scenario. This continuum had two opposite responses at each end and a range of numbers in between them. The willingness to change behaviour was based on the one hand on whether the respondents were willing to change their behaviours because the organisation forced them to change or, on the other hand, whether the respondents would change out of their own choice. The items set out to test willingness to change, time frame of change, degree of change and, finally, the action to change.

I am willing to change my behaviour according to:								
the requirements of the organisation in this scenario	**1**	**2**	**3**	**4**	**5**	**6**	**7**	what I think the situation requires of me
I will change my behaviour:								
within the time frame set by the organisation	**1**	**2**	**3**	**4**	**5**	**6**	**7**	as fast as I think the situation requires of me
I will change as far as:								
this organisation wants me to change	**1**	**2**	**3**	**4**	**5**	**6**	**7**	I think the situation requires of me
I am willing to do:								
what the organisation wants me to do	**1**	**2**	**3**	**4**	**5**	**6**	**7**	what I believe the situation requires of me

The last part of each scenario measurement consisted of seven manipulation-check items, which were used after each scenario's relationship measure to ascertain the effectiveness of the explanations of each scenario. These were based on the seven questions extracted after the pre-test was done.

As the scenarios were fictitious, two questions were asked in connection with the real organisation each respondent was working for, or having a continuous relationship with, in terms of the change strategy followed in that organisation. This was followed by some classification questions to determine educational level, years employed in the organisation, ranking in the organisation and designation in

order to establish whether these variables may have an influence upon the dependent variables, as predicted by some theoretical considerations discussed in Chapter 3, as well as the responses from the pre-test focus groups. These were also used as a control for possible extraneous variables.

A final test of the completed questionnaire was conducted to check for legibility, comprehension, editing, general appearance, and to make sure that the questions would be applicable to South African organisations and contexts. The questionnaire was given to ten colleagues and friends to complete, and the acceptable length and intelligibility were subsequently ascertained.

6.6 Sampling method, sample size and data collection

Nine organisations were selected from different industries and sectors. Each organisation was selected on a convenience basis where the researcher had a contact and was allowed entry to an organisation. The experimental subjects were randomly selected and consisted of 10 to 37 employees from each organisation. The questionnaires were distributed to employees as chosen stakeholder because the relationship indicators for employees reflect that productivity is clearly influenced by trust and relationships with employers (Hon & Grunig, 1999). Employees who are empowered and who are directly involved in the decision-making processes are more likely to be happier in their work environment. They are thus also more effective communicators when dealing with external stakeholders (Grunig et al., 2002), and are more likely to change their behaviour.

Other external stakeholders were also considered as potential subjects, and questionnaires were distributed to over 200 respondents who represented service providers, clients, suppliers, and the like, of the selected organisations. However, only 38 questionnaires were returned and were not considered enough for thorough statistical analysis and inferences. Such a group of stakeholders, who would have to represent a diverse population of external relations, requires a much larger sample even though modern experimental design does not require total representation. External validity is often a trade-off for internal validity (Malhotra, 1993), and group representation is more important than population representation (Keppel, 1991). Another limiting factor in the decision to focus on internal

stakeholders was the problem of time, and the difficulty in collecting questionnaires from widely spread external research units. The data had to be collected within the planned time frame and not enough questionnaires were returned from external stakeholders of the chosen organisations by the time the results had to be analysed. It proved to be very difficulty to have control over the distribution and collection of these questionnaires. For the purposes of this study, particularly in finding some initial exploratory data to test the hypotheses, the final decision was to work with internal employee stakeholders only. Further studies would be useful to extend this research to external stakeholders.

Each employee evaluated the two different scenarios, which resulted in 186 responses, more or less, in total (some questionnaires were not fully completed; refer to Table 6.12). A total number of 372 individual evaluations were made because each respondent repeated the measure.

The questionnaires were distributed evenly from upper management to non-managerial levels in each organisation. The scenarios were about changes in general and included various issues.

Table 6-12: Data collection strategy

Type of Organisation	Number of respondents	Evaluations
Org 1 = Private sector - large bank	20	40
Org 2 = Large private industry	37	74
Org 3 = IT company	35	70
Org 4 = Professional body	1	2
Org 5 = Large bank - governmental	21	42
Org 6 = Large private industry	10	20
Org 7 = Large corporate (partially privatised; semi-parastatal)	19	38
Org 8 = Higher education	32	64
Org 9 = Higher education	11	22
TOTAL	186	372

Data were collected from 2 the two alternated questionnaires. This was to ensure that the order of the scenarios did not affect the responses. The respondents were not aware of the order differences in the way that the questionnaires were

distributed. After all the data were collected and the 186 questionnaires were returned, the data was processed to prepare for analysis.

6.7 Data processing

If thorough care is taken with the data preparation stage, it can improve the quality of the data analysis and statistical results. Raw data have to be converted into a suitable format in order to be analysed (Malhotra, 1993). The process of data preparation involves questionnaire checking, editing, coding, transcribing, data cleaning, statistical adjusting of the data, and lastly, the selection of data analysis strategy.

6.7.1 Data editing and cleaning

The first step of data preparation is the checking of the questionnaires. These questionnaires were checked for completeness and quality. Parts of the questionnaires received were incomplete, but it was decided that whatever data that were entered would be used if full questions were responded to. For example, if the first part of the questionnaire referring to the first scenario was completed, but the respondent have, for whatever reason, neglected to answer the second part relating to scenario B, then the completed responses were still used. The questionnaires were also checked for possible inclusion of respondents who might not qualify for participation or responses that showed little variance, which could suggest that respondents did not understand the questionnaires. Care was also taken to ensure that, more or less, even numbers of each order scenario was achieved; that is, that there was more or less the same amount of questionnaires where scenario A was answered first as there were questionnaires where scenario B was first. An equal distribution across the levels in the organisation was also checked for.

6.7.2 Coding and data transformations

Coding is when numbers are assigned to statements, responses or answers. Coding is also done for column positions and data records. It is easier to process, analyse, and store numbers rather than words, and it minimises errors. In this case the questionnaire was pre-coded because it contained no unstructured questions.

Missing values on completed questionnaires were substituted by a neutral value so that the mean of the variable remained unchanged. Any other statistics on the data would thus not be affected much. Codes or values were transferred to an electronic database and this process was carefully monitored. Coder reliability was checked by maintaining a stable pattern with little variability, and randomly verified by a second operator.

Where necessary, variable respecification was performed. The one negatively worded item in the relationship measure was reversed scored. Some variables had too many categories and were not consistent with the objectives of the study, so these were collapsed into lesser categories, which simplified the analysis. These are described in the next chapter.

6.7.3 Validity and test hypotheses

As discussed previously, external and, more importantly, internal validity, are relevant issues to consider in experimental design. External validity addresses the question of whether the causal relationship between the independent and dependent variables can be generalised across persons, settings, and times (Cooper & Schindler, 2001; Baxter & Babbie, 2004; Malhotra, 1993). Factors that influence external validity are thus:

- Reactive effect – subjects might respond differently because they have been exposed to the pre-test.
- Interaction of the selection and X – this relates to the way subjects were selected because the group that participated might not represent the general population. This implies that researchers cannot generalise the results to the actual population they intended to.
- Other reactive factors such as the artificiality of the setting might influence the authenticity of responses.

Generally, external validity is much harder to control for than internal validity, so the rule of thumb is always to favour internal validity. As Cooper & Schindler (2001) point out,

> *Try to secure as much external validity as is compatible with the internal validity requirements by making experimental conditions as similar as possible to conditions under which the results will apply (Cooper & Schindler, 2001, p. 403).*

In this study, the two scenarios were given to the respondents. Then the respondents were asked questions about the scenarios consecutively. This could influence the way they perceive the scenarios. In other words, one scenario might be perceived as being more positive than the other, which may influence their responses. Also the use of scenarios is extremely artificial, which means that the external validity could be affected. The respondents were, however, asked to complete the questionnaires within their working environment and within their own time.

Threats to internal validity refer to whether the independent variables tested for could have been the only variables responsible for changes in the dependent variable. Types of threats include:

- **History:** During the time of an experiment, an event may influence the responses. In this case, the repeated measures test eliminates this threat since only a short time has passed between the first and the second scenarios.

- **Maturation:** Changes over time may influence results between a pre-test and a post-test. Again, in this case the repeated measures test excluded this threat.

- **Testing:** The learning effect between the first and second response could influence the results. In this study, this could have had an effect because the reading of both scenarios before answering questions about one of them could influence the perception of the next, and thus influenced the responses to the second scenario. Although, again, it is a very short time and one was answered directly after the other.

- **Instrumentation:** Because this experimental design had no observers or experimenters, and the questionnaires were answered within the natural

working environment of the respondents, instrumentation was a minimum threat in this study.

- **Selection:** When control and experimental groups are compared they have to be as close as possible in all aspects to curb the threat of selection bias. The repeated measures test used in this study, in effect, equalised the groups.

- **Statistical regression:** This happens when a pre-test causes the scores to regress towards the mean in the post-test. Again, the repeated measures used prohibited this from happening.

- **Experiment mortality:** Since participants could leave the experiment at any time for various reasons, this could affect the pre-test–post-test comparison. Very few questionnaires in this study had only the first part completed and the second part incomplete, thus this was not a big threat in this study. The threat was also diminished by the repeated measure in one questionnaire and there was no time lag between the responses to the two scenarios.

Most of the above threats could be dealt with in this study by the repeated measures questionnaire and the random assignment of respondents. Internal validity can be increased if all extraneous variables can be controlled, or statistically tested for. In this study, the possible extraneous variables, identified by the pre-test focus groups, were issues such as type and size of organisation, the educational levels of the respondents, and the levels on which the respondents functioned within their organisations. The pre-test focus groups also mentioned that the actual organisation for which the respondents worked could influence how they perceive change management styles, as well as whether the respondent's organisation was actually going through a change at the time of the response.

These concerns all led to the setting of test hypotheses that served as experimental validation and control measures. The first test hypothesis was used to test for a difference in how the participants perceived the two scenarios. A meaningful difference between the experimental controls would improve the validity of the research instrument and show manipulation success.

Test hypotheses 2 to 6 all tested for extraneous variables identified by the theory and qualitative focus groups in the preparation phase of the research. Table 6.13 is a summary of the test hypotheses:

Table 6-13: Summary of test hypotheses

Hypotheses regarding experimental validation and control measures:		
Test Hypotheses (TH)		
TH1	=	There is a meaningful difference between the experimental controls of Scenario A (planned approach) and Scenario B (participatory approach) as perceived by the respondents.
TH2	=	There is a meaningful difference between the different organisations in terms of the respondents' responses to the two different scenarios.
TH3	=	There is a meaningful difference between the different educational levels of respondents in terms of their responses to the two different scenarios.
TH4	=	There is a meaningful difference between the different functional levels within organisation in terms of the respondents' responses to the two different scenarios.
TH5	=	There is a meaningful difference between the real change management styles followed in the respondents' organisations in terms of the experimental test of the relationships with the two scenarios.
TH6	=	There is a meaningful difference between the change or not in the respondents' organisations in terms of the experimental tests of relationships with the two scenarios.

6.8 Hypotheses operationalisation

In this section, each hypothesis will be explained as it is operationalised. First, each hypothesis will be stated, all relevant information regarding the hypothesis is then outlined in a table in order to clarify the procedures used, and lastly, the statistical notation of each hypothesis is given.

Each table consists of the number of variables concerned, a description of the variable, the data types, the concept measured, the method used to measure this concept, and lastly, the statistical technique used. A more detailed discussion of the statistical techniques used in each case can be found in Section 6.9.

6.8.1 Operationalisation of Test Hypothesis 1

Test Hypothesis 1 = There is a meaningful difference between the experimental controls of Scenario A (planned approach) and Scenario B (participatory approach) as perceived by the respondents.

Table 6-14: Test Hypothesis 1—Operationalisation

Number of variables	2 (independent)	7 (dependent)
Variables	Scenario A & Scenario B	Control measures of the experimental design: Question 26—32 of each of the scenarios
Data type	Non-metric—Nominal	Metric—Interval
Measurement	Meaningful difference between the experimental controls of Scenario A (planned approach) and Scenario B (participatory approach) as perceived by the respondents.	
Method of measurement	7 questions were asked to test the experimental validity of the experimental stimuli; that is, the two scenarios. These 7 questions related to change, communication, decision-making, change managers, conflicts, information flow, and evaluation. The two scenarios were done separately.	
Technique used	MANOVA	

Test Hypothesis 1 stated in Statistical Notation:

$$TH1 \quad \begin{matrix} \mu_{c1s1} \\ \mu_{c2s1} \\ \mu_{c3s1} \\ \mu_{c4s1} \\ \mu_{c5s1} \\ \mu_{c6s1} \\ \mu_{c7s1} \end{matrix} \quad \square \quad \begin{matrix} \mu_{c1s2} \\ \mu_{c2s2} \\ \mu_{c3s2} \\ \mu_{c4s2} \\ \mu_{c5s2} \\ \mu_{c6s2} \\ \mu_{c7s2} \end{matrix}$$

Notation used:

μ= Mean of variable (sample mean)

c = Control measures (ranging from 1 – 7)

s = Scenarios (ranging from 1 – 2)

6.8.2 Operationalisation of Test Hypothesis 2

Test Hypothesis 2 = There is a meaningful difference between the different organisations in terms of the respondents' responses to the two different scenarios.

Table 6-15: Test Hypothesis 2—Operationalisation

Number of variables	8 (independent)	2 (dependent)
Variables	Organisations 1 to 8	Average of relational index for Scenario A & Average of relational index for Scenario B
Data type	Non-metric—Nominal	Metric—Interval
Measurement	Meaningful difference between the different organisations in terms of respondents' responses to the two different scenarios.	
Method of measurement	Different organisations were used in the experimental design, and the average of the relational index was determined by adding the scores of the different relational dimensions.	
Technique used	MANOVA—Wilks' Lambda	

Test Hypothesis 2 stated in Statistical Notation:

$$TH2 \begin{bmatrix} \mu_{r1O1} \\ \mu_{r2O1} \end{bmatrix} \square \begin{bmatrix} \mu_{r1O2} \\ \mu_{r2O2} \end{bmatrix} \square \begin{bmatrix} \mu_{r1O3} \\ \mu_{r2O3} \end{bmatrix} \square \begin{bmatrix} \mu_{r1O4} \\ \mu_{r2O4} \end{bmatrix} \square \begin{bmatrix} \mu_{r1O5} \\ \mu_{r2O5} \end{bmatrix} \square \begin{bmatrix} \mu_{r1O6} \\ \mu_{r2O6} \end{bmatrix} \square \begin{bmatrix} \mu_{r1O7} \\ \mu_{r2O7} \end{bmatrix} \square \begin{bmatrix} \mu_{r1O8} \\ \mu_{r2O8} \end{bmatrix}$$

Notation used:
μ= Mean of variable (sample mean)
r = Average of relational index (ranging from 1 – 2)
O = Organisations (1 – 8)

6.8.3 Operationalisation of Test Hypothesis 3

Test Hypothesis 3 = There is a meaningful difference between the different educational levels of respondents in terms of their responses to the two different scenarios.

Table 6-16: Test Hypothesis 3—Operationalisation

Number of variables	2 (independent)	2 (dependent)
Variables	2 educational levels	Average of relational index for Scenario A & Average of relational index for Scenario B
Data type	Non-metric—Nominal	Metric—Interval
Measurement	Meaningful difference between the different educational levels in terms of the respondents' responses to the two different scenarios.	
Method of measurement	Different educational levels were included in the experimental design and the average of the relational index was determined by adding the scores of the different relational dimensions.	
Technique used	MANOVA—Wilks' Lambda	

Test Hypothesis 3 stated in Statistical Notation:

TH3 $\begin{bmatrix} \mu_{r1e1} \\ \mu_{r2e1} \end{bmatrix} \square \begin{bmatrix} \mu_{r1e2} \\ \mu_{r2e2} \end{bmatrix}$

Notation used:

μ= Mean of variable (sample mean)

r = Average of relational index (ranging from 1 – 2)

e = Educational levels (1 – 4)

6.8.4 Operationalisation of Test Hypothesis 4

Test Hypothesis 4 = There is a meaningful difference between the different functional levels within the organisation in terms of the respondents' responses to the two different scenarios.

Table 6-17: Test Hypothesis 4—Operationalisation

Number of variables	6 (independent)	2 (dependent)
Variables	5 levels in the organisation and a category of non-responses	Average of relational index for Scenario A & Average of relational index for Scenario B
Data type	Non-metric—Nominal	Metric—Interval
Measurement	Meaningful difference between the different functional levels within the organisation in terms of the respondents' responses to the two different scenarios.	
Method of measurement	Different functional levels were included in the experimental design, and the average of the relational index was determined by adding the scores of the different relational dimensions.	
Technique used	MANOVA—Wilks' Lambda	

Test Hypothesis 4 stated in Statistical Notation:

$$TH4: \begin{matrix}\mu_{r1L1}\\ \mu_{r2L1}\end{matrix} \square \begin{matrix}\mu_{r1L2}\\ \mu_{r2L2}\end{matrix} \square \begin{matrix}\mu_{r1L3}\\ \mu_{r2L3}\end{matrix} \square \begin{matrix}\mu_{r1L4}\\ \mu_{r2L4}\end{matrix} \square \begin{matrix}\mu_{r1L5}\\ \mu_{r2L5}\end{matrix} \square \begin{matrix}\mu_{r1L6}\\ \mu_{r2L6}\end{matrix}$$

Notation used:

μ= Mean of variable (sample mean)

r = Average of relational index (ranging from 1 – 2)

L = Levels in the organisation (1 - 6)

6.8.5 Operationalisation of Test Hypothesis 5

Test Hypothesis 5 = There is a meaningful difference between the real change management styles followed in the respondents' organisations in terms of the experimental test of the relationships with the two scenarios.

Table 6-18: Test Hypothesis 5—Operationalisation

Number of variables	3 (independent)	2 (dependent)
Variables	2 scenarios of styles that can be followed in the respondents' organisations and a category of non-responses	Average of relational index for Scenario A & Average of relational index for Scenario B
Data type	Non-metric—Nominal	Metric—Interval
Measurement	Meaningful difference between the real change management styles followed in the respondents' organisations in terms of the experimental test of the relationships with the two scenarios.	
Method of measurement	Options for the change management styles followed in the respondents' organisations were included in the experimental design, and the average of the relational index was determined by adding the scores of the different relational dimensions.	
Technique used	MANOVA—Wilks' Lambda	

Test Hypothesis 5 stated in Statistical Notation:

$$TH5 \quad \begin{bmatrix} \mu_{r1s1} \\ \mu_{r2s1} \end{bmatrix} \square \begin{bmatrix} \mu_{r1s} \\ \mu_{r2s2} \end{bmatrix} \square \begin{bmatrix} \mu_{r1s3} \\ \mu_{r2s3} \end{bmatrix}$$

Notation used:

μ= Mean of variable (sample mean)

r = Average of relational index (ranging from 1 – 2)

s = Respondent's organisational style (1 – 3)

6.8.6 Operationalisation of Test Hypothesis 6

Test Hypothesis 6 = There is a meaningful difference between the change in the respondents' organisations in terms of the experimental test of relationships with the two scenarios.

Table 6-19: Test Hypothesis 6—Operationalisation

Number of variables	3 (independent)	2 (dependent)
Variables	The fact, if major changes occurred, in the respondents' organisations and a category of non-responses	Average of relational index for Scenario A & Average of relational index for Scenario B
Data type	Non-metric—Nominal	Metric—Interval
Measurement	Meaningful difference between the change or not in the respondents' organisations in terms of the experimental test of relationships with the two scenarios.	
Method of measurement	The possibilities of major changes occurring in the respondents' organisations were included in the experimental design, and the average of the relational index was determined by adding the scores of the different relational dimensions	
Technique used	MANOVA—Wilks' Lambda	

Test Hypothesis 6 stated in Statistical Notation:

$$TH6 \quad \begin{vmatrix} \mu_{r1c1} \\ \mu_{r2c1} \end{vmatrix} \square \begin{vmatrix} \mu_{r1c2} \\ \mu_{r2c2} \end{vmatrix} \square \begin{vmatrix} \mu_{r1c3} \\ \mu_{r2c3} \end{vmatrix}$$

Notation used:

μ= Mean of variable (sample mean)

r = Average of relational index (ranging from 1 – 2)

c = Change in Respondent's organisation (1 – 3)

6.8.7 Operationalisation of Research Hypothesis 1 to 5

Research Hypothesis 1 to 5 = High participatory communication and change strategy will lead to significantly more trust/control mutuality/commitment/satisfaction/behavioural effects between an organisation and its employees than with a lower degree of participation and a planned approach.

Table 6-20: Research Hypothesis 1 to 5—Operationalisation

Number of variables	2 (independent)	1 (dependent)
Variables (the dependent variables are tested separately in each of the research hypotheses 1 to 5)	2 Scenarios of change strategy	1. Trust - 6 items of the relational index 2. Control mutuality – 5 items 3. Commitment – 5 items 4. Satisfaction – 5 items 5. Behavioural effects – 4 items
Data type	Non-metric—Nominal	Metric—Interval
Measurement	Causal relationship between scenario followed and each relationship factor that employees had with the organisation	
Method of measurement	The stimulus was the change management strategies depicted in the scenarios and the resulting relationship was measured by the items used to measure each separate relationship factor in the measuring instrument	
Technique used	ANOVA	

Research Hypothesis 1 to 5 stated in Statistical Notation:

H1	μ_{Rt1s1}	□	μ_{Rt1s2}
H2	μ_{Rm1s1}	□	μ_{Rm1s2}
H3	μ_{Rc1s1}	□	μ_{Rc1s2}
H4	μ_{Rs1s1}	□	μ_{Rs1s2}
H5	μ_{Bs1s1}	□	μ_{Bs1s2}

Notation used:

μ= Mean of variable (sample mean)

R = Relationship or behaviour factor (Rt = trust, Rm = control mutuality, Rc = commitment, Rs = satisfaction, B = behavioural effect)

s = Scenario of change strategy (ranging from 1 – 2)

6.8.8 Operationalisation of Research Hypothesis 6

Research Hypothesis 6 = High degree of participation during high change in organisations will lead to significantly more positive relationship between an organisation and its internal publics than with lower degrees of participation and a planned approach.

Table 6-21: Research Hypothesis 6—Operationalisation

Number of variables	2 (independent)	4 (dependent)
Variables	2 Scenarios of change strategy	Trust, control mutuality, commitment, satisfaction—all items of the relational index
Data type	Non-metric—Nominal	Metric—Interval
Measurement	Causal relationship between scenario followed and all the dimensions of the relationships that employees have with the organisation.	
Method of measurement	The stimulus was the change management strategy depicted in the scenarios, and the resulting relationship was measured by all the items in the measuring instrument. Scheffe's test was conducted to determine if the strategy followed for change had a meaningful impact on the relationships that employees would have with organisations	
Technique used	MANOVA – Scheffe's test	

Research Hypothesis 6 stated in Statistical Notation:

$$H6 \quad \begin{bmatrix} \mu_{r1s1} \\ \mu_{r2s1} \\ \mu_{r3s1} \\ \mu_{r4s1} \end{bmatrix} \square \begin{bmatrix} \mu_{r1s2} \\ \mu_{r2s2} \\ \mu_{r3s2} \\ \mu_{r4s2} \end{bmatrix}$$

Notation used:

μ= Mean of variable (sample mean)

r = Average of relational index (ranging from 1 – 4)

s = Scenario of change strategy (1 – 2)

6.8.9 Operationalisation of Research Hypothesis 7

Research Hypothesis 7 = There is a meaningful difference between Scenario A (planned approach) and Scenario B (participatory approach) in terms of the relationships with internal stakeholders.

Table 6-22: Research Hypothesis 7—Operationalisation

Number of variables	2 (independent)	4 (dependent)
Variables	2 Scenarios of change strategy	Trust, control mutuality, commitment, satisfaction—all items of the relational index
Data type	Non-metric - Nominal	Metric - Interval
Measurement	Statistical relationship between scenario followed and all the dimensions of the relationships that employees had with the organisation	
Method of measurement	The stimulus is the change management strategy depicted in the scenarios, and the resulting relationship was measured by all the items in the measuring instrument. Scheffe's test was conducted to determine if the strategy followed for change had a meaningful impact on the relationships that employees would have with organisations	
Technique used	MANOVA – Scheffe's test	

Research Hypothesis 7 stated in Statistical Notation:

$$H7 \quad \begin{bmatrix} \mu_{r1s1} \\ \mu_{r2s1} \\ \mu_{r3s1} \\ \mu_{r4s1} \end{bmatrix} \quad \square \quad \begin{bmatrix} \mu_{r1s2} \\ \mu_{r2s2} \\ \mu_{r3s2} \\ \mu_{r4s2} \end{bmatrix}$$

Notation used:

μ= Mean of variable (sample mean)

r = Average of relational index (ranging from 1 – 4)

s = Scenario of change strategy (1 – 2)

6.9 Data analysis and statistical techniques

The study used scientifically acceptable methods to ensure reliability and validity. The most important of these methods are outlined below.

6.9.1 Test for order differences

An ANOVA test was performed to ascertain whether there was a significant difference between the responses when the questionnaire for Scenario A (planned approach) and Scenario B (participatory approach) was alternated. ANOVA was also used to test research hypothesis 1 where there is one dependent variable and two independent variables.

ANOVA is a statistical method to test **analysis of variance**. One way analysis of variance is used when one is interested in "examining the differences in the mean values of the dependent variable for several categories of a single independent variable or factor" (Malhotra, 1993, p. 522). The ANOVA tells us whether the separate groups differ significantly regarding the dependent variable (Baxter & Babbie, 2004).

There are several conditions in order to perform ANOVA tests (Cooper & Schindler, 2001):

- The samples have to be randomly drawn from a normal population;
- Populations must have equal variances;
- There should be independence of error.

The test statistic for ANOVA is the *F* ratio, and if this is found to be significant it is difficult to determine which pairs are not equal (Cooper & Schindler, 2001). For this reason *multiple comparison tests* can be performed, of which there are more than a dozen with different options available. The *Scheffe's S* test, used in this study, is a conservative test that is robust to violations of assumptions. It is a complex comparison test with unequal n's, and equal variances assumed (Cooper & Schindler, 2001; Gay & Diehl, 1992).

6.9.2 Reliability analysis

Reliability pertains to consistency and the degree to which the same results may be obtained if the measure was repeated. This has to do with the accuracy and precision at which the measurement procedure is performed, and the main concern is with estimates of the extent to which any measure is free of error (Cooper & Schindler, 2001). Reliability measures have to be stable and cannot fluctuate (Stacks, 2002). Cronbach's Alpha reliability test was used to establish the internal consistency of the measuring instrument. Cronbach's Alpha is best suited for a multi-item scale with the interval level of measurement, such as was used in this questionnaire. A Cronbach's Alpha can also be used to determine a measure's reliability if some items are excluded from the measure.

In general, a coefficient of **0.70** or higher is considered good, and higher than **0.90** is considered excellent (Stacks, 2002). A value below **0.60** would indicate unsatisfactory internal consistency reliability. The reliability analysis in this case showed a coefficient of **0.97**, which indicated that the questionnaire was highly reliable for testing relationships between employees and their organisations in the scenarios.

6.9.3 Construct validity analysis

Cooper & Schindler (1998, p. 149) describe *validity* as the extent to which differences found in the research reflect true differences among respondents. The extent to which a measuring instrument actually measures what it sets out to measure determines the internal validity of the instrument (Stacks, 2002). Construct validity is the most sophisticated validity measure to determine what construct the scale is measuring (Malhotra, 1993). Most attitudinal measurement scales, such as that used in this study, are composed of a number of statements, which have more than one underlying concept to be measured. In this case the relationship measuring scale consists of the factors trust, commitment, satisfaction and control mutuality. A measure's validity can be established through a statistical factor analysis.

A principal component factor analysis was performed on the results obtained in this study in order to determine the extent to which the instrument measured

what it was intended to measure. Factor analysis is a multivariate technique used when one cannot distinguish between the dependent and the independent variables, and when metric data is used (Diamantopoulos & Schlegelmilch, 1997). The whole set of interdependent variables are thus examined and then presented in terms of underlying factors. These factors thus explain the correlations amongst a set of variables.

In principle components analysis the total variance in the data is taken into account, and is recommended when the main aim is to

> *determine the minimum number of factors that will account for maximum variance in the data for use in subsequent multivariate analysis (Malhotra, 1993, p. 625).*

Principle component analysis reduces the original variables into a smaller set of factors called principle components, which are not correlated with on another (Malhotra, 1993; Diamantopoulos & Schlegelmilch, 1997). A principle component is created through a linear combination of the original variables. Unities make up the diagonal of the correlation matrix, and full variance is included in the factor matrix.

Common factor analysis is used to determine the underlying dimensions and the common variance. As Malhotra (1993) point out, “Communalities are inserted in the diagonal of the correlations matrix” (, p. 625).

The ultimate aim of factor analysis is to gain parsimony, and the ultimate question always relates to the number of factors to be extracted (Malhotra, 1993). Various approaches can be followed, for example, the use of eigenvalues, percentage of variance accounted for, and significance tests.

When eigenvalues are used, only factors with eigenvalues greater than 1.0 are retained. Eigenvalues represent the amount of variance associated by a factor (Malhotra, 1993). When determination of which factors to retain is based on the percentage of variance, it implies that the cumulative percentage of variance extracted by a specific factor should reach a satisfactory level. At least a 60% of the variance should be accounted for.

Determination based on significance tests implies that statistical significance of separate items can be determined and only items that are significant will thus be retained (Malhotra, 1993).

Correlations coefficient is used to determine whether or not there is a relationship between variables (Gay & Diehl, 1992). The extent of the relationship is also determined. A positive correlation ranges from 0.00 to 1.00 and a negative one from 0.00 to -1.00. When a correlation coefficient is squared it usually indicates the amount of common variance shared by the variables. The higher the common variance between two variables, the stronger the relationship between them. A satisfactory factor solution in this study resulted in a cumulative variance of **78.34%**, which implied a high possibility that the instrument was measuring what it was intended to measure.

However, causality should not automatically be assumed, whatever the statistical significance (Cooper & Schindler, 2001). A coefficient is not necessarily remarkable simply because it is statistically significant.

In a factor analysis correlation coefficients are normally referred to as *loadings*. One would like to find some pattern where the first factor would be loaded on some variable and the second factor on others, and so forth for more factors. This would suggest a *pure* construct underlying a specific factor. Rotation is used to secure a less ambiguous condition between factors and variables (Cooper & Schindler, 2001), that is, preventing one variable of having a high correlations coefficient with more than one factor. The most commonly used method of rotation is the varimax procedure –

> *an orthogonal method of rotation which minimizes the number of variables with high loadings on a factor, thereby enhancing the interpretability of the factors (Malhotra, 1993, p. 627).*

Interpretations of factor loadings can be largely subjective as it is difficult to calculate the meanings of factors (Cooper & Schindler, 2001). Orthogonal rotation, especially, results in factors that are not correlated (Malhotra, 1993). In this case a correlation matrix was calculated to give a clearer indication of correlations.

A correlation matrix displays the coefficients for more than two variables and the table with findings are reported in the form of a triangle below the diagonal (Cooper & Schindler, 2001). The coefficients of 1.00 display the relationship of each variable with itself.

Another term used in this study that needs explanation is *multicollinearity*. "Multicollinearity arises when intercorrelations among predictors are very high" (Malhotra, 1993, p. 577). Multicollinearity might not always indicate a problem, but could imply that dimensions are not independent and rather highly correlated, which was the case in this study.

6.9.4 MANOVA

As mentioned previously MANOVA is an extension of ANOVA. It is an especially versatile technique to use in experimental research design. Multivariate analysis deals with more than two variables simultaneously and is therefore used to compare several groups in terms of several variables (Diamantopoulos & Schlegelmilch, 1997). MANOVA is also used to explore the interrelationships among sets of variables. The null hypothesis of an ANOVA would be that there is no difference in the group means for the specified variable, whereas the MANOVA hypothesis would specify that "there is no difference in the *sets* of means across the groups (since several variables are simultaneously compared)" (Diamantopoulos & Schlegelmilch, 1997, p. 210). Thus a MANOVA hypothesis refers to a set of variables as a whole rather than to separate variables.

To test multivariate hypotheses, multivariate significance tests are used (Diamantopoulos & Schlegelmilch, 1997), and there are several types. The most commonly used significance test is called Wilks' Lambda (or *U* statistic) and the smaller the value (close to 0) of a Wilks' Lambda (λ), the greater the implied significance. The univariate λ for each function makes up the Wilks' λ statistic and the significance value is calculated according to a chi-square transformation of the statistic (Malhotra, 1993). A large value of λ will be considered a λ close to 1 and this would indicate that group means do not seem to be different. "Wilks' λ for each predictor is the ratio of the within-group sum of squares to the total sum of squares" (Malhotra, 1993, p. 593).

In this study MANOVA was used to analyse Test Hypotheses 2 to 6. With all of these hypotheses one could:

- distinguish between the dependent and independent variables,
- there were several dependent variables,
- and the dependent variables were all metric (interval scales).

6.10 Summary

Experiments come closer than any primary data collection method to convincingly linking one variable to another. The greatest advantage of experimental design is the ability to manipulate the independent variable, which proved to be the most important reason for choosing this research design for this study. Another advantage of experimental design is that the influence of extraneous variables can be controlled, either through a control group, or through statistical testing. Experimental variables can be isolated and their influence can be measured over time. The disadvantage of generalisation with experimental design is not significant if compared to the advantage of being able to test theoretical concepts and contribute to theory building.

This chapter gave a description of the methodology used to test the hypotheses created from the literature discussed in the previous chapters. An explanation of the theory behind the methods used to prepare and analyse the data will aid in the understanding of the significance of the findings, which will be presented in the next chapter.