

## CHAPTER 4

### RESEARCH METHODOLOGY AND METHOD

*If we knew what it was we were doing, it would not be called research, would it?*

**Albert Einstein (1879-1955)**

#### 4.1 INTRODUCTION

Qualitative and quantitative approaches are applied in this research, as well as inductive and deductive reasoning. In any good quantitative research a map or framework of thirteen set steps is typically followed, in four distinct phases (conceptualisation, instrumentation, information gathering and closure). The validity of each step is important as indicated in Table 17.1 in Mouton (1996:111). The phases of qualitative research differ from those of quantitative research except for the conceptualisation phase. The steps in qualitative research also differ from those of quantitative research, because it is an evolving process of material (data) discovery, description and understanding. Figure 4.1 (adapted from Mouton and Marais, 1988; Neuman, 2000 and Babbie & Mouton, 2001) clearly indicates the integration of the qualitative and quantitative approaches followed in this research, and the conceptualisation and empirical research phases (see Figure 4.1).

#### 4.2 RESEARCH DESIGN

Hofstede and Neuijen (1990) suggest that measuring organisational culture is 'advisably started with a qualitative orientation and then followed up with a quantitative verification. Determine which operationalisable and independent dimensions can be used to measure them, and how do these dimensions relate to what is known about organisations from existing theory and research'.

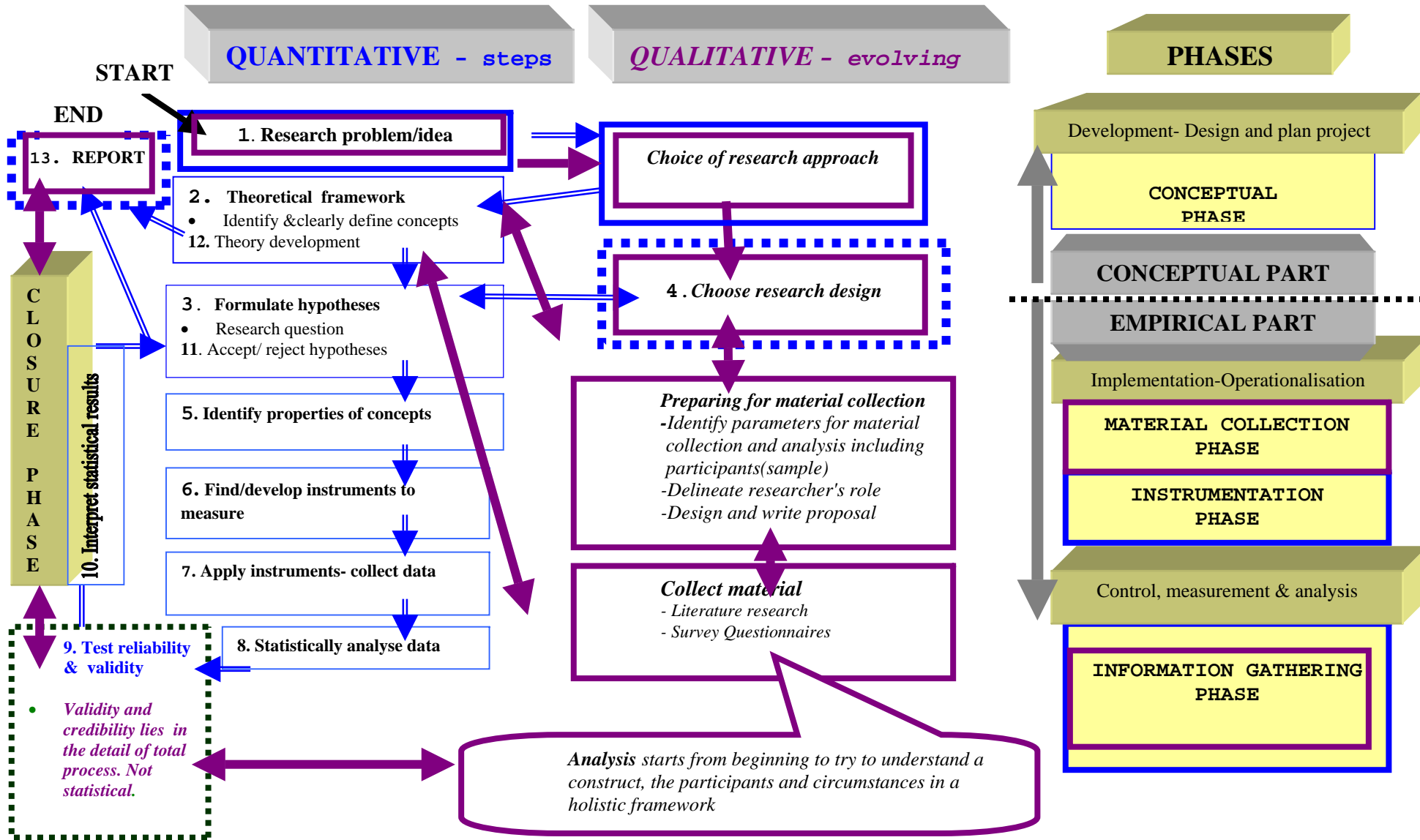
The complexity of the construct and research questions in this study necessitated the use of a triangulation approach (multiple methods). This

research was therefore designed in four stages (see Figure 4.2). The four stages can be briefly described as follows:

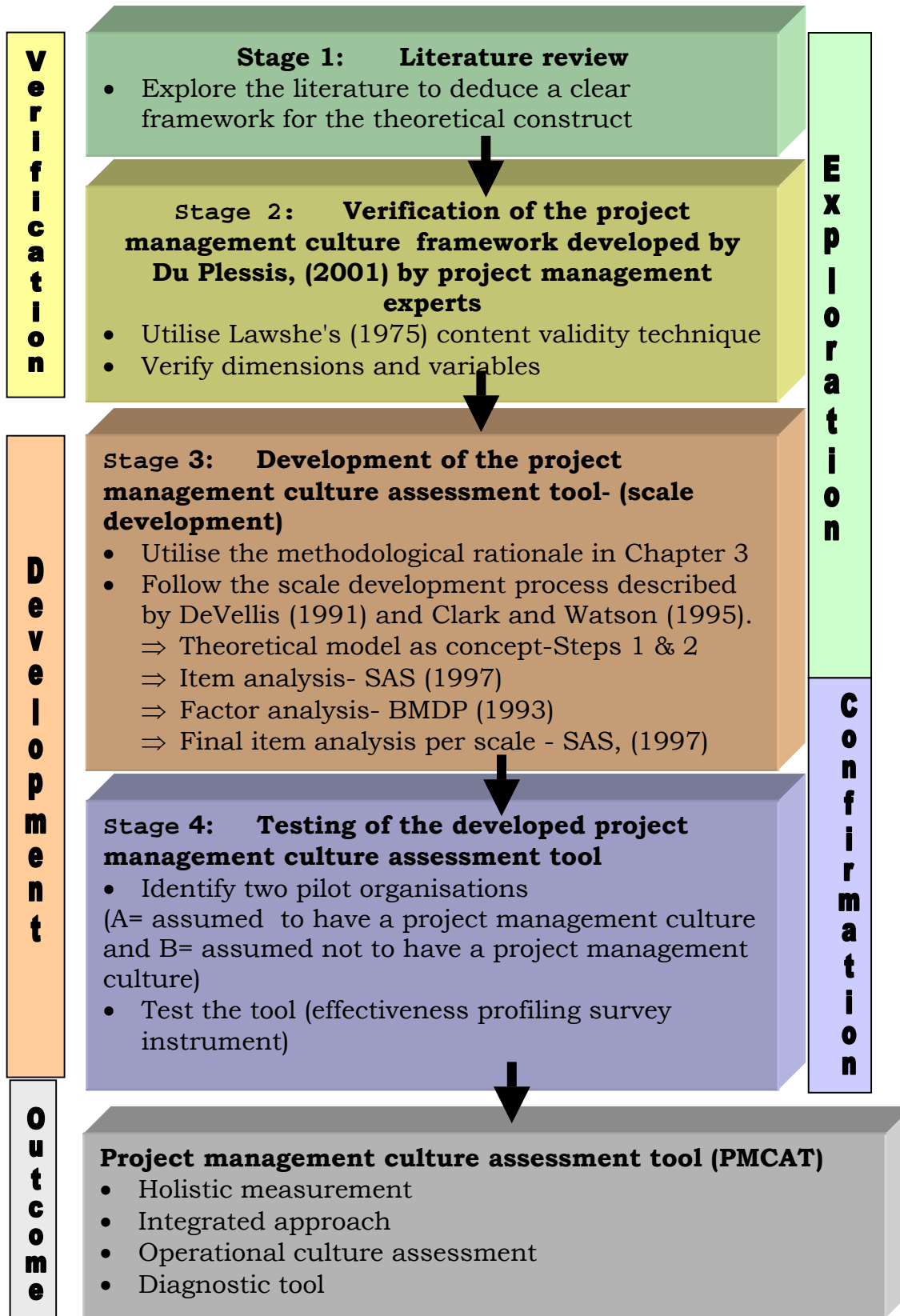
- **A literature study** was done to comprehend the context of the multidisciplinary fields involved and to provide a clear theoretical framework as the basis of which the desired project management culture assessment tool could be developed.
- **Verification of the project culture dimensions** and elements identified by Du Plessis (2001), by project management experts was done. This stage involved the use of a qualitative perception questionnaire, (Addendum A: Relevance questionnaire - Project Management Culture) and some means of quantification utilising Lawshe's (1975) quantitative approach to content validity.
- **The project management culture assessment tool** was developed utilising research inputs from previous researchers as mentioned in the literature (see Chapter 2) and the rationale for the methodology used (see Chapter 3). (Also see Addendum C: Project Management Culture Assessment Tool).
- **The final construct, assessment tool**, was tested as a pilot study in two organisations. One organisation (A) is renowned for successful project work and customer satisfaction over a number of years. Their employees are trained in and are actively practicing project management and was assumed to have a project management culture. The other organisation (B) is relatively new in the project management field, with little training and has not been able to get project work implemented successfully and thus was assuming not to have a project management culture. This test was designed to indicate whether the project management culture

assessment tool is able to distinguish between an organisation with a project management culture or not, and whether it can be utilised as a reliable diagnostic tool.

(see Figure 4.1 on overleaf)



**Figure 4.1: Integrated process using quantitative and qualitative research approaches**



**Figure 4.2: Research design and process**

The research design can mainly be classified as an exploratory and confirmatory study. The research started with an exploration of existing literature. A qualitative perception questionnaire (Addendum A) was employed to verify the data, using project management experts in terms of Lawshe's (1975) content validity technique previously researched by Du Plessis (2001) on the key dimensions and descriptive elements of a project management culture. The confirmatory part of the research consisted of a quantitative study using the survey method and an analysis of the factors and constructs of the assessment tool.

An effectiveness profiling survey assessment tool, as described in Chapter 2, was developed (such a tool has been cited by numerous researchers as contributing favourably to quantitative techniques in general). The nature of survey methods render them especially useful for organisational culture research (Lewis, 1996b; Ashkanasy *et al.*, 2000a).

### **4.3 PARTICIPANTS AND SAMPLING**

The empirical part of this study has two parts and therefore two different sampling groups were used:

- the *verification part* to check the project management culture dimensions and descriptive elements as identified in a previous study by Du Plessis, 2001; and
- the project management culture *assessment tool development part* (see Figure 4.2).

The *verification part* of the study made used a pool of 70 practising project managers and academics in project management from various organisations (South African industries and universities). These individuals practice project

management from a technical, process and research point of view and are thus not just from traditional project management, for example engineering firms. Participants were chosen non-randomly. A criterion in the participant selection was that all the participants had to be involved in project management, either as project managers or as project team member for at least five years. All participants received the same qualitative perception questionnaire (see Addendum A). Of the 70 questionnaires sent out, 52 were returned unspoiled. The number of responses (n=52), represents a 74% response rate.

The *assessment tool development part* used a pool of 494 practising project managers and experienced project team members who were non-randomly chosen from a database of students who had attended post-graduate project management training, between 1999-2001, at the University of Pretoria and who are working in project environments. The textbooks on factor analysis generally require the number of cases to be much larger than the number of variables, although they remain vague on the allowable limit:

"Unfortunately, nobody has yet worked out what a safe ratio of the number of subjects to variables is" (Gorsuch, 1983: 332). The rule of thumb in scale development is that approximately 300 responses are necessary to factorise items successfully (DeVellis, 1991). However, since the items in the questionnaire were divided into sub-scales on the basis of the theoretical model the number of responses could be less than 300 (the 'rule of thumb' often used is five responses per item). The maximum number of items per sub-scale was 48; therefore the minimum number of responses needed was 240 (5x48). Of the 494 questionnaires sent out, 236 were returned unspoiled. The number of unspoiled responses (n=236) represents a response rate of 48%. This number of responses was adequate to continue with scale development. The process steps in scale development indicated by DeVellis (1991) and supported by Clark and Watson (1995) as discussed in

Chapter 3 were used and are described in the research procedure (see point 4.4) in this chapter.

*The testing of the scale instrument to be developed* involved selecting two organisations that were engaged in project management. One organisation (A) is perceived as doing well in project management and has been involved in conducting successful projects for more than ten years. The other organisation (B) is perceived as not doing so well in project management and has only started with project work in the last year.

#### **4.4 RESEARCH PROCEDURE**

As was indicated earlier in this chapter this research consisted of two distinct phases namely: conceptualisation and empirical work (see Figures 4.1.and 4.2), which was clarified and integrated with the scale development process of DeVellis (1991), supported by Clark and Watson (1995).

The first five steps in DeVellis's (1991) process were completed during the conceptualisation phase and the verification process described below. Thus identifying the purpose, setting up the initial items from theoretical base, deciding on a format for measurement, the collection of the initial item pool and the validation of the items were completed.

##### **4.4.1 The conceptualisation phase**

The literature was researched (as discussed in Chapter 2) and deductions were made as to the construct of the questionnaire, based on a sound initial theoretical model.

##### **4.4.2 The empirical phase**

###### *4.4.2.1 Verification of the data by experts*

Data was gathered from project management experts by means of a qualitative perception questionnaire (Addendum A), based on a sound initial



theoretical model of the dimensions and descriptive elements of a project management culture identified in a study by Du Plessis (2001).

The questionnaire (Addendum A) was completed anonymously by 52 out of 70 experts who had received the questionnaire either by hand or by electronic mail.

Data was analysed by using Lawshe's (1975) content validity technique (discussed in Chapter 3). The validity of the items at this stage of the research was ensured by applying

- content validity to ensure that the sample of items are representative of project management culture as perceived by experts; and
- criterion validity to ensure that the items are practical and reflected the theory.

#### *4.4.2.2 Development of the project management assessment tool- scale development*

Steps 6 to 8 of DeVellis (1991) were followed as described below:

##### *4.4.2.2.1 Step 6: Administer items to a development sample*

A survey questionnaire comprising of 135 items (see Addendum B) was formulated on the basis of the feedback and data received from experts (see step 5 of DeVellis's process), complying with the theoretical construct and project management culture model with dimensions identified by Du Plessis (2001).

The items were formulated in such a way that they were easy to understand and clearly supported the theoretical model.

A Likert-type rating scale, with an unequal 1-5 agreement format, was chosen. It was noted that the mid-range option of 3 in the scale could lead to respondents choosing the middle option; however, equal number options could have resulted in respondents' falling to one side.

Data was gathered by distributing the survey questionnaire (see Addendum B) either by electronic-mail or by hand to the representative sample group of 494, of whom 236 responded anonymously.

#### *4.4.2.2.2 Step 7: Evaluate the items - Item analysis*

The 236 respondents' data (unspoiled returns) were analysed by means of a mainframe computer, assisted by the statisticians of the Department of Statistics at the University of Pretoria. The statistical programmes that were used are the SAS (1997) and BMDP (1993).

Item analysis on the initial 135 items per construct (theoretical model) was done to determine construct validity by means of a Pearson correlation. Items with an item-scale correlation of  $\leq 0.32$  were eliminated from the item pool.

#### *4.4.2.2.3 Step 8: Optimise scale length - Factor analysis*

Each of the four theoretical constructs (Project process, People in projects, Project systems and structure, and Project environment) were subjected to exploratory factor analysis (EFA), using the BMDP (1993) to determine the underlying scales or factor structure. The factors indicated on a scree plot with eigenvalues of 1.0 and higher were considered and were further

subjected to factor analysis using Principal Factor Analysis with Direct Quartinim rotation of the items. The sorted rotated factor loading pattern was evaluated and items with a factor loading  $< 0.35-0.5$  (without influencing the theoretical construct of a holistic measurement tool) were eliminated. This is in line with the recommendations of Hofstede and Neuijen (1990). A Cronbach alpha coefficient for each factor was set at  $>0.7$ . It is noted that the closer to 1.0 the alpha was, the better, but the theoretical basis of the tool should also be supported as a holistic tool (Clark and Watson, 1995).

The final scale with factors (the test instrument or assessment tool) derived from this research process, was subjected to item analysis to confirm the item correlation and to ensure that item correlations was  $\geq 0,32$ .

The assessment tool was then pilot tested in the two independent organisations selected. The pilot test instrument (see Addendum C) in the form of a diagnostic survey questionnaire was distributed by electronic mail or hand delivered to the specific organisations. Each questionnaire was marked as A (organisation A) or B (organisation B) to ensure that the responses would not be contaminated. The mean responses in each data construct, was tested against the other by using the Mann-Whitney t-test.

#### **4.5 CONCLUSION**

The research method was followed, based on scientific research as described in Chapter 3. No stumbling blocks were experienced in conducting the research, which indicated that the method was suitable and sound.

The results and findings derived from implementing the research method are reported on and discussed in the following chapter, Chapter 5.