

**ASSESSING THE FACTOR STRUCTURE OF THE
SOUTH AFRICAN PERSONALITY INVENTORY BY EMPLOYING A DICHOTOMOUS
AND A POLYTOMOUS RESPONSE SCALE**

by

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DECLARATION OF ORIGINAL AUTHORSHIP

I, Dalinda Prinsloo, declare that this dissertation titled, "Assessing the factor structure of the South African Personality Inventory by employing a dichotomous and a polytomous response scale", which I hereby submit for the degree MCOM IP at the University of Pretoria, is my own work and has not previously been submitted by me for a degree at another university.

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ABSTRACT

ASSESSING THE FACTOR STRUCTURE OF THE SOUTH AFRICAN PERSONALITY INVENTORY BY EMPLOYING A DICHOTOMOUS AND A POLYTOMOUS RESPONSE SCALE

In a multicultural society such as South Africa, there is a need for valid and reliable instruments measuring personality. Most personality instruments currently used in South Africa are imported from abroad and therefore have limited utility in the South African context as they have been developed for a specific group. The introduction of technology has resulted in personality measuring instruments increasingly being administered by means of computer-based assessments. The dramatic increase in computer-based assessments has sparked debate regarding the use of various response scale categories in personality assessment.

The present study, which forms part of the broader South African Personality Inventory (SAPI) project, focused on the preliminary qualitative personality structure produced by the SAPI project, which is categorised into nine clusters. The current study aimed to determine whether a dichotomous or a polytomous response scale administered by means of computer-based assessments would be more suitable for measuring the preliminary personality structure of the SAPI. The participants were first- and second-year undergraduate students enrolled at a tertiary institution ($N = 490$). The inventory consisted of 262 closed-ended personality statements and was administered in both the dichotomous (“agree” and “disagree”) and polytomous (“strongly agree”, “agree”, “somewhat agree/disagree”, “strongly disagree” and “disagree”) response scale form.

The results, which were based on an exploratory factor analysis, revealed that 37.2% of the items in the dichotomous response scale were problematic, whereas only 3.6% of the items in the polytomous response scale were problematic. By comparing the factor structures of the dichotomous and polytomous response scales, the polytomous response scale was determined to be more suitable for measuring the preliminary personality structure of the SAPI.

The conclusion was based on two specific criteria. Firstly, the factor structure across the polytomous response scale loaded similarly to the qualitative personality structure that was conceptualised in the first phase of the SAPI project. Secondly, Cronbach alpha coefficients, ranging from 0.60 to 0.87 across the nine factors, with the exception of the Integrity and Openness clusters with values of 0.45 and 0.53 respectively, for the polytomous response scale were higher than those yielded by the dichotomous response scale.

Keywords: *computerised assessments, factor analysis, personality assessment, reliability, response scale categories, South African Personality Inventory (SAPI)*

CHAPTER 1

INTRODUCTION TO THE STUDY

1.1 INTRODUCTION

In a multicultural society such as that in South Africa, it is essential that personality measuring instruments are valid and reliable for all test-takers and at the same time cross-culturally applicable. Personality testing has become controversial in South Africa in recent years. This is because most personality instruments used in South Africa were initially developed for specific non-South African cultural groups. In most cases personality instruments were imported from abroad or adapted for the South African context. The aim of this study is to validate the preliminary personality inventory, the South African Personality Inventory (SAPI)¹, developed in South Africa by determining whether a dichotomous or polytomous response scale is more suitable in measuring the desired constructs.

The sections below provide background to the study, followed by the problem statement, purpose, research objectives and the significance of the study. The chapter also briefly discusses the limitations and assumptions of the study, the key terms used in the study, as well as the research design and methodology. Finally, the chapter provides a brief overview of the chapter layout.

1.2 BACKGROUND

As the diversification of cultures in South Africa has increased the application of assessment instruments also increased. Due to the globalisation of world trade a large variety of personality assessment instruments are available in South Africa. Most personality measures used in South Africa are imported from other countries and have been developed based on existing personality models (Foxcroft & Roodt, 2009). This poses a problem for South Africans because many psychologists use

¹ The aim of the South African Personality Inventory (SAPI) project is to develop an indigenous personality measure for all 11 official languages in South Africa.

assessment instruments that were developed for one specific culture and apply these instruments to different cultures. In South Africa, most of the personality inventories currently in use were developed based on the etic approach (in other words, they emphasize the universals or core similarities in all human beings). These personality measures do not account for specific cultures and do not include the utilisation of a culture-specific orientation (Church, 2001). The problem facing psychologists is that the available personality measures do not always represent the multicultural and multilingual South African environment (Foxcroft & Roodt, 2009). This problem has resulted in inadequate assessment of individuals and can influence the selection of job applicants with consequences for both applicant and employer.

It is therefore important that assessment scores obtained across different cultural groups are valid and reliable because this is a precondition for valid comparisons and interpretations (Foxcroft & Roodt, 2009). To overcome the current problems in personality measurement, the SAPI project, which has therefore far resulted in the identification of a nine-factor personality structure, is attempting to create a personality inventory that is compatible with the multicultural and multilingual environment of South Africa and is not focused on only one ethnic group.

The process of development of the SAPI is known as the SAPI project and consisted of two stages. The first stage was qualitative and comparative and included the development of a personality structure that would reflect the 11 official language groups in South Africa. The second stage is quantitative and involves the attempt to integrate testing instruments with each of the language groups found in the first stage (Nel et al., 2012).

Previous research on the SAPI project focused mainly on one particular personality cluster of the SAPI and only applied the Likert scale as a response scale, for example the work by Janse van Rensburg (2010) focusing on Conscientiousness, Lötter (2010) focusing on Integrity and Chrystal (2012) focusing on Emotional Stability. Based on their research, it was recommended that the effect of the type of response scale on the factor structure of the SAPI for factor analysis and internal reliability should be tested by means of the ideal point response scale or the dichotomous response scales. The present study goes beyond merely replicating

previous research studies conducted on the SAPI and extends the scholarly literature by focusing on all nine clusters separately, rather than focusing on individual clusters as was done in previous research. Specifically the study focuses on all nine SAPI factors and explores the impact of both the dichotomous and polytomous response scales on the SAPI factor structure.

According to Van de Vijver and Tanaka-Matsumi (2008) and Van de Vijver and van Hemert (2008), there are two main concerns in cross-cultural personality assessment. The first concern is whether the concepts and constructs measured apply to all the language groups and whether they have the same meaning in the different cultures. The second concern is whether the scores obtained can be directly compared for the different language groups. Another factor influencing cross-cultural personality assessment in South Africa concerns the decision regarding which response scale would be the most appropriate for a particular scale (Van de Vijver & Tanaka-Matsumi, 2008).

This study focuses on two types of response scales, namely the dichotomous and polytomous response scales. The dichotomous response scale is a quantitative tool that uses a two-point scale. It is generally used in social psychology research (Fox, 2005). This type of response scale (also known as the Guttman scale) was developed to test the one-dimensionality of a set of items (Fox, 2005; Foxcroft & Roodt, 2009). Dichotomous response scales are mostly associated with the measurement of attitudes (Cziko, 1984; Foxcroft & Roodt, 2009). Cziko (1984) and Gomez, Vance, and Gomez (2011) found that the dichotomous response scale can also provide reliable and valid measures of cognitive variables and is able to discriminate between items belonging to different dimensions.

Polytomous response scales, also referred to as Likert-type scales, are generally used in applied psychological research that generates continuous data (Tay, Ali, Drasgow, & Williams, 2011). According to Tay et al. (2011), it is preferable to use polytomous response scales when assessing self-reported typical behaviour because these scales are able to define the constructs being measured more clearly.

It is important that researchers use the most suitable style of response scale as the comparability of cross-cultural scores is affected by response styles that could be a potential source of bias. A possible reason for this is that some people may have a tendency towards responding to items in a methodical pattern. This problem may be increased when online assessments are used (Balajti, Darago, Adany, & Kosa, 2010). In recent years, more research attention has been focused on online assessments or web-based surveys compared to paper-and-pencil methods (Bethlehem, 2010; Balajti et al., 2010). It is therefore important to understand the essence of each technique before deciding on one specific response scale (Balajti et al., 2010). The broad themes of cross-cultural personality assessment in South Africa and the challenges relating to valid and reliable measurement were introduced above. This study has academic and practical significance because it contributes to the ethical application of the SAPI to the 11 official language groups in South Africa. The study therefore bridges the current gap in cross-cultural assessment. The present study also contributes to the establishment of the SAPI inventory as part of the larger SAPI project.

The purpose of the present study is to focus on the preliminary nine-factor personality inventory, the SAPI. The rationale for the study was, firstly, to establish the suitability of either or both the dichotomous response scale and the polytomous response scale in measuring the desired constructs of the preliminary nine-factor SAPI. Secondly, to determine whether the preliminary nine-factor inventory measures the desired constructs and, on the basis of this determination, draw conclusions about the most suitable response scale for use with the SAPI inventory items.

1.3 PROBLEM STATEMENT

Tests that do not account for psychological domains that are applicable to different cultural groups are currently widely used in many countries (Meiring, 2007). The majority of personality inventories used in South Africa are administered in either Afrikaans or English, which means under-representation of individuals in the other South African language groups. This gap has been addressed by developing a preliminary personality measuring inventory (the SAPI) that represents the different

cultures in their most proficient language. It is hoped that this inventory will ultimately solve the problem of personality measurement in South Africa. The problem faced by the SAPI project was the fact that the personality assessment instruments used in South Africa are not developed for multicultural and multilingual South Africans, and therefore do not necessarily represent the different cultural groups in a valid way (Meiring, Van de Vijver, & Rothmann, 2006). To address this problem, an extensive quantitative study was conducted, which focused on the development of culturally appropriate response scales for the SAPI.

An additional problem faced by the SAPI project concerns the question of whether a dichotomous or polytomous response scale has more meaning for the nine-factor personality structure. In other words, which response scale would be most suitable to measure personality when administered through a web-based survey. This study was designed to address this problem. The data from this study will determine whether the dichotomous and polytomous response scales are compatible with the nine-factor personality structure in South Africa. Both the dichotomous and polytomous response scales were tested in order to make comparisons. The comparison will also demonstrate whether the dichotomous or the polytomous response scale is more suitable for the SAPI and best replicates the preliminary qualitative South African personality structure.

1.4 PURPOSE OF THE STUDY

The purpose of this study was to investigate which response scale would be more appropriate to use when assessing personality through an empirical quantitative measuring inventory, the SAPI. To achieve the purpose of the study, research objectives were used as a guide for developing the arguments.

1.5 RESEARCH OBJECTIVES

The following overall objective was formulated:

- To examine whether using a dichotomous or a polytomous response scale with the SAPI inventory would be more effective in measuring personality.

The following general research objective was formulated for the study:

- To determine whether a dichotomous or polytomous response scale administered online would be more suitable to use for the SAPI.

The following more specific research objectives to achieve the overall objective were formulated:

- To determine which response scale would best replicate or be representative of the preliminary qualitative personality factor structure.
- To identify the difference between the dichotomous and polytomous response scales in terms of which scale is more reliable in measuring personality specific to the SAPI.

1.6 SIGNIFICANCE OF THIS STUDY

Previous research on the SAPI project has focused on specific clusters such as conscientiousness, intellect and soft-heartedness. Hence the significance of the study is that it goes beyond merely replicating previous research studies conducted on a single cluster of the nine-factor personality structure but extends current literature by using all nine clusters separately in order to assess the effectiveness of the dichotomous and polytomous response scales. This study is original and unique in the sense that it contributes to study of the current personality measurements being used in South Africa. This study captures the multicultural environment. The academic contribution of this study is that it will allow for more accurate reliability comparisons in cross-cultural assessment. The results of this study will enable researchers to develop better guidelines for good practice in the SAPI project. The next section briefly addresses the delimitations and assumptions of the study.

1.7 LIMITATIONS AND ASSUMPTIONS

1.7.1 Delimitations

One limitation of the research is that it only assessed students enrolled at the University of South Africa (Unisa). The specific context of the study therefore

included only students who were enrolled for a specific diploma at Unisa. The theoretical perspectives relating to the study only accounts for the following themes: the dichotomous response scale, the polytomous response scale, the nine-factor personality structure and online assessments. The relationship between the dichotomous response scale and the nine-factor personality structure was studied as well as the relationship between the polytomous response scale and nine-factor personality structure. Time was another limitation, as it was not possible to predict how long it would take to collect the data. It was therefore necessary to consider the different workloads and living circumstances of the students and lecturers involved in the study. Owing to the fact that Unisa is an open distance education institution, the motivation of the students is questionable as they may think completing the inventory in a positive manner they will be favoured above other students, although the population used in this study was representative of different age and race groups. The Unisa culture does not always represent the most loyal commitment on the part of students; since most of them are working people and do not always have spare time to complete inventories that are voluntary.

1.7.2 Assumptions

In general, it was assumed that most students would be computer-literate and would therefore be unlikely to experience computer anxiety. Furthermore, the assumption was made that most students would be familiar with Unisa's internal system (myUnisa) and capable of using the self-assessment tool without assistance.

1.8 DEFINITION OF KEY TERMS

The study contains several terms which may be unfamiliar to the reader. This section provides definitions of key terms used in the study.

Dichotomous response scale: A quantitative tool that uses two point scales (Guttman, 1950; Tay et al., 2011).

Nine-factor personality structure: The final nine clusters of the SAPI, comprising the following: conscientiousness; emotional stability; extraversion; facilitating; integrity; intellect; openness; relationship harmony; and soft-heartedness (Nel et al., 2012).

Polytomous response scales: A quantitative tool that uses more than two points in its response options (Tay et al., 2011).

Reliability: “The reliability of a measure refers to the consistency with which it measures whatever it measures” (Foxcroft & Roodt, 2009, p. 47).

Validity: “The validity of a measure concerns what the test measures and how well it does so” (Foxcroft & Roodt, 2009, p. 47).

Web-based surveys: A structured method of data collection where the questionnaire is in a digital version administered online (Saunders, Lewis, & Thornhill, 2009).

The abbreviations used in this study are explained in Table 1.1 below.

Table 1.1: Abbreviations used in this document

Abbreviation	Meaning
CBA	Computer-based administration
CBT	Computer-based testing
PBA	Paper-based administration
SAPI	South African Personality Inventory
SPSS	Statistical Package for Social Sciences
Unisa	University of South Africa
WBA	Web-based administration

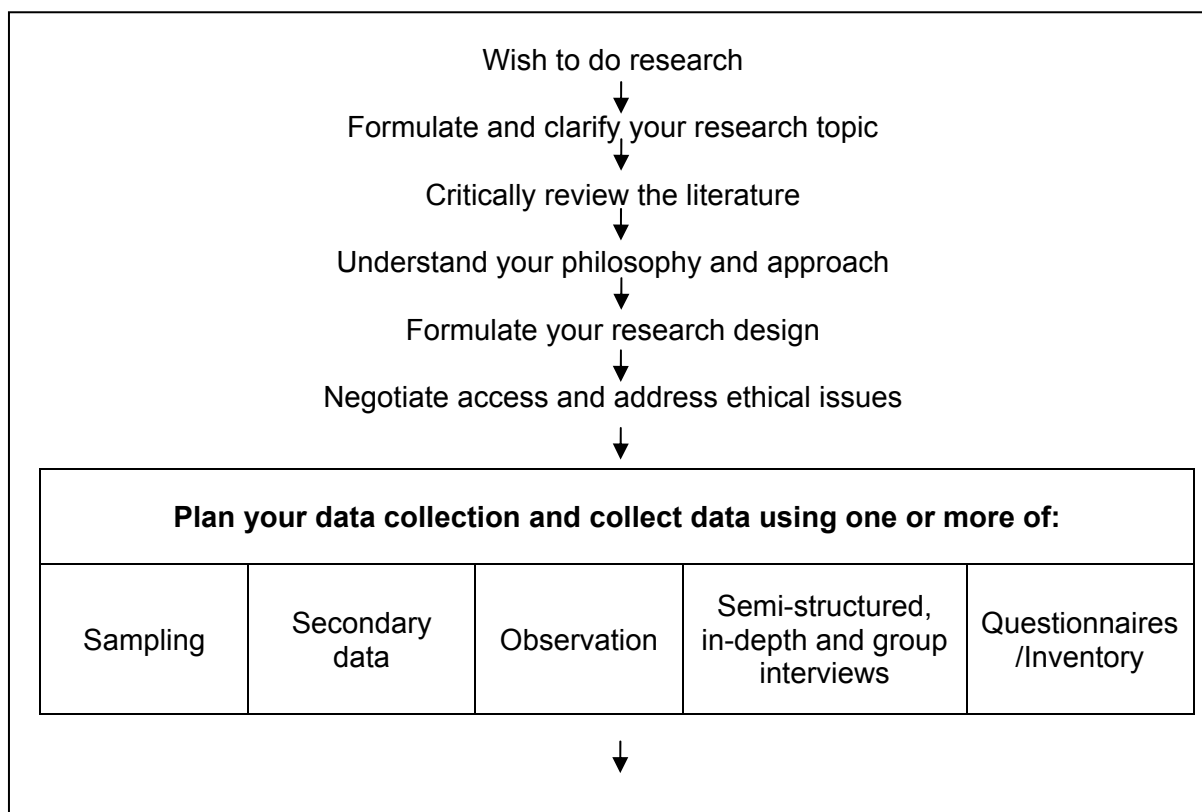
1.9 RESEARCH DESIGN AND METHODOLOGY

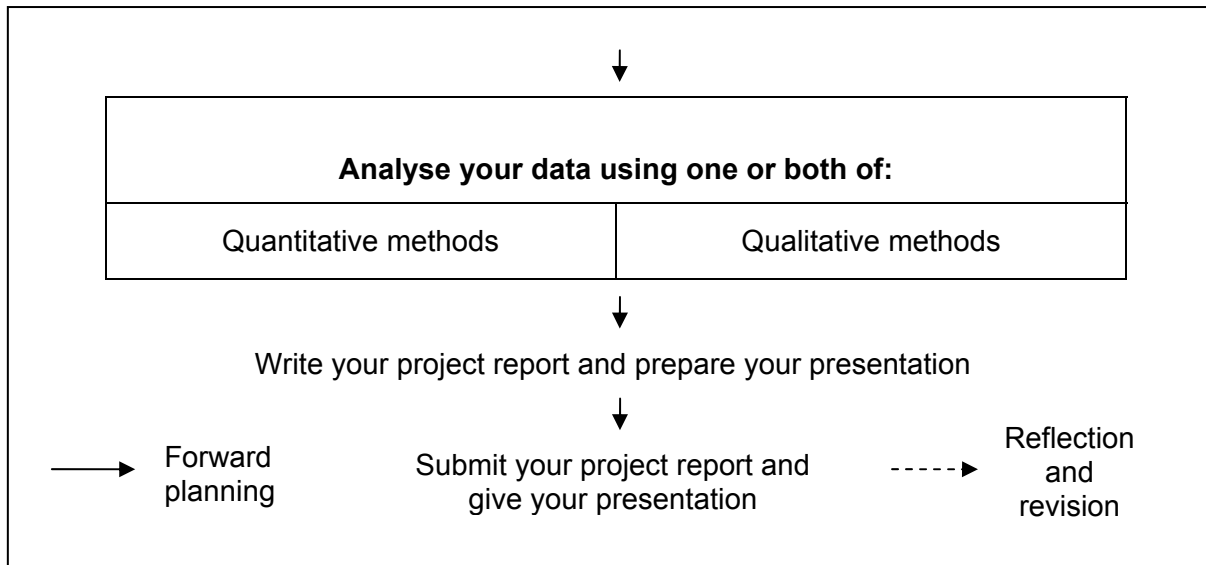
The research design and methodology chosen for this study are briefly explained in this section. According to Saunders et al. (2009), in the early stages of a research study, the researcher should be clear on what will be done and the reasons why this is being done. In most research studies, a multistage process is followed at the start

of the project. Although the exact number of steps applied in various research projects may differ, most research studies follow the 10 steps described by Saunders et al. (2009). According to Babbie (2005), it is necessary to understand and have an overall idea of the research process, because this provides the researcher with a step-by-step outline of the research. Based on the research steps described by Saunders et al. (2009), Figure 1.1 provides an overview of the research process followed in the study.

The research process in this study was linear and involved a specific sequence of linked processes and steps. According to Saunders et al. (2009) all researchers should follow these steps, although some researchers may include only some of them. The first step involves having an interest in or an idea about a certain topic (Babbie, 2005; Saunders et al., 2009). In this study, once the research topic that relates to personality had been identified, the research design and appropriate literature were critically reviewed. A decision was taken to use quantitative methods to collect and analyse the data.

Figure 1.1: The research process





Source: Adapted from “Research methods for business students (5th ed.)” by M. Saunders, P. Lewis, & A. Thornhill (2009, p. 11).

1.10 CHAPTER LAYOUT

Chapter 2: Literature review

The purpose of this chapter is to provide theoretical background regarding how and when the SAPI project began and how this study fits into the larger project. The first part of the chapter explains the foundation of the study. The chapter also contains a literature review, which is divided into the following three subsections: (1) cross-cultural assessment; (2) the response scales most appropriate for measuring personality; (3) the consequences of online assessment and measurement.

Chapter 3: Research methodology

This chapter describes the research design and methodology and the most appropriate research philosophy for the study. It also explains the strategy of inquiry. The sample, the data collection method, measuring instrument and analysis are discussed in order to clearly interpret the findings.

Chapter 4: Research results and discussion

This chapter integrates and interprets the data analysis and results of the study. The discussion focuses on how the data were screened and prepared, the descriptive statistics, factor analysis and reliability of the nine clusters of the SAPI.

Chapter 5: Conclusions, limitations and recommendations

The closing chapter deals with the conclusions relating to the success of the research objectives. It also summarises the implications and limitations of the main findings of the research and makes recommendations for future research.

1.11 CHAPTER SUMMARY

This chapter provided an overview of the background to and rationale for the study. The purpose of the study is to investigate whether the dichotomous or polytomous response scale is more suitable for assessing personality by means of an empirical quantitative study. The significance of the study lies in the fact that it will not only contribute to the current personality measurements being used in South Africa, but it is also the very first study to use all nine SAPI clusters together in one assessment. The study also allows for more accurate reliability comparisons by investigating the different types of response scales and administration methods to ultimately choose one administration method.

Chapter 2 discusses the foundation on which the study was built.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter provides an overview of the literature, and is divided into four sections: (1) background to psychological testing practice in South Africa and the SAPI project; (2) the development of the SAPI structure; (3) cross-cultural personality assessment; (4) dichotomous and polytomous response scaling; and (5) online assessment and measurement. The chapter ends by drawing conclusions regarding the literature presented.

2.2 BACKGROUND

In South Africa, research on personality and culture is thriving regardless of economic, social and political conditions. In the past 25 years the use of cross-cultural studies in particular has increased significantly and that more studies incorporate cross-cultural components (Van de Vijver & Tanaka-Matsumi, 2008). South Africa often follows international trends and this has been the case with psychometric testing. This is unfortunate as it has resulted in psychometric tests being applied in a multicultural setting without the psychometric testing being representative of the different cultural groups. Since the 1990s South Africa has imported tests and these tests have been used in a variety of sectors in the community (Meiring, Van de Vijver, Rothmann, & Barrick, 2005). Cross-cultural issues in psychometric testing were recognised as early as the 1920s, when concerns were focused mainly on black South African citizens and their trainability (Abrahams & Mauer, 1999). Questions of fairness, bias, and discriminatory practices started to emerge in the 1980s because different cultural groups expected people to have a better understanding of their nature and unique cultural backgrounds. Specific cultural groups therefore received more attention because of international developments in the field (Gopaul-McNicol & Armour-Thomas, 2002).

Following the first democratic elections in South Africa in 1994 there has been a demand for culturally appropriate psychological tests for use with a South African population. The *Constitution of South Africa* and section 8 of the *Employment Equity Act 55 of 1998* underscore the importance of culturally appropriate psychological testing (Laher & Cockcroft, 2013). According to the *Employment Equity Act* psychological testing is prohibited unless it meets certain criteria. Therefore, psychological testing can be used only if “it has been scientifically shown to be valid and reliable; it can be applied fairly to all employees; and it is not biased against any employee or group” (Van Niekerk, Christianson, McGregor, Smit, & Van Eck, 2008, p. 142).

Given the global trends and the knowledge-driven industry transformation of South African society, industrial psychologists need to make an effort to remain up to date and strategic in terms of using more advanced statistical methods, choosing more effective task strategies and promoting reliable and valid psychological testing (Bergh & Theron, 2006). Test developers are also striving to make their instruments universally applicable (Laher & Cockcroft, 2013). Regardless of the specific profession, professionals are required to make judgements daily and need to measure outcomes that make sense of these judgements (Salkind, 2013). A proactive approach to the measurement of personality across different cultural groups is required in order to meet the requirements of the *Employment Equity Act 55 of 1998* pertaining to the psychological testing of multicultural groups in South Africa (Van Niekerk et al., 2008).

The SAPI project represents a proactive approach to the measurement of personality across multicultural groups. It was launched in 2005 to address the deficiencies in current personality testing in South Africa. The ultimate goal of the SAPI project is to develop a personality inventory that will be available in all 11 languages in South Africa. The SAPI project comprises a two-stage process. The first stage was conceptual and qualitative, with the main focus being to create a personality structure that would be representative of all 11 official language groups in South Africa. The second stage is quantitative, and mainly focuses on the development of a personality inventory, which includes item development, scale development and ultimately the empirical validation of the preliminary personality inventory. The

current study falls within the second stage of the SAPI project and focuses on both the dichotomous and polytomous response scales. The aim of this study is to determine which one of the two response scales is more suitable for representing the nine-factor personality structure.

2.3 DEVELOPMENT OF THE SAPI STRUCTURE:

STAGE 1 - QUALITATIVE PHASE

In order to enhance the validity and reliability of personality assessment, the idea of the SAPI project was to create a personality inventory that would benefit South Africans in numerous ways. The specific aim was to explore South African personality structure. This was done by using conceptions and methodologies derived from each of the 11 language groups being studied. The SAPI project explored the development of an implicit personality structure by employing a convergent approach utilising both emic and etic approaches. The first stage involved the selection of the participants from the 11 language groups from which data were gathered and analysed (Valchev et al., 2011).

2.3.1 Selection of participants

In the development of the SAPI structure, a target of 120 participants from each of the 11 language groups was selected. Both convenience and quota sampling were used to allow for a variation among the gender, age, education and rural residence of participants. The target population included whites, coloureds, Indians and Africans. Interviews were conducted with 1 216 participants from the 11 official language groups (Nel et al., 2012).

2.3.2 Data gathering

In the qualitative study, semi-structured interviews were conducted by field workers in that specific home language across the 11 languages (Cheung, Van de Vijver, & Leong, 2011; Nel et al., 2012). The SAPI team attempted to collect as many personality-descriptive terms through the interviews as possible to ensure

representation of the different cultural views (Nel et al., 2012). Participants had to describe themselves and nine other well-known or close individuals, for example: “Please describe the following people to me by telling me what kind of person he or she is?” The data were collected and tape-recorded. After the notes of the interviews had been compiled, written records in the form of transcripts were made and translated into English for the purpose of data analysis (Nel et al., 2012).

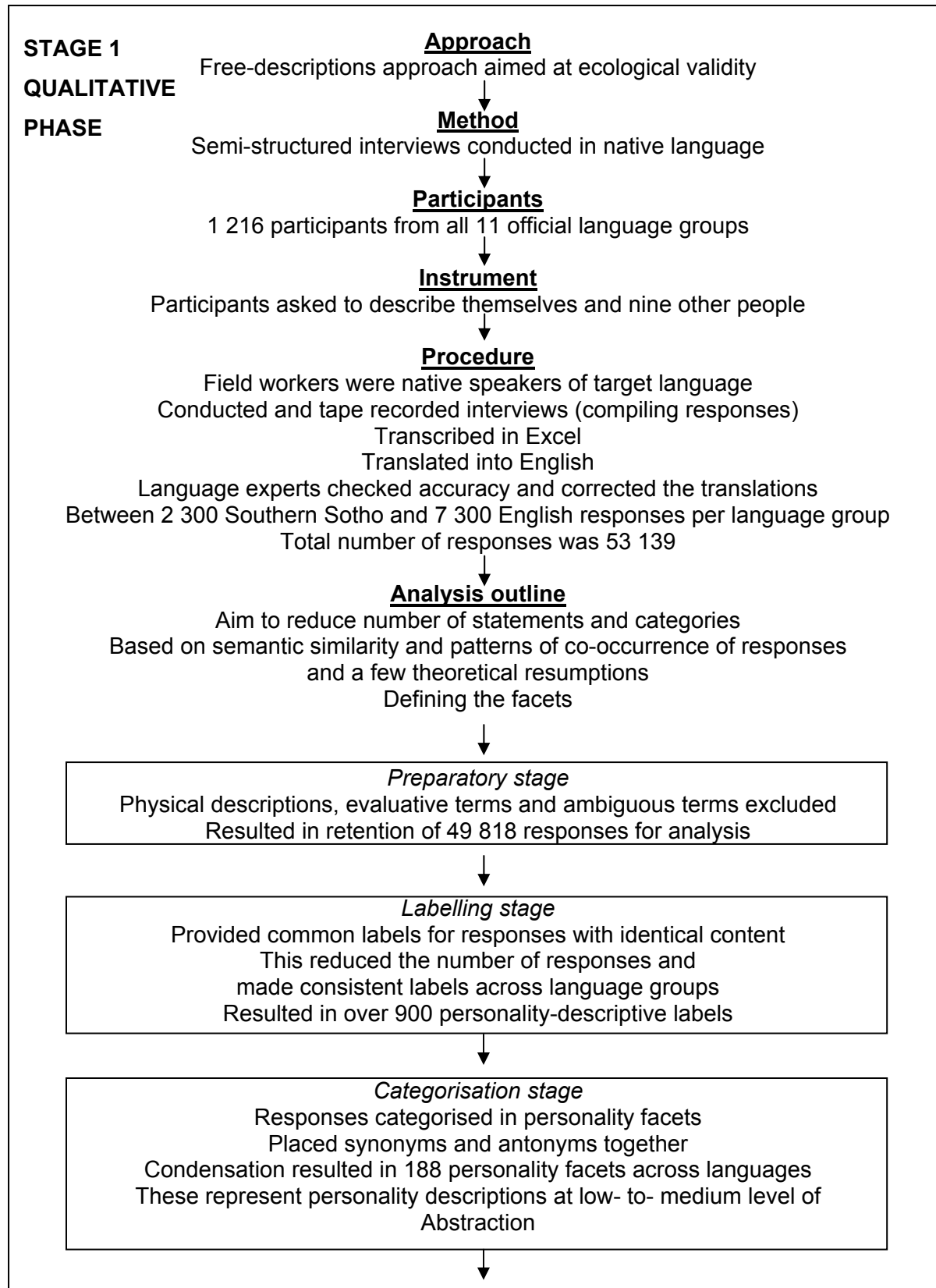
2.3.3 Data analysis

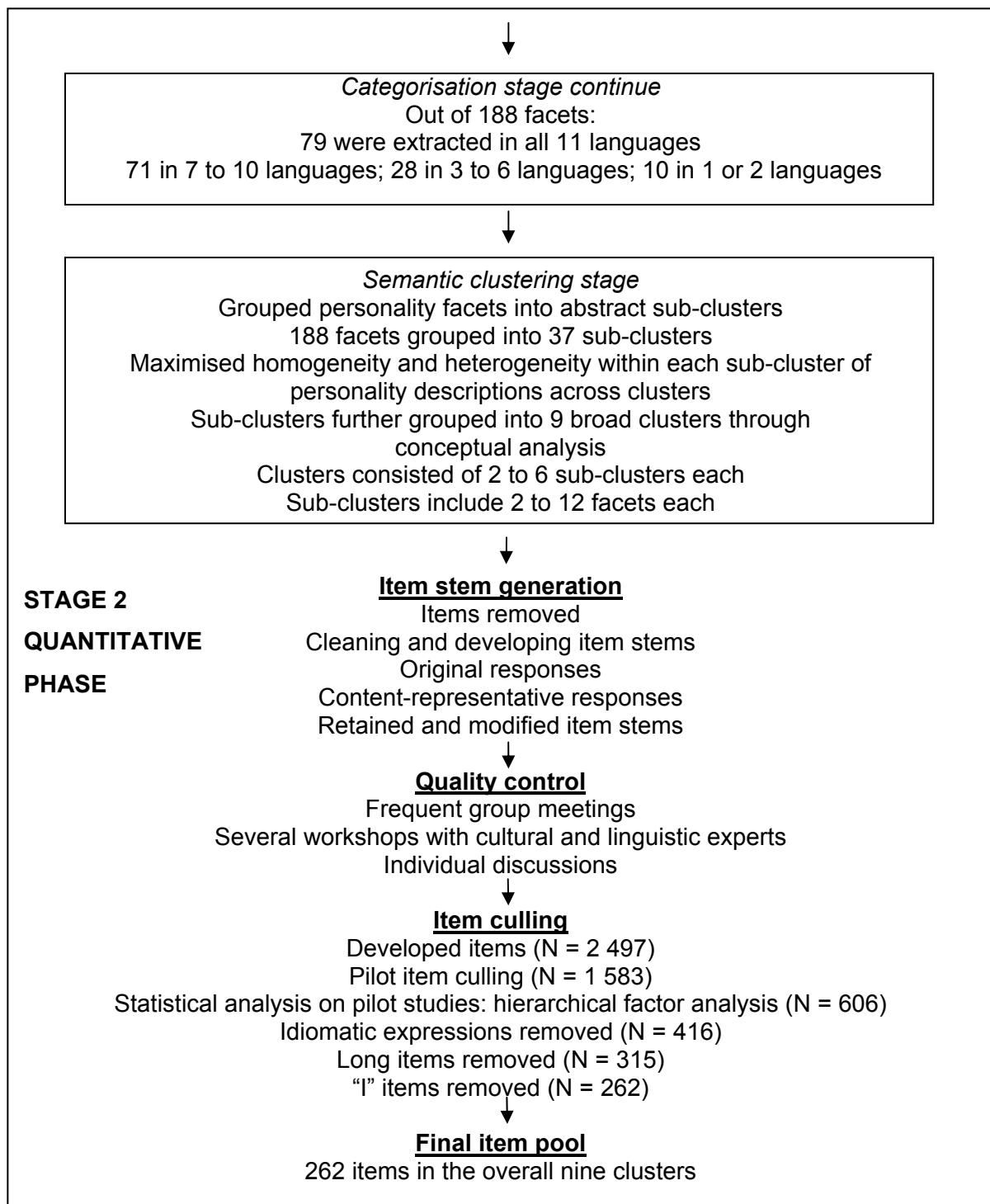
The initial translations were checked by cultural and linguistic experts with a view to assessing their accuracy. Translations were corrected where necessary. This ensured that the personality-descriptive terms were accurate and effective. Ambiguous and non-personality terms for example “She is unlike other girls”, “He has a dark complexion”, and “He is not good” were removed and the complex responses were divided into separate units. The next step entailed content analysis that was applied to place the terms in facets. This was done by grouping the original responses and extracting content-representative responses that facilitated the describing of the nine SAPI constructs. During this step the qualitative responses were also transformed into items stems. By comparing the verbalisations, the adequacy of each clustering was checked, and this ensured that there were no discrepancies in the meaning of the terms. The SAPI team then sorted the personality-descriptive terms that remained after all the modifications were discussed. These terms were placed in alphabetic order and the frequencies of the terms were calculated and summated (Nel et al., 2012).

The next step in the data analysis involved the categorical clustering of the personality-descriptive terms by clustering the derived personality-descriptive terms. The semantic relations were used to cluster these terms together. This involved group discussions and contact with language and culture experts. The facets were subdivided into common, semi-common, semi-specific and language-specific levels (Nel et al., 2012). By using content analysis it was possible to cluster these 50 000 personality-descriptive terms into 188 facets, which were further grouped in 37 sub-

clusters. From the 37 sub-clusters, nine clusters were grouped together. The SAPI process is summarised in Figure 2.1.

Figure 2.1: Summary of the SAPI process





2.3.4 The personality clusters of the SAPI

During the qualitative phase of the SAPI project, nine clusters emerged from the analysis. These clusters were labelled Conscientiousness, Emotional Stability, Extraversion, Facilitating, Integrity, Intellect, Openness, Relationship Harmony, and Soft-Heartedness. Each of these main constructs is briefly discussed in the paragraph below.

The Conscientiousness cluster relates to a person being determined and orientated toward achieving personal goals, being precise and well organised in carrying out tasks. The Emotional Stability cluster represents the emotional balance, self-confidence and independence of a person. Extraversion relates to a person having the tendency to be energetic, upbeat and can easily communicate with other people. The Facilitating cluster represents a person's ability to teach, mentor, motivate and guide others in reaching their full potential. Integrity consists of being honest, loyal and ethical. Intellect refers to a person being creative, innovative and having the ability to share information and to understand others. The Openness cluster represents the outspokenness and adventurousness of a person, being open to new ideas and learning new things. Being approachable, accessible and cooperative in maintaining good relationships are characteristics of the Relationship Harmony cluster. The last cluster is Soft-Heartedness and deals with a generous person having compassion for the feelings and needs others (Nel et al., 2012).

Most of the clusters display certain correspondence with established models of personality like the Big Five, Five-Factor Model (FFM), Chinese Personality Assessment Inventory (CPAI), and the six-dimensional framework HEXACO model (Honesty-Humility, Emotionality, Extraversion, Agreeableness, Conscientiousness, and Openness to Experience). The only cluster not covered in any of the personality models was the Facilitating cluster (Hill, Nel, Van de Vijver, & Meiring, in press; Nel et al., 2012).

2.4 DEVELOPMENT OF THE SAPI INVENTORY AND VALIDATION:

STAGE 2 - QUANTITATIVE PHASE

The second stage specifically focused on the development and validation of indigenous scales for all nine of the SAPI clusters.

2.4.1 Item development of the SAPI

After the process of finalising the nine personality clusters, all the personality descriptive terms that were generated during the first qualitative phase were utilised

to develop the SAPI items. An item pool of 2 497 was available and a four step process was followed in developing the final items: “(1) developing stimuli/items to which the examinee responds, (2) deciding on a response format or method, (3) determining conditions governing how the response is made to the stimulus, and (4) establishing procedures for scoring the response” (Hill et al., in press, p. 9; Hogan, 2007). All the items had to comply with the following criteria for inclusion into the final SAPI item pool (Hendriks, Hofstee, & De Raad, 1999):

- Items needed to be short, simple and clear;
- Items needed to be written in the first person;
- Negations needed to be excluded;
- Items need to describe a single activity;
- Temporal qualifiers need to be excluded;
- Items need to be formulated in the direction of the construct;
- Double-barrelled items need to be excluded;
- Items need to refer to concrete behaviours;
- Psychological trait terms need to be avoided;
- Idioms and expressions need to be avoided;
- Items need to be written with a view to translatability.

Following the criteria outlined above resulted in the generation of 2 497 items. Item culling was then used to reduce the number of items to a manageable number. The cultural and language experts were able to advise the SAPI team on whether the items had the same meaning across the 11 language groups (Hill et al., in press). The language experts were invited to participate in this culling process at various workshops. The Excel sheet with all the items was sent to 10 language experts who were familiar with isiXhosa, isiZulu, isiNdebele, SiSwati, Sesotho, Sepedi, Setswana, Xitsonga, and Tshivenda. The language experts received strict instructions on what they should do, which included checking whether all the items were understandable, meaningful, translatable and culturally appropriate (Hill et al., in press).

Items that were not translated correctly or that could not be translated were removed from the item pool. After this item culling process, 1 583 items remained. Pilot studies were then conducted for each cluster and the statistical analysis procedure

of hierarchical factor analysis was used to reduce the number of items. The items with extreme mean values and low loadings were removed, leaving only 606 items. The language experts were then consulted again at a number of workshops, this time to comment on language accuracy in terms of idiomatic expressions, which had to be removed according to the item criteria. Items that were removed included complex statements, culture-bound items and mistranslations.

The established aims were to ensure that simple English was used and that the translations were accurate and comparable across the 11 official languages. Only 416 items remained after this process. The SAPI team reconsidered the number of items remaining and decided that further reduction was necessary. The SAPI team therefore removed items that were longer than 10 words. Following this procedure 315 items were left. The SAPI team reconvened and decided that only first person items would be included. This resulted in the final item pool comprising 262 items. For a summary of the item culling stages see Figure 2.1 above (Hill et al., in press).

2.5 DEVELOPMENT OF THE SAPI PROJECT SCALE

The second stage of the SAPI project involved a survey study. As part of the development of the SAPI project inventory it is important to determine the most suitable response scale for the SAPI for the multicultural South African context based on the nine clusters. The choice of response scale is linked to the nature of the preliminary nine-factor personality structure being measured as the SAPI will be administered in groups or individually. The two response scales chosen as possible response scales for the SAPI inventory were the dichotomous and polytomous response scales. For the dichotomous response scale, “agree” and “disagree” categories were used, and for the polytomous response scale “strongly agree”, “agree”, “somewhat agree/disagree”, “strongly disagree” and “disagree” categories were used. Both response scales were used in order to determine which scale will be the easiest to score and in order to determine which scale will be most understandable for all of the 11 language groups. The response scale chosen will affect the way the respondents answer and respond to the items as it may be difficult or easy to distinguish between the different scale options. This particular study

therefore focused on whether the dichotomous or the polytomous response scale is better able to measure the nine-factor personality structure in a valid way.

2.6 PERSONALITY IN A CROSS-CULTURAL CONTEXT

2.6.1 Introduction

In the late 1950s debates regarding whether industrial psychologist practitioners should accept, respect and understand cultural differences emerged (Gopaul-McNicol & Armour-Thomas, 2002). This debate emerged as a result of the increasing influx of multiple cultures into the USA, which resulted in health professionals becoming aware of the fact that people are raised according to their particular society's norms – in other words, the people of that society are regarded as “normal” and that “normal” means different things in different societies (Gopaul-McNicol & Armour-Thomas, 2002). Culturally diverse groups expect others to have a better understanding of their unique cultural ethnicity and backgrounds. For instance, individuals from certain cultures complain that their potential is not acknowledged by standardised assessment measures. The use of standardised assessment measures that do not acknowledge people from different cultural backgrounds may lead to misjudgement of personality. Examples of popular Western measures used across countries include the Big Five, the HEXACO Personality Inventory, the B5/FFM and the CPAI (Gopaul-McNicol & Armour-Thomas, 2002).

It is evident that Western personality psychology has provided the theoretical basis for most of the research regarding the measurement of personality across different cultures (Church, 2001). Most psychologists therefore appear to believe that all personality dimensions are universal and that the impact of culture is only on the manifestation of that personality trait (Church, 2001).

The cross-cultural adaptation and development of personality inventories can provide useful assessment techniques for the future of diverse groups because the adaptation and development of measurement detects and eliminates bias (Björgvinsson & Thompson, 1994; Butcher, 1985; Foxcroft & Roodt, 2009).

Establishing similarities and differences in personality is the aim of cross-cultural studies. Therefore, the need exists to standardise these adapted and developed personality inventories (Laher & Cockcroft, 2013).

2.6.2 The nature of cross-cultural personality assessment

In South Africa, as in the USA, the population consists of multiple cultures and psychological assessment has developed to meet the needs of this diverse population (Laher & Cockcroft, 2013). In South Africa, the most frequently used psychological tests are personality assessment tests (Foxcroft & Roodt, 2009). The strongest action against the inappropriate use of assessment measures in South Africa involved the enactment of the *Employment Equity Act* No. 55 of 1998 (Section 8). Therefore, when personality measures are applied across different cultures and the scores obtained are then used to compare the different cultural groups, certain issues need to be addressed. These issues include ensuring that the correct response scale and category are used for the specific cultural group. In the 20th century, as a result of the influx of international tests and culture, the norm in this kind of testing was multiculturalism, as tests had to take multiculturalism into account (Foxcroft & Roodt, 2009; Laher, 2010; Pomerantz, 2011). According to Pomerantz (2011), multiculturalism can be defined as issues relating to the cultural impact on the current era of psychology.

Multiculturalism can therefore be regarded as a new dimension within psychology that complements existing dimensions of psychology by fostering greater sensitivity and awareness. Existing psychological models can then be applied in the best way to accommodate individuals of various cultural backgrounds (Pomerantz 2011). The most notable model currently in use in personality psychology is the Five Factor Model (FFM) (Laher & Cockcroft, 2013). A large body of research on imported inventories has focused on replicating the Eysenck personality questionnaires and the FFM (Church, 2001; McCrae & Costa, 1997; Robins, Fraley, & Krueger, 2007). According to Van de Vijver and Leung (2001, p. 1008), “without cross-cultural comparisons, psychological theory is confined to its own cultural boundaries; but a blind ‘exportation’ of Western instruments to other cultures without any concern for

the appropriateness of the measures is also unlikely to lead to major theoretical advancements". Many professional organisations have recognised that professionals who assess individuals must be trained to make cross-cultural comparisons (Van de Vijver & Leung, 2001). This type of training can enable the assessors to recognise and meet non-discriminatory assessment guidelines when assessing individuals from culturally diverse backgrounds (Gopaul-McNicol & Armour-Thomas, 2002). The American Psychological Association (APA) (1993, cited in Gopaul-McNicol and Armour-Thomas, 2002) has stated that the issue of culture does impact on the provision of appropriate psychological services.

In attempting to determine whether people are similar or different, three specific perspectives or approaches can be adopted in cross-cultural psychology (Odendaal, 2013). The first perspective is referred to as the etic (culture-comparative) perspective and accentuates the similarities and differences in psychological functioning between multicultural groups and individuals (Odendaal, 2013). It is also known as the normative viewpoint because it implies that psychological functioning can be classified universally across different cultures (Odendaal, 2013). In addition, the etic perspective focuses specifically on personality measures that are imported and on establishing their measurement equivalence in specific countries (Chang, 1994, Cheung et al., 2011). In addition, the etic approach is mostly used by cross-cultural psychologists as they seek to identify universal categories of behaviour (Odendaal, 2013).

The second perspective is referred to as the emic (indigenous) perspective in that it recognises culture-specific norms and focuses on studying personality in specific cultures in an attempt to understand behaviour within that culture (Chang, 1994; Odendaal, 2013; Pomerantz, 2011). This perspective has emerged as part of the development of multiculturalism in psychology (Dana, 1995; Pomerantz, 2011).

The third perspective is the combined emic-etic approach; this approach is also referred to as the convergent approach. This perspective combines the best of both the etic and the emic approaches because it addresses different factors. For example, as part of this approach emic concepts are generated for specific cultures and all these concepts are then combined to represent the etic approach that is

involves shared and universal concepts. Hence the etic approach focuses on methodological rigour, while the emic approach focuses on cultural sensitivity. Combining the two perspectives assists in understanding the different personality dimensions through providing a comprehensive framework (Church, 2008).

Despite the fact that many researchers have acknowledged the importance of culture there has been limited research on cross-cultural assessment (Fontaine, 2007; Groeschl & Doherty, 2000). According to Pomerantz (2011), the most recent professional research efforts have been found in publications on cross-cultural issues in assessment, which include journals on cross-cultural issues as well as assessment journals, in clinical psychology scholarly journals, in the American Psychological Association Divisions and in *The diagnostic and statistical manual of mental disorders* (DSM-IV), released in 1994, which deals with awareness of culturally diverse populations. In a study conducted in Italy and the Netherlands, Leone, Van der Zee, Van Oudenhoven, Perugini, and Ercolani (2005) found that the absence of measures specifically developed to take cognisance of individual differences and multicultural attitudes hampers personality assessment. This suggests that industrial psychologists and psychometrists need to ensure that they understand the meaning of terms such as "culture", "personality" and "cross-culture" and how these are linked to human behaviour.

"Culture is a key determinant of what it means to be a person" (Robins et al., 2007, p. 170) and it is related to personality in the sense that it influences the expression of personality (Hofstede & McCrae, 2004). Culture has a pervasive influence on all subjective and objective elements relating to human beings, including things such as norms and beliefs. It is those norms, beliefs and values that shape people's thinking and behaviour and make every individual unique (Bergh & Theron, 2006; Foxcroft & Roodt, 2009; Grobler & Warnich, 2006; Murray & Schaller, 2010; Wu, Batmunkh, & Lai, 2011). In addition to the descriptive definitions provided by most of the above researchers, Gopaul-McNicol and Armour-Thomas (2002, p. 6) adopted another approach by defining culture as a multifaceted concept, "[c]ulture is a socially constructed phenomenon that enables an understanding of the way of life of any social group".

Traditional studies on culture focused mainly on values and the differences between values in various cultures (Dong & Liu, 2010; Fontaine, 2007; Kashima, Hardie, Wakimoto, & Kashima, 2011). These studies involved countries such as Malaysia, China and Australia and were based on the assumption that cultures differ because of different values (Dong & Liu, 2010; Fontaine, 2007; Kashima et al., 2011). In the current study, the generally accepted definition of culture as an integrated system that consists of the beliefs, values and spontaneous behaviours of people in a specific racial or even religious group in a particular country was used (Bergh & Theron, 2006; Dong & Liu, 2010; Fontaine, 2007; Kashima et al., 2011; Wu et al., 2011). This definition of culture emphasises the ways of life that can be identified in different social groups, but also indicates that the way in which things are done and the conditioning elements of further action also form part of culture.

Furthermore, in relation to the standardisation of assessments, Gopaul-McNicol and Armour-Thomas (2002) stated that difficulties occur when assessment developers use concepts such as ethnicity and race as if they are interchangeable with culture.

When culture is defined as something that influences human behaviour, this raises questions regarding the definition of personality (Gopaul-McNicol & Armour-Thomas, 2002). Most people can readily define the term “personality” because it has many meanings (Laher & Cockcroft, 2013). However, in a more traditional approach to personality, Maloney and Ward (1976) stated that the meaning of personality can mainly be interpreted in two different ways. It can mean the impression one makes on others, on the one hand, or it can be seen as a social skill, on the other. It is therefore not surprising that the term “personality” is often interpreted differently in various contexts (Wu et al., 2011).

“Personality is shaped by both genetic and environmental factors; among the most important of the latter are cultural influences” (Robins et al., 2007, p. 170). Differences in behaviour are affected by cultural influences. In cross-cultural studies, the main objective is to investigate whether personality models can be applied and compared universally to different culture groups. Van de Vijver and Leung (2001) argued that cross-cultural studies mainly focus on observing and comparing personality across cultures. Culture can therefore be linked to personality in relation

to the unique or similar individual traits that are expressed through their personalities, for instance, dominance or verbal aggression. The relationship between personality and culture is often not established as the links are not explicitly acknowledged (Robins et al., 2007).

In addition to the traditional way of thinking, a more current approach to personality is that personality can refer to the overall uniqueness of a person. This uniqueness originates in the way a person reacts to and interacts with other people – in other words, consistent and repetitive patterns of behaviour (Bergh & Theron, 2006; Robbins & Judge, 2007). Personality is a significant indicator for predicting behaviour. In fact, according to Church (2001), in order to study cross-cultural personality, one has to measure personality. Although Church's (2001) statement may seem simple, the "assertion belies the complexity of the task" (p. 979). These definitions of culture and personality provided the foundation for defining and exploring the nature of cross-cultural personality inventories.

2.6.3 Conclusion

On the basis of the different definitions of culture, the concept can generally be defined as a precondition of human behaviour and as a socially constructed phenomenon comprising beliefs and values which enable people to understand life. Furthermore, personality refers to the overall uniqueness of a person that is expressed in the way he/she reacts to and interacts with others, which involves consistent and repetitive patterns of behaviour. Cultural forces can influence personality, but personality can shape cultural contexts (Robins et al., 2007).

As far as cross-cultural personality assessment is concerned, most institutions still continue to exclude training and the use of appropriate assessments and therefore fail to address ethical and legal issues in cross-cultural assessment (Gopaul-McNicol & Armour-Thomas, 2002). The next section focuses on the types of response styles that may influence the validity and reliability of assessment.

2.7 DICHOTOMOUS AND POLYTOMOUS RESPONSE SCALING

2.7.1 Introduction

“The history of science is the history of measurement” (Cattell, 1893, p. 316). According to Ayala (2008), Guttman, Rasch, Likert, Thurstone and Mokken were some of the notable researchers in measurement. The aim of the present study was to focus on personality assessment using the SAPI inventory. Contractor and Fox (2011, p. 23) briefly defined measurement as the “assignment of numbers to objects according to rules”. Therefore to facilitate measurement, most researchers make use of itemised rating scales and categories. Based on the statement above, one of the fundamental questions in measurement relates to deciding how many response categories to include (Contractor & Fox, 2011; Green & Rao, 1970; Kieruj & Moors, 2010). Response categories may vary in terms of the number of scale options and their wording (Fox, 2005; Osteras et al., 2008).

Variables such as the question content and respondent factors are important in deciding on the optimal number of response categories to use (Kieruj & Moors, 2010). The optimal number of response categories also depends on the nature of the test-takers and the measure used by the researchers. For example, if the personality measuring instrument contains many items with in-depth explanations, it would be more plausible to use fewer response categories. This may help to reduce any confusion and be less time-consuming. The psychometric properties (particularly validity and reliability) of an instrument are significantly affected by the type of response scale used (Kieruj & Moors, 2010; Vorster, 2010). The reliability of a measure refers to the “consistency with which it measures whatever it measures” (Foxcroft & Roodt, 2009, p. 47). In studies where the number of response categories used is important, the focus is on reliability, as more categories may increase the reliability in comparison to using fewer categories (Kieruj & Moors, 2010). Symonds (1924) and Bendig (1954) were the first researchers to study reliability, and proposed that the optimal number of response categories is a seven-point scale (Bendig, 1954; Kieruj & Moors, 2010; Symonds, 1924). In conclusion, Kieruj and Moors (2010, p.

322) made the assumption that “reliability increases as the number of answering categories increases”.

Validity describes “a measure that accurately reflects the concept it is intended to measure” (Babbie, 2005, p. 490). Since the initiation of psychometric testing, the optimal number of response categories has continued to be a topic of debate (Vorster, 2010). In relation to personality assessment, this debate has focused mainly on the use of either dichotomous or continuous (polytomous) rating scales (Vorster, 2010).

Researchers continue to investigate the optimal number of response categories in order to determine the most appropriate scale for their measuring instruments (Vorster, 2010). In the present study, two equivalent forms of the SAPI were measured using different rating scales. In order to compare rating scales the conditions of the two tests should be equivalent in all aspects, such as the items included and the method used to administer the inventory (Schlebusch & Roodt, 2008). Ideally, researchers should allow respondents to use the response categories provided as a means to convert their latent answers to the response categories (Kroh, 2007). Kroh (2007) also noted that if the response categories are too broad, some respondents may experience difficulty converting their answers to the response categories provided. The same applies to response categories that are too specific. Due to these differing views on response scales, further investigation was required to gain a better understanding of which response scale would be the most appropriate for the variables in this study. The two response scale types used in this study are discussed in more detail below.

2.7.2 The dichotomous response scale

2.7.2.1 Classification

The theory on which dichotomous response scales are based was firstly noted by Bliss (1934). The dichotomous response scale was a methodological innovation and the first of its kind (Robinson, 1973). Guttman (1944, p. 1950) laid the groundwork

for a new technique that was designed to explore the unidimensionality of a set of test items. According to Guttman (1950, p. 60):

[o]ne of the fundamental problems facing research workers [...] is to determine if the questions asked on a given issue have a single meaning for the respondents. In addition if a question means different things to different respondents, then there is no way that the respondents can be ranked [...] questions may appear to express a single thought and yet not provide the same kind of stimulus to different people.

Researchers currently use the scale Louis Guttman developed which indicates that some items may be more extreme indicators of the variable (Babbie, 2005).

As mentioned in Chapter 1, the dichotomous response scale is characterised by a variable that can take only two possible values (Lindsey, 2004). The dichotomous response scale is a categorical variable and is generally used in prejudice and social science data and social psychology survey research (Fox, 2005). Furthermore, the dichotomous response scale can often be viewed and interpreted as reflecting comparative responses (Skrondal & Rabe-Hesketh, 2004). This type of response scale is also known as the binary categorical variable, the Guttman scale or scalogram analysis (Cziko, 1984; Fox, 2005; Foxcroft & Roodt, 2009). In addition, De Munck and Sobo (1998, p. 111) stated that “Guttman scaling is a method for discovering whether series of measures on a set of individuals (or groups) belong on a unidimensional continuum”. The different approaches to the dichotomous response scale are discussed below.

2.7.2.2 *The affirmative and reparative approach*

The use of cumulative, dichotomous response scales has been popular since the 1900s. According to Busch (1993) and Chen, Lee, and Stevenson (1995) the dichotomous response scale accounts for variance and is sufficiently reliable because of the exclusion of extreme responding and the middle point or neutral response option. In addition, one advantage of the dichotomous response scale is that it gives the researcher a more accurate representation of the data. It therefore

makes the scoring of the results straightforward and intuitive because of the higher degree of correlation between the items (Levine, 2001; Levine, Shaw, & Shulman, 2010). Similarly, Levine et al. (2010) also argued for the use of the dichotomous response scale based on the fact that it is easily implemented.

Studies have also suggested that the dichotomous response scale is able to provide more accurate findings and judgements of the participants in comparison to the polytomous response scale. The dichotomous response scale prevents participants from choosing extreme points as there are no extreme points, as on a polytomous response scale. This gives the dichotomous response scale a substantial advantage above the polytomous response scale (Cziko, 1984; Levine, 2001; Levine et al., 2010). The dichotomous response scale therefore forces the respondents to make a decision in the sense that they can only choose one answer to each item in order to reflect their attitude and no neutral options are available (Panter, Swygert, Dahlstrom, & Tanaka, 1997).

Respondents have to choose between two options and the interpretation of the items therefore becomes more important in comparison to the polytomous response scale. Since respondents from different cultural groups are likely to interpret the response categories of a polytomous response scale differently, this tends to make the results less reliable (Busch, 1993; Vorster, 2010). The educational level of the respondents also plays a vital role in the reliability of the measure. In other words, it may be easier for respondents with a higher education to discriminate between the response categories (Chen et al., 1995). It is therefore essential to determine the optimal number of response categories for use with a particular assessment.

Table 2.1 presents two examples of how the dichotomous response scale can be structured. The number assigned to each option is only used in the statistical part of the research, that is, during the actual coding of the data (Field, 2009; Maree, 2010).

Table 2.1: Examples of dichotomous response scales

Items	0	1
I thrive on conflict.	Agree	Disagree
I feel neutral about crime.	Yes	No

Source: Adapted from “Introduction to psychological assessment in the South African context (3rd ed.)” by C. Foxcroft and G. Roodt (2009, p. 31) and adapted from “First steps in research (2nd ed.)” by K. Maree (2010, p. 157).

Despite the benefits associated with the use of the dichotomous response scale, Levine et al. (2010) also acknowledged that the polytomous response scale could provide greater reliability and validity in some instances. In addition, the stern deficiencies to the statistical index such as internal reliability of the dichotomous response scale may be universal. The classification of the polytomous response scale is discussed in the next section.

2.7.3 The polytomous response scale

2.7.3.1 Classification

In general, the polytomous response scale is a discrete variable (as previously indicated in Chapter 1), and is mostly used in applied psychological research that generates categorical data or is designed to collect attitudinal data. These types of response scale are also referred to as continuous scales, Likert-type scales or summated ratings (Tay et al., 2011). The Likert score is a linear rescaling of the respondents’ average rank across the different items (Bond & Fox, 2007; Massof, 2004). The following section continues the discussion regarding multiple response categories.

2.7.3.2 The affirmative and reparative approach

The first advantage of using the polytomous response scale over the dichotomous response scale is that Likert scores, which measure a specific trait of the respondents, are accepted by most instrument developers at face value (Massof, 2004). Additional insight can be gained if the researcher wishes to investigate

beyond the values in order to examine the distributions. The dichotomous response scale is restricted in this regard and is unable to provide more information than the values found (Levine, 2001). The use of polytomous response scales allows for superior variability in the response categories, and therefore provides more valid and reliable measuring.

Furthermore, Levine, Asada, and Lindsey (2004) found that several constructs such as general intelligence can be better articulated using the polytomous response scale in comparison to the dichotomous response scale. Moreover, according to Bond and Fox (2007) and Tay et al. (2011), the polytomous response scale should be used when assessing self-reported typical behaviour as it provides a softer form of collecting data that enhances the process of reporting the variance of a variable. Table 2.2 provides two different examples of how the polytomous response scale can be structured.

Table 2.2: Examples of polytomous response scales

Items	1	2	3	4	5
I take risks.	Strongly Disagree	Disagree	Somewhat Disagree / Somewhat Agree	Agree	Strongly Agree
I obey rules.	Never	Rarely	Sometimes	Often	All the time

Source: Adapted from “Introduction to psychological assessment in the South African context (3rd ed.)” by C. Foxcroft and G. Roodt (2009, p. 31) and adapted from “First steps in research (2nd ed.)” by K. Maree (2010, p. 157).

However, using the polytomous response scale can result in a lack of discriminability between the response categories, which may reduce the reliability and validity of the measure (Cziko, 1984; Levine, 2001; Levine et al., 2010). According to research conducted by Chang (1994, cited in Bond & Fox, 2007), increasing the number of response categories may initiate an error where the respondents are allowed to draw on divergent frames of reference. Bond and Fox (2007) further argued it is difficult to establish a common language between different respondents from different cultural backgrounds. The basic problem in this regard relates to the fact that people’s perception occurs at different levels. Second language English speakers, for instance, tend to be assessed according to higher standard of English (Foxcroft & Roodt, 2009). Furthermore, Bond and Fox (2007) reported that when the polytomous

response scale is used to collect the data, more respondents should be included in the sample. This is because large amounts of data on the underlying construct are required so that all the items in the constructs being measured can be used.

2.7.4 Conclusion

According to Jacoby and Mattel (1971), if there are too few response categories in a scale this results in an ordinary scale, which limits the powers of discrimination. By contrast, too many response categories may go beyond the powers of discrimination.

The aim of the present study is to develop a response scale that will be most appropriate for all nine clusters of the SAPI in the South African context. In brief, the dichotomous response scale can function at the same level as the polytomous response scale because of its simplicity and ease of use. In other words, when the variables are categorical, the dichotomous response scale is just as reliable and valid as the polytomous response scale. In conclusion, Bond and Fox (2007, p. 220) noted that “[w]e should remember that the category[sation] that works best for communication with the respondent might not be the one that works best for analysis”.

There are many divergent views regarding response scaling options and there is no simple answer to the question of how many categories to include in a response scale. Each situation is different and should be assessed individually to determine what factors (such as statistics or simplicity) are more important. The next subsection discusses the different methods that can be used to administer personality inventories. It also discusses why online assessment was considered the best option for this study.

2.8 ONLINE PERSONALITY ASSESSMENTS

2.8.1 Background

The aim of the present study was to focus on personality assessment using the SAPI inventory. This section complements the aim of the study by discussing the selection of an administration method that would be most convenient and suitable not only for the SAPI inventory, but also for the investigation of the suitability of various response scales. Online personality assessments were first developed when communication and the transfer of information became of importance in the 1950s. This led to the development of the internet for use by academics and the military. Literature concerning computer-based testing (CBT) dates back to 1963. However, the use of the internet in South Africa only increased in the mid-1990s (Bethlehem, 2010; Joubert & Kriek, 2009; Mills, Potenza, Fremer, & Ward, 2002; Tredoux, 2013). The 1990s were also known as the decade of significant change in measurement, referred to as the web revolution (Mills et al., 2002; John, 2004). In South Africa, one example of the development of computerised testing was the “report-writing system for the Sixteen Personality Factor Questionnaire (16PF)” (Tredoux, 2013, p. 430). Current research on online assessment can be found in numerous academic journals and works (Hardré, Crowson, Xie, & Ly, 2007). Most of the current information on online assessment is classified under the heading of CBT, and often only provides a general overview of the topic (Hricko & Howell, 2006).

Research relating to online, CBT, computerised adaptive tests (CATs), computer-assisted or even web-based surveys is becoming increasingly common due to the dramatic increase in the use of computers (Joubert & Kriek, 2009). There is also a growing body of literature on the effects of CBT and CAT in support of standardised tests (Hardré et al., 2007). However, according to Hardré et al. (2007) there is limited empirical research available on the specific effects of surveys and questionnaires that are administered online in psychological research. Despite the increase in administering surveys online and the wide use of online administration, there is evidence of the responses being biased. Schulenberg and Yurtzenka (1999) noted that respondents may experience computer anxiety or aversion. In contrast, Gosling,

Vazire, Srivastava, and John (2004) found that administering surveys online can be as consistent as other methods, although more data are required. Research is the fundamental tool in understanding the effects of administering web-based surveys and questionnaires. In addition, guidelines have been formulated by the International Test Commission (ITC) to ensure that the responsibilities regarding the use of computerised testing are outlined (Tredoux, 2013). The next section deals with the different characteristics of administration methods.

2.8.2 Characteristics of administration methods

This section briefly focuses on three administration methods. This is significant in the current study due to the lack of empirical support for data quality because of the possible vagueness of data. It is therefore necessary to understand the basics in this type of research and to justify the decision to use online assessment in this study.

2.8.2.1 Paper-based administration (PBA)

The first system to be considered is the paper-based administration method (in a printed format) which is regarded as the traditional method of administration of questionnaires. The PBA method of conducting research is also referred to as the paper-and-pencil method. In this method each respondent is given a hard copy of the questionnaire, which he/she must complete using either a pen or pencil and return to the researcher in the original format (Hardré et al., 2007; Maree, 2010).

2.8.2.2 Computer-based administration (CBA)

The second method is the computer-based administration method, which is a tool consisting of self-contained software systems. This enables the researcher to replicate a paper-and-pencil questionnaire or even create a new questionnaire in digital format. In general, CBA systems are administered in closed-system environments. Examples of such systems are Click-Up and myUnisa, where only the students and staff have access to the specific system (Hardré et al., 2007; Saunders et al, 2009).

2.8.2.3 Web-based administration (WBA)

The last method to be considered is the web-based administration method, which is in the format of digital versions of questionnaires. In the WBA method questionnaires are completed online by navigating the experimental site. The respondents then log on to the interface and complete the questionnaire by clicking on the most appropriate responses (Hardré et al., 2007).

The next section focuses on the differences between the various assessment administration systems and explains in more detail the assessment process and the possible advantages and disadvantages of each administration system (Creswell, 2009; Maree, 2010).

2.8.3 Differences between the various assessment administration systems

The PBA method, which is the traditional paper-and-pencil format of assessment, has experienced fundamental changes over the past few decades. Where previously the norm was to distribute assessments through the postal system, web-based surveys are now becoming the norm (Balajti et al., 2010; Bethlehem, 2010; Hardré et al., 2007). In addition, postal surveys were traditionally regarded as the norm when working with large sample sizes, while face-to-face interviewing was known to yield higher response rates when working with a relatively small sample size. However, advancements in technology have resulted in the gradual phasing out of the traditional data collection methods mainly because of the slow turnaround time associated with traditional methods (Balajti et al., 2010; Hardré et al., 2007).

According to Mills et al. (2002) the shift to computer-based testing has been largely successful, despite its limitations. The automation of test administration has resulted in web-based surveys becoming increasingly popular. The main advantage is that the scoring and interpretation of the tests is almost immediate (Joubert & Kriek, 2009). Joubert and Kriek (2009) estimated that the use of the internet in South Africa increased by 112.5% between 2000 and 2007. On the whole, advances in technology have increased the use of online assessments. There are still disputes

regarding the use of WBA and CBA methods instead of the traditional pen-and-paper methods (Laher & Cockcroft, 2013).

According to Hardré et al. (2007), both the WBA and CBA methods offer more revision flexibility compared to the traditional pen-and-paper systems. Web-based surveys are the most extensively used tool in research today and undoubtedly an attractive alternative to data collection (Balajti et al., 2010; Bethlehem, 2010; Hardré et al., 2007). It is generally easier to code and analyse the gathered data using WBA or CBA because the numerical data do not have to be entered manually from a paper-based questionnaire (Hardré et al., 2007). The response rate and validity of the data collected are therefore affected by the method of data collection (Balajti et al., 2010).

Web-based surveys are also useful for administering self-assessed personality tests through electronic mail, especially when the researcher only has a small budget to work with. These are also referred to as e-mail surveys or online internet web surveys (Balajti et al., 2010; Bethlehem, 2010). When comparing the different types of web-based surveys, e-mail surveys seem to have the ability to generate higher response rates than internet web surveys (Balajti et al., 2010; Van Geest, Johnson, & Welch, 2007). Moreover, if students are the main focus and population of the study, it is recommended that internet web surveys or even e-mail surveys be used because most students are computer proficient and have easy and free internet access. Hence combining internet web surveys and e-mail surveys can save the researcher money and time and can yield high response rates (Balajti et al., 2010).

Internet web surveys can reach large samples quickly with minimal costs. WBA and CBA have the ability to reach geographically distributed participants more effectively (Balajti, et al., 2010; Berge & Collins, 1996; Bethlehem, 2010; Greenlaw & Brown-Welty, 2009). Both these methods have the following advantages: attractive technological possibilities in terms of multimedia; no mailing or printing costs; no interviewers are needed; they can be launched quickly; they avoid missing data; data entry is automated; interviewer or respondent bias is excluded; and there are no out-of-range responses (Bethlehem, 2010; Joubert & Kriek, 2009; Shropshire, Hawdon, & Witte, 2009).

However, the disadvantages of web-based surveys should not be underestimated. Under-coverage is one of the disadvantages of WBA and CBA. Under-coverage means that web-based surveys only include those respondents with internet access. In fact, it is common for internet web surveys to yield low response rates and to under-represent the section of the population without internet access. Hence web-based surveys only represent the subpopulation of people with internet access, which means that the results may be biased (Bethlehem, 2010). Furthermore, according to Maclsaac, Cole, Cole, McCullough, and Maxka (2002), the way in which the questionnaire is displayed on the browser may alter the presentation. When internet capacity limit is reached, it will affect the response rate. Also, some respondents may experience fatigue and boredom when reading text on a computer screen, which could mean they lose interest and fail to complete the questionnaire.

Self-selection is another disadvantage of WBA and CBA. Self-selection means that the respondents select themselves to participate in the study. For example, web-based surveys are usually created on a special website and sometimes e-mailed to students to complete on a voluntary basis. Some of the students may decide to visit the website and will either decide to continue or decline participation in the study. The researcher has no control over this decision. When the self-selection issue comes into play in any research study, probability sampling principles cannot be applied. However, if the researcher uses random sampling selection, he/she is able to use probability theory to accurately construct unbiased approximation. Therefore self-selection has an impact on the quality of the results and has the potential to substantially bias the results because probability theory cannot be used (Bethlehem, 2010). Although surveys are a simple economical method of collecting data, a number of considerations should be kept in mind. This may influence the validity and reliability of data, bias and equivalence (Greenlaw & Brown-Welty, 2009).

2.8.4 Conclusion

To conclude this section, it is difficult to make clear comparisons between the different administration systems as the PBA, WBA and CBA methods can enhance the quality of the data. Furthermore, when comparing the reliability of each

administration method, there is a lack of empirical research on the averages of such questionnaire instruments (Hardré et al., 2007). The researcher opted for, WBA in this study because of time and money constraints.

2.9 CHAPTER SUMMARY

This chapter aimed to describe the two stage process followed by the SAPI project in validating the scales that form part of the preliminary personality measuring inventory.

The chapter also aimed to provide theoretical background concerning cross-cultural assessment and to discuss some of the earliest ideas concerning differences in this type of assessment, as recorded in the USA. In the new South Africa, there was a greater demand for psychological culturally appropriate tests after the first democratic elections in 1994. The basic human rights set out in the *Constitution of South Africa* resulted in the promulgation of the *Employment Equity Act 55 of 1998*, section 8, which sets certain standards for psychological testing. After investigating differing views on culture, the following definition was formulated: culture can be defined as a precondition of human behaviour and a socially constructed phenomenon that consists of beliefs and values which enable people to understand life. Furthermore, personality was defined as the overall way in which a person reacts to and interacts with other people and displays consistent and repetitive patterns of behaviour.

The chapter also included a discussion regarding the suitability of various response category scales to the measurement of personality online. After examining the advantages and disadvantages of each type of response scale, it was concluded that each response scale should be studied in depth to ensure that the response scale selected matches the type of test-taker and measuring instrument. The final section of the chapter focused on selecting the most convenient and suitable method for the administration of the inventory. It was decided that the web-based method would be used because of time and money constraints. Chapter 3 focuses on the research design and methodology used in the study.

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

The review of relevant literature presented in Chapter 2 serves as the foundation for the research design and methodology presented in this chapter. This chapter focuses on the research philosophy chosen for the study and describes the strategy of inquiry and the broad research design. The sampling method, data collection, measuring instrument and the data analysis are discussed.

3.1 RESEARCH PHILOSOPHY

A research philosophy refers to the body of knowledge developed on a certain topic. It is therefore essential to choose the right philosophy, because it has a significant impact on how the researcher understands and investigates the variables in the specific research study. The post-positivist philosophical view holds more meaning for quantitative research and wants to determine the outcomes or effects. Also the post-positivist view is based on measurement and the development of numeric measures. Therefore, based on research conducted by Babbie (2005), Creswell (2009) and Saunders et al. (2009) it was determined that the objectives of the post-positivist philosophical view were in keeping with the objectives of the study. The primary objective of this study is to obtain reliable and valid knowledge that can determine whether the dichotomous or the polytomous response scale is compatible with the nine-factor personality structure. This study therefore made use of a post-positivist philosophical view.

3.2 RESEARCH DESIGN

Bless and Higson-Smith (1995, p. 46) defined a research design as “the plan of how to proceed in determining the nature of the relationship between variables”. Leedy and Ormrod (2010, p. 182) stated that all quantitative studies fall under descriptive quantitative research. This “involves either identifying the characteristics of an observable phenomenon or exploring possible correlations among two or more

phenomena.” For this study, a quantitative research design was used in order to determine whether the dichotomous or the polytomous response scale provided the most suitable construct level fit with the nine-factor personality structure of the SAPI.

3.2.1 Developmental design

Researchers can use one of two developmental designs, namely a cross-sectional study or a longitudinal study. A cross-sectional study was considered appropriate for this study because the sample included students from various age groups. A cross-sectional research design was chosen for this study because it is relatively easy to conduct as all the data are collected in one “snapshot” in time. It also has the advantages of being relatively low cost, limiting interviewer bias and allowing the students to complete the inventory in their own time and online. Disadvantages of using the cross-sectional design are that “different age groups sampled may have been raised under different environmental conditions [and that the correlations cannot be computed between different age levels]” (Creswell, 2009; Leedy & Ormrod, 2010, p. 186).

3.2.2 Research strategy

For the purpose of the study a survey design was used. Using a survey design allows the researcher to collect and analyse quantitative data by means of inferential statistics. The advantages of a survey are that a large amount of data can be collected from a sizeable population, it is also fairly simple to design and it allows for easy comparisons (Leedy & Ormrod, 2010). A survey gives the researcher more control over the research process compared to other research strategies and findings can be generated at a considerably lower cost. However, survey research does have limitations. One of the disadvantages is that the analysis of results is time consuming and is unlikely to be wide ranging. Moreover, the researcher relies on self-reported data (Leedy & Ormrod, 2010; Saunders et al., 2009).

3.2.3 Administration method of the inventory

Based on the characteristics of administration systems discussed in Chapter 2, it was decided that the computer-based administration, which is a tool consisting of self-contained software system, was the most appropriate method for use in this study. This administration method enables the researcher to replicate a paper-and-pencil questionnaire (Hardré et al., 2007). An advantage of using a computer-based administration for the questionnaire is that the scoring and interpretation of the questionnaire can be done almost immediately (Joubert & Kriek, 2009). It is also easier to code and analyse the gathered data because the numerical data do not have to be manually entered (Hardré et al., 2007). However, computer-based administration sometimes yields low response rates and may have the methodological problem of under-representing segments of the population who do not have access to the internet.

The above characteristics of computer-based administration justified the use of computer-based administration of the inventory on (internal Unisa system) myUnisa. Only students who had access to the internal Unisa system were included in this study. This method suited the budget for this research project and facilitated the coding process. Although the method chosen for this survey research is inexpensive and easy to implement, there may still be sources of error (Umbach, 2005).

3.3 SAMPLING IN A DESCRIPTIVE STUDY

This section explains the factors that were taken into consideration during sample selection. It also explains the process used during sampling, with specific reference to the sampling plan and the size and selection of the sample. The biographical composition of the sample is discussed in terms of gender, age, race and language.

3.3.1 Sampling plan

The sampling plan starts with the selection of the sampling frame. In this study, the first step in the sampling plan involved identifying an institution that had access to a

wide variety of cultures and races. The researcher then decided to use web-based communication to access this sample. The sampling frame was selected from Unisa. Unisa is a comprehensive, open learning and distance education institution. It was considered to be a good organisation for use in this study because it operates a web-based electronic messaging system, known as myUnisa. Most of Unisa's students have access to myUnisa, and the researcher therefore believed that using this platform would ensure a high response rate with the least amount of money and time being expended.

The next step involved selecting the sampling frame. This had to be done timeously in order to ensure that there would be sufficient time to obtain ethical clearance from Unisa and to allow the researcher to involve Unisa students in the research. The researcher was given access to the students who were enrolled for the National Diploma in Office Management and Technology (NDOFM) and/ or the National Diploma in Administrative Management (NDADG), specifically those students enrolled for the subjects Administrative Management IA and Administrative Management IIA. The sampling frame was therefore selected from the students enrolled for Administrative Management IA and IIA.

Once the sampling frame had been selected, the process of applying for ethical clearance commenced. The researcher applied to the Ethics Review Committee (ERC) of the College of Economic and Management Sciences (CEMS) by submitting two copies (in English) consisting of the following: a complete research proposal; a completed application for review form; the proposal summary sheet; and any documents relating to the proposal. After the application for ethical clearance had been approved, the next process could begin, that is, identifying the sample size.

3.3.2 Sampling size

According to Saunders et al. (2009, pp. 217-218) "[t]he larger your sample's size the lower the likely error in generalising to the population". It is therefore imperative that the time and money the researcher invests in collecting the data is reflected in the accuracy of the findings. According to Saunders et al. (2009, p. 218) the choice of

the sample size is influenced by the researcher's confidence in the data; the margin of error the researcher can accept; the type of analyses used; and the size of the total population.

According to Whitley (2002) there are no hard and fast rules for determining sample size, but there is more stability when the sample size is larger than 300. When factor analysis is to be conducted most experts recommend a sample size of a minimum of 200 to 300 (Whitley, 2002). In addition, "the sample size is usually determined by the purpose of the research, the sampling design, the confidence limit, the population size, the nature of statistical analysis, expected occurrence of missing data, expected response rates, approximately: personal interviews 50-90%; postal surveys less than 20%, internet e-mail – less than 10%" (Strasheim, 2012, p. 52). In this study, the sample size could not be identified prior to sample selection because the sample size depended on the number of students enrolled for Administrative Management IA and IIA.

3.3.3 Sampling selection

The total population in this study included first- and second-year students from different language groups. These students had to be enrolled for one of the following two formal subjects: Administrative Management IA and Administrative Management IIA. The informed consent and letter of introduction for participation in the research study are included in Appendix A. From a total population of students registered for the subjects, the sampling frame was $N = 587$. These academic subjects were considered to be relevant and appropriate for this study, because they provided easy access to all the information needed and to appropriate students.

For the purpose of the SAPI project, specific answers or responses were required in order to draw valid conclusions. The myUnisa system allows the designer of the inventory to see the current response rate. The response rate of the self-assessment SAPI inventory on myUnisa was relatively high and only included Group A (comprising Administrative Management IA and IIA dichotomous response scale results) and Group B (comprising Administrative Management IA and IIA polytomous

response scale results) (see Appendix B). A summary of the sample is provided in Table 3.1.

Table 3.1: Sample (N = 490)

Category	Administrative Management IA	Administrative Management IIA	TOTAL
Registered for subject	795	607	1402
Cancelled subject	69	20	89
Total students (N =)	726	587	1313
Group A (<i>dichotomous</i>)	149	135	284
Group B (<i>polytomous</i>)	124	82	206
Total students that completed the inventory (N =)	273	217	490

The biographical characteristics of the participants for both scale formats involved in the study are indicated in Table 3.2.

Table 3.2: Biographical information of all the participants (N = 490)

Item	Category	Dichotomous response scale		Polytomous response scale	
		Frequency	Percentage	Frequency	Percentage
Gender	Male	58	21.2%	54	24.5%
	Female	215	78.8%	163	74.1%
Age	18-21	20	7.3%	48	21.8%
	22-25	45	16.5%	46	20.9%
	26-29	48	17.6%	40	18.2%
	30-33	49	17.9%	29	13.4%
	34-37	44	16.1%	26	11.8%
	38-41	35	12.8%	16	7.3%
	42-45	18	6.6%	7	3.2%
	46-older	14	5.1%	5	2.3%
Race	White	34	12.5%	32	14.5%
	Black	201	73.6%	162	74.7%
	Indian	12	4.4%	12	5.5%
	Coloured	26	9.5%	8	3.6%
	Asian	0	0.0%	0	0.0%
	Other	0	0.0%	3	1.4%

Home language				
Afrikaans	44	16.1%	30	13.8%
English	35	12.8%	27	12.3%
IsiNdebele	8	2.9%	7	3.2%
IsiXhosa	17	6.2%	20	9.1%
IsiZulu	50	18.3%	34	15.5%
Sepedi	46	16.8%	31	14.1%
Sesotho	17	6.2%	19	8.6%
Setswana	27	9.9%	16	7.3%
SiSwati	4	1.5%	7	3.2%
Tshivenda	11	4.0%	5	2.3%
Xitsonga	14	5.1%	14	6.4%
Other	0	0.0%	7	3.2%
Highest qualification				
Below Grade				
12	3	1.1%	2	0.9%
Grade 12	156	57.1%	131	59.5%
Certificate	95	34.8%	62	28.2%
3-year Diploma	13	4.8%	19	8.6%
3-year Degree	1	0.4%	2	0,53%
4-year Degree (Honours)	4	1.5%	1	0.5%
Masters Degree	1	0.4%	0	0.0%
Doctors Degree	0	0.0%	0	0.0%
English reading ability				
Very poor	0	0.0%	0	0.0%
Poor	5	1.8%	2	0.9%
Good	151	55.3%	121	55.0%
Very good	117	42.9%	94	43.3%

Based on the information in Table 3.2 above, the dichotomous sample ($N = 273$) consisted mainly of female students (78.8%). This could be due to the fact that this is mainly a female-dominated field. The age of the students was evenly spread between the different age groups. The majority of the students were either black (73.6%) or white (12.5%), with only 4.4% Indian and 9.5% Coloured students. The main home languages of the students were IsiZulu (18.3%); Sepedi (16.8%) and Afrikaans (16.1%). The highest qualification was either Grade 12 (57.1%) or a certificate (34.8%). The English reading ability of all the students ranged from good (55.3%) to very good (42.9%).

The polytomous sample ($N = 217$) was composed mainly of female students (74.1%) aged 18 to 21 (21.8%) and 22 to 25 (20.9%). The majority of the students were black (74.7%) and white (14.5%), with only 5.5% Indian and 3.6% Coloured students. The home language was distributed equally between IsiZulu (15.5%), Sepedi (14.1%) and Afrikaans (13.8%) students, with the highest qualification being either Grade 12 (59.5%) or a certificate (28.2%). The English reading ability of all the students was between good (55.0%) and very good (43.3%).

3.4 DATA COLLECTION

The data collection method considered most appropriate to answer the research question involved the use of a standardised test administered through a web-based survey on myUnisa. In this study, the researcher utilised two response scale formats (dichotomous and polytomous) with the SAPI 262 item inventory.

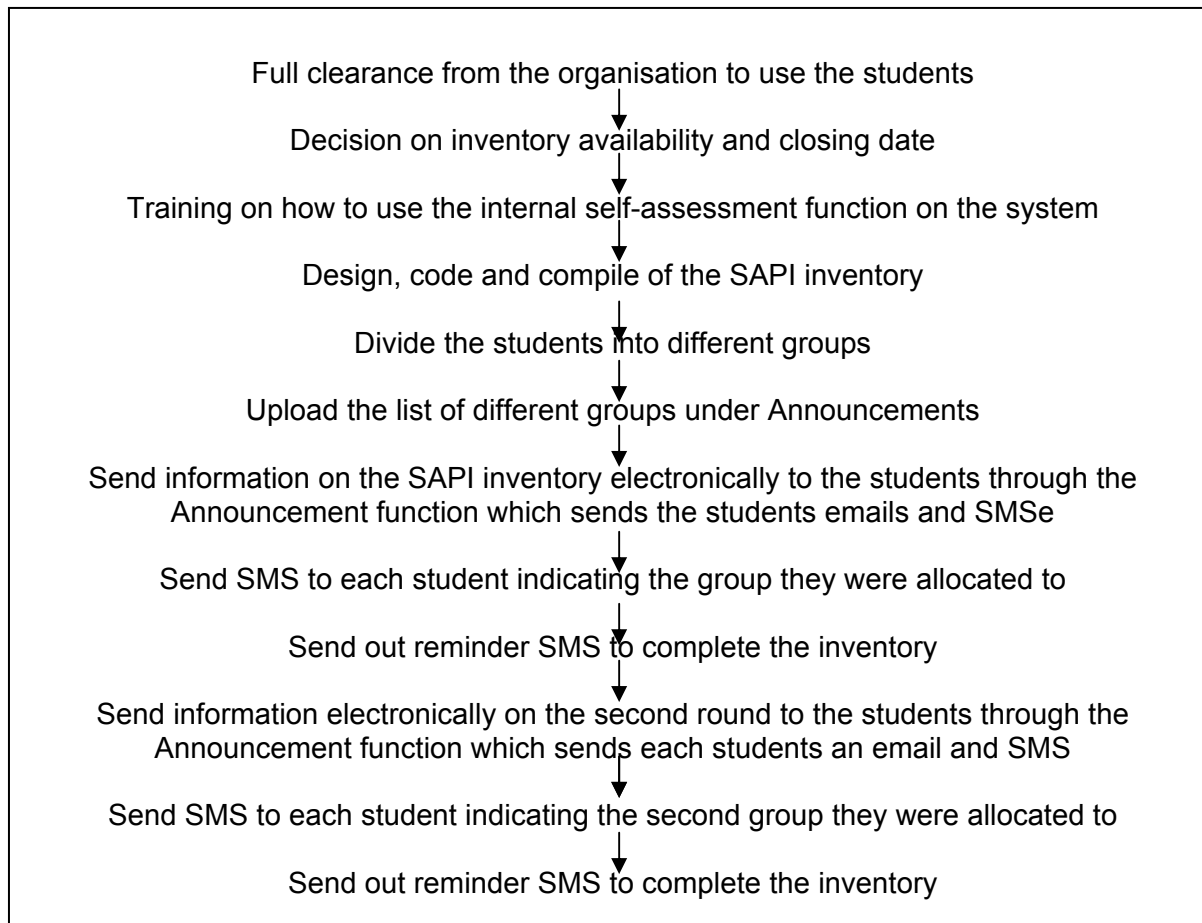
3.4.1 Measuring instrument

The SAPI inventory that was utilised is described in Chapter 2 (see section 2.2.6). The study made use of closed-ended personality related questions and statements based on the nine-factor personality structure of the SAPI. Respondents were required to select an answer in the given inventory. The respondents were required to choose the response option that best correlates with their answer. Both inventories consisted of 262 statements. For the dichotomous response scale (Group A), the respondents had to indicate whether they agreed or disagreed with the statements. For the polytomous response scale (Group B) respondents has to indicate whether they strongly agreed, agreed, somewhat agreed/disagreed, strongly disagreed or disagreed with each statement.

The SAPI inventory was given to the selected group of students. The dichotomous and polytomous response scale versions were alternatively administered. The students were divided into two groups and the student number with the corresponding group was uploaded on myUnisa. On the homepage of both subjects, a message was posted to inform the students about the self-assessment and explain

how the assessment worked. The inventory was cross-sectional because all the students had access to the self-assessment personality inventory for the same amount of time (the survey became available on 4 February 2012 and was deactivated on 6 June 2012). Figure 3.1 provides a full outline of the whole data collection process.

Figure 3.1: The data collection process



3.5 DATA ANALYSIS

3.5.1 Data preparation

To prepare the data for analysis, the researcher had to code the responses by allocating numerical representations to the variables on the computer. The statements and scales in the SAPI inventory were designed according to a specific coding scheme where the raw data were converted into numbers (Leedy & Ormrod,

2010; Saunders et al., 2009). After the students had submitted the inventories online, the myUnisa system exported the responses to a Microsoft Excel spreadsheet. Before the coded data were electronically transferred to the computer program, IBM Statistical package for social sciences (SPSS) 21, the data were cleaned (checked for errors and missing values) and diagnostic measures were taken to test for reliability and validity.

3.5.2 Statistical procedures

Hopwood and Donnellan (2010) argued that psychometric experts frequently state that exploratory factor analysis (EFA) is “primarily a data-driven approach, whereas confirmatory factor analysis (CFA) is theoretically grounded” (Byrne, 2005, p.17). In EFA the researcher does not have to identify indicators that have meaningful or strong loadings. Hopwood and Donnellan (2010) also found that the CFA approach performs poorly when evaluating personality trait inventories’ structures. Based on the findings of Hopwood and Donnellan (2010), the decision was taken to use EFA for this study. The research followed the standard statistical procedures followed by the SAPI project to date. A complete manual for data analysis for the SAPI was created by De Bruin (2009). The steps used to compare the dichotomous and polytomous response scales are discussed in the section below.

Step 1: Descriptive analysis

Descriptive statistics were used to determine the quality of the data through the calculation of the mean, standard deviation, skewness² and kurtosis³. It was decided to exclude items that were unsuitable⁴ and that served no purpose in the construct. To determine the unsuitable items, the cut-off was set for the mean at < 0.95 for the dichotomous response scale, and at < 4.50 for the polytomous response scale (Bond & Fox, 2007). The cut-off for skewness and kurtosis for both response scales was

² “A measure of the symmetry of a frequency distribution” (Field, 2009, p. 794)

³ A measure of the degree to “which scores cluster in the tails of a frequency distribution”(Field, 2009:788). “Kurtosis can be formally defined as the standardised fourth population moment about the mean” (DeCarlo, 1997, p. 292).

⁴ Items that were too simple or too complex.

set at > 2 and $> 4^5$ to allow the researcher to use as many items as possible (DeCarlo, 1997; Field, 2009). The items with a negative value for skewness and kurtosis were not considered important in the context of this research, as the negative numbers represented the fact that the SAPI inventory has overestimated the predictions (Field, 2009). Removing the unsuitable items helped to clarify the relationships between the items. For the purpose of the study, the problematic items identified in the descriptive statistics were removed from subsequent analysis.

Step 2: Factor analysis

EFA was performed by using the IBM SPSS version 21 program to examine the factor structures of the different response scales. The first decision involved the choice of which factor extraction method to use (De Bruin, 2009; Salkind, 2013). For the purpose of this study the principal axis method of extraction was utilised as the maximum likelihood resulted in one or more communality estimates greater than 1. These estimates were inconsistent and could therefore not be used. In an analysis not all factors are retained; only those factors with large eigenvalues > 1 should be retained. An inspection of the scree plot can also be utilized, which entails plotting a graph of each eigenvalue (Y-axis) against the factor with which it is associated (X-axis). When selecting factors the cut-off point should be at the point of inflexion⁶ (Field, 2009). More than two methods can be used in selecting the number of factors to be extracted, but for the purpose of this study, the method suggested in the SAPI manual was used in conjunction with personal inspection of the factors (Cooper & Schindler, 2008; De Bruin, 2009; Vorster, 2010).

The second decision involved determining which factor rotation method to use. When looking at the specific background of the study, the assumption can be made that within each cluster one “can expect the sub-clusters to be correlated” (De Bruin, 2009, p. 12). This led to the decision to use Oblimin rotation (De Bruin, 2009; Salkind, 2013).

⁵ De Bruin (2009) recommended that the cut-off for kurtosis is > 7 . Hence the normal kurtosis in the SPSS was subtracted from seven giving a cut-off of > 4 .

⁶ This is where the slope line changes dramatically.

Thirdly, in order to determine whether each item within the identified nine factors is well defined and correlates with the hypothesised factors, the pattern matrices should be analysed. In order to draw reliable and valid conclusions, the correlations between the items within a factor should have absolute values above 0.28 and items with lower loadings (< 0.28) should be removed. The low loadings of these items may be an indication that the items of the cluster had a larger measurement error than expected or that the item may not belong to that cluster, owing to the significance of the items for interpretation. The significance of the items for interpretation means that each item individually should make sense in collaboration with the other items in the same factor.

Step 3: Internal reliability analysis

The degree of the consistency with which it measures whatever it measures can be referred to as the reliability of the instrument (Whitley, 2002). There are different types of reliability, namely test-retest, equivalent, split-half and internal reliability. For the purpose of this study, only internal reliability was analysed, because the objective of this study was to test whether the SAPI measures the same construct across different response scales (Maree, 2010). The Cronbach alpha (α) coefficient was used to determine the degree to which the response scales measured the same construct. This value was therefore used to compare the internal reliability of the two response scales. This analysis was also based on inter-item correlations. The standard cut-off for good reliability and high internal consistency is estimated at $\alpha > 0.80$, although Osburn (2000) and Vorster (2010) recommended that the standard for exploratory studies be set at $\alpha > 0.65$. If the Cronbach alpha coefficient is lower than 0.60 it is regarded as unacceptable (Maree, 2010).

Step 4: Factor comparisons

Based on the factor structures and reliability results that emerged from Step 2 and 3, the dichotomous and polytomous response scales' factor structures and reliability values are compared. A comparison is made at the sub-factor level on each of the nine clusters. The extent to which the factors complement the target factors as conceptualised in the first qualitative phase of the SAPI project is also examined. An analysis of these comparisons and the reliability values determines which one of the

two response scale formats is more representative of the preliminary nine-factor personality structure.

3.6 ETHICAL CONSIDERATIONS

When conducting any research involving human participants, it is important to consider research ethics. According to Maree (2010), ethical considerations are vital in any research. When using students as respondents, the researcher must consider the confidentiality of the results and protect the identities of the respondents (Schlebusch & Roodt, 2008). These issues were dealt with by using the updated version of the relevant ethics policy of Unisa. It was also necessary to send out letters of consent to obtain permission to distribute the inventory to the students participating in this study (see Appendix D for the official ethical clearance letter).

3.7 CHAPTER SUMMARY

This chapter explored the methodology for the empirical study by explaining the research philosophy and design. The sections in this chapter focused on determining the sampling plan, size, and sample selection. The chapter also described the data collection, measuring instrument and analysis process of the research design. In conclusion, the chapter briefly presented the ethical considerations that were of concern in this study.

The next chapter examines the research findings by reporting on the data analysis and interpreting the findings of the study.

CHAPTER 4

RESEARCH RESULTS AND DISCUSSION

This chapter integrates and interprets the data analysis and results of the study, as described in Chapter 3. The discussion focuses on the data analysis procedures, namely descriptive statistics, exploratory factor analysis on both the dichotomous and polytomous response scales, internal reliability analysis (Cronbach α), the comparison of the factor structure for both response scales with the nine-factor personality structure of the SAPI and lastly the comparison of the overall reliability of all nine clusters (as conceptualised in the first qualitative stage of the SAPI project). The main objective of the study was to identify the most suitable response scale to be used for the nine factors of the SAPI. The total sample size ($N = 490$) was obtained by utilising both Group A (dichotomous response scale results) and Group B (polytomous response scale results). For all the statistical data and analysis see Appendix E (contained on a compact disc).

4.1 DATA PREPARATION

Prior to implementing the main statistical procedures, the data in the inventory were checked and inspected for missing and unanticipated values. For the purpose of the study, the missing values were replaced by using regression estimates. This data preparation process was followed for both the dichotomous and polytomous response scales and was described in Chapter 3. The Microsoft Excel files for the two response scales were exported as input files to IBM SPSS to create two new files for statistical analysis.

4.2 DESCRIPTIVE STATISTICS

According to Maree (2010), the term descriptive statistics is used to describe different statistical methods which focus on simplifying and summarising the data in a consequential way (Zeller, 1999). The Descriptive statistics were calculated to check the minimum and maximum values, the mean and standard deviations as well

as the items that showed extreme skewness and kurtosis. The descriptive statistics are summarised in Table 4.1. The skewness and the kurtosis coefficients of the items from both inventories were investigated and items with skewness of > 2 and kurtosis of > 4 were identified.

Table 4.1: Descriptive statistics for Administrative Management IA and IIA (N = 490)

Items	Group A (n = 273)				Group B (n = 217)			
	<i>Dichotomous response scale</i>				<i>Polytomous response scale</i>			
	Mean	SD	Skewness	Kurtosis	Mean	SD	Skewness	Kurtosis
V1	.42	.49	.31	-1.92	2.96	.99	-.09	.29
V2	.74	.44	-1.11	-.77	2.59	1.1	-1.62	-.13
V3	.05	.21	4.25	16.21	4.39	.77	-.99	1.36
V4	.30	.46	.86	-1.26	3.77	.78	-1.21	-1.13
V5	.10	.31	2.62	4.91	4.04	.72	-1.12	-1.14
V6	.94	.24	-3.60	11.06	1.71	.88	-.65	1.01
V7	.04	.21	4.46	17.98	4.30	.67	-.32	-.49
V8	.04	.21	4.44	17.82	4.09	.69	-.64	-.49
V9	.07	.26	3.37	9.43	4.09	.77	1.07	.57
V10	.10	.31	2.59	4.76	4.02	.79	-1.30	-.99
V11	.05	.22	4.05	14.49	4.25	.75	-.69	-.73
V12	.90	.29	-2.74	5.54	1.86	.91	-.39	-.36
V13	.06	.24	3.63	11.24	3.86	.69	-2.36	-1.63
V14	.03	.16	6.01	34.39	4.37	.59	-.48	-.29
V15	.10	.31	2.61	4.84	3.98	.77	-1.06	-.58
V16	.43	.49	.29	-1.93	3.48	1.02	-.45	1.47
V17	.86	.35	-2.08	2.36	1.88	1.05	-1.5	-.29
V18	.77	.42	-1.31	-.280	2.21	.93	-.86	-.91
V19	.01	.09	11.55	132.47	4.27	.64	-1.04	-.23
V20	.02	.15	6.49	40.46	4.34	.63	-.85	-1.75
V21	.03	.17	5.56	29.09	4.25	.60	.05	-1.14
V22	.22	.42	1.34	-.19	3.71	.91	.86	-.06
V23	.06	.25	3.59	11.00	4.20	.61	-1.07	-.52
V24	.05	.22	4.04	14.42	4.15	.66	.32	.00
V25	.00	.00	.	.	4.70	.53	-.037	-.14
V26	.04	.19	4.66	19.89	4.35	.78	-.73	-.93
V27	.17	.38	1.74	1.02	3.54	.92	.92	-.58
V28	.16	.37	1.83	1.36	3.98	.71	1.11	-.82
V29	.08	.27	3.08	7.57	4.17	.71	-.82	-.57
V30	.06	.24	3.74	12.06	4.09	.68	-.57	-.04
V31	.31	.47	.80	-1.37	3.53	1.04	-.24	-.82
V32	.93	.26	-3.38	9.48	1.70	.893	-.32	-.41
V33	.01	.12	8.08	63.71	4.53	.61	-1.20	-1.95
V34	.05	.22	4.07	14.63	4.15	.69	.65	-.15
V35	.13	.34	2.17	2.73	3.83	.89	-.70	-.78
V36	.15	.36	1.98	1.93	4.05	.86	-1.24	-1.62

V37	.01	.12	8.05	63.21	4.31	.65	-.84	-.29
V38	.26	.44	1.09	-.80	3.75	.75	-.23	.06
V39	.04	.21	4.43	17.73	4.21	.66	-.61	-.15
V40	.01	.12	8.08	63.71	4.52	.66	1.21	-.27
V41	.57	.49	-.29	-1.93	2.65	1.05	-.69	1.11
V42	.13	.34	2.21	2.91	3.99	.84	-.86	-.14
V43	.76	.43	-1.25	-.44	2.73	.87	-1.04	-.42
V44	.53	.50	-.10	-2.00	3.30	.86	.56	.75
V45	.03	.17	5.58	29.34	4.37	.64	-1.02	-.34
V46	.48	.50	.07	-2.01	3.47	.94	-.42	.25
V47	.78	.42	-1.33	-.23	2.63	1.07	.45	.53
V48	.55	.49	-.20	-1.97	3.00	1.02	-.52	-.04
V49	.02	.14	7.17	49.76	4.09	.60	-.39	-.74
V50	.00	.06	16.40	269.00	4.39	.55	1.64	-.56
V51	.16	.37	1.89	1.59	4.12	.72	.99	-.65
V52	.01	.121	8.06	63.46	4.25	.66	.42	-.59
V53	.90	.29	-2.76	5.66	1.82	.87	-.64	-.74
V54	.03	.16	6.00	34.25	4.07	.66	-.59	-.27
V55	.97	.18	-5.23	25.53	1.85	.79	-1.14	2.13
V56	.10	.30	2.66	5.12	4.00	.68	-.31	1.15
V57	.12	.32	2.37	3.66	4.06	.76	2.08	-.76
V58	.06	.24	3.63	11.24	4.15	.65	-.32	-.82
V59	.23	.42	1.29	-.35	3.82	.67	-1.03	-1.02
V60	.49	.50	.06	-2.01	3.22	.95	.09	-1.49
V61	.06	.24	3.77	12.31	4.12	.67	-.53	-.53
V62	.24	.44	1.22	-.52	3.64	.89	-.27	-.53
V63	.38	.49	.48	-1.78	3.50	1.01	-.45	-.14
V64	.03	.18	5.23	25.53	4.2	.63	-.47	.17
V65	.00	.06	16.46	271.00	4.7	.46	-.24	-.71
V66	.00	.00	.	.	4.82	.39	-.024	-.23
V67	.84	.36	-1.91	1.64	1.90	.83	-.48	-1.13
V68	.11	.32	2.43	3.93	3.77	.68	-.74	-.03
V69	.20	.39	1.53	.33	3.81	.89	.25	1.43
V70	.13	.33	2.27	3.17	3.80	.817	.32	-.49
V71	.03	.17	5.56	29.09	4.12	.60	-.74	-.64
V72	.03	.17	5.56	29.09	4.33	.83	-.69	.63
V73	.10	.30	2.67	5.16	4.08	.74	-.69	.24
V74	.09	.29	2.83	6.04	3.94	.63	1.18	-1.08
V75	.45	.49	.21	-1.9	3.10	1.05	-.74	-.61
V76	.54	.49	-.16	-1.9	2.96	1.12	1.72	-.49
V77	.36	.48	.59	-1.66	3.49	1.01	-.13	-.77
V78	.05	.22	4.23	15.99	4.03	.58	-.07	-1.49
V79	.96	.19	-4.68	20.07	1.94	.76	-.41	-.29
V80	.39	.49	.47	-1.79	3.37	1.02	-.19	.34
V81	.14	.35	2.07	2.28	3.84	.75	-.21	-1.25
V82	.94	.24	-3.75	12.19	1.79	.89	.09	-.66
V83	.03	.17	5.58	29.34	4.09	.59	-.56	-.82
V84	.57	.49	-.27	-1.94	3.04	1.04	-.37	.59
V85	.05	.22	4.07	14.63	3.90	.62	-.78	-1.01

V86	.00	.06	16.34	267.00	4.58	.51	.67	.18
V87	.83	.38	-1.76	1.16	2.35	.99	-.41	-.59
V88	.86	.34	-2.13	2.55	2.1	.89	-.49	-.29
V89	.15	.36	1.95	1.82	4.2	.78	-.48	1.16
V90	.34	.47	.69	-1.52	3.70	.82	-1.04	-.55
V91	.05	.22	4.07	14.70	4.3	.60	1.60	-.319
V92	.17	.38	1.74	1.02	3.8	.69	-.03	.119
V93	.81	.39	-1.55	.40	2.4	.85	-1.09	-.37
V94	.75	.43	-1.16	-.67	2.27	.87	.07	-.99
V95	.07	.26	3.28	8.81	3.92	.68	-1.04	.19
V96	.04	.21	4.46	17.98	4.08	.61	-.36	1.11
V97	.06	.23	3.88	13.13	4.01	.60	-.83	-.76
V98	.17	.38	1.77	1.14	3.92	.74	-.28	-.48
V99	.90	.29	-2.75	5.62	1.80	1.13	.31	-.59
V100	.27	.44	1.06	-.89	3.61	.91	-.91	-.97
V101	.99	.09	-11.51	131.47	1.55	.65	-.66	-.07
V102	.02	.14	7.7	49.76	4.22	.59	-.09	.61
V103	.01	.11	9.42	87.29	4.21	.49	-.10	-.01
V104	.02	.14	7.18	49.96	4.51	.56	1.38	-1.09
V105	.10	.31	2.60	4.79	3.94	.81	-.54	.38
V106	.01	.12	8.09	63.96	4.30	.58	-.42	-.44
V107	.17	.38	1.74	1.02	3.85	.74	.72	-.52
V108	.24	.43	1.25	-.44	3.69	.76	-.07	-.14
V109	.02	.15	6.53	40.96	4.09	.76	-.15	-.725
V110	.96	.21	-4.5	17.98	1.54	.73	-.93	-1.05
V111	.05	.22	4.24	16.06	4.22	.62	-.10	.95
V112	.91	.29	-2.84	6.12	1.91	1.03	-.14	-.63
V113	.97	.17	-5.57	29.22	1.45	.65	.87	-.13
V114	.07	.26	3.28	8.81	3.82	.69	.34	-.22
V115	.20	.40	1.49	.21	3.61	.82	.63	-.60
V116	.03	.16	6.00	34.25	4.06	.68	-.32	-.43
V117	.06	.23	3.92	13.46	3.93	.72	-.61	-.17
V118	.03	.16	6.00	34.25	4.55	.58	.54	-1.17
V119	.75	.43	-1.18	-.60	2.30	.90	-.17	.74
V120	.00	.06	16.46	271.00	4.56	.56	-.12	-66
V121	.12	.32	2.37	3.66	3.99	.68	-.50	1.05
V122	.09	.29	2.81	5.96	3.84	.66	-.45	.09
V123	.31	.46	.82	-1.35	3.10	.89	.79	.30
V124	.10	.30	2.63	4.94	4.13	.69	-.18	-.64
V125	.03	.17	5.57	29.22	4.06	.58	-.72	-.15
V126	.10	.29	2.74	5.54	3.90	.63	-.69	-.32
V127	.03	.18	5.22	25.42	4.42	.57	.84	.049
V128	.67	.47	-.71	-1.51	2.78	.97	-.74	.47
V129	.44	.49	.23	-1.97	2.84	.92	.62	-1.16
V130	.03	.16	5.96	33.82	4.15	.62	1.26	-.24
V131	.49	.50	.05	-2.01	2.84	1.05	-1.29	-.38
V132	.03	.18	5.23	25.53	4.16	.61	.	-.71
V133	.09	.28	2.99	6.98	4.16	.62	-.65	3.57
V134	.04	.19	4.67	19.98	4.24	.77	-.44	2.74

V135	.16	.37	1.84	1.38	3.87	.96	1.91	4.11
V136	.01	.11	9.31	85.29	4.27	.56	3.97	2.77
V137	.68	.47	-.79	-1.41	2.64	1.25	2.46	-.24
V138	.96	.19	-4.92	22.38	1.84	.85	.87	.18
V139	.57	.49	-.29	-1.93	3.03	1.08	.13	1.03
V140	.41	.49	.36	-1.88	3.4	1.00	-.37	.21
V141	.12	.32	2.38	3.69	3.88	.85	-.132	5.64
V142	.14	.34	2.14	2.58	4.09	.79	3.22	3.11
V143	.28	.45	.99	-1.01	3.71	.90	.58	.71
V144	.84	.37	-1.84	1.40	2.19	.92	.13	10.48
V145	.21	.41	1.42	.027	3.99	.90	4.13	.05
V146	.01	.12	8.08	63.71	4.36	.51	-.07	3.04
V147	.89	.32	-2.44	3.97	1.83	.92	1.44	-.52
V148	.01	.12	8.08	63.71	4.12	.68	1.99	4.96
V149	.00	.00	.	.	4.28	.59	-.62	.75
V150	.17	.38	1.76	1.12	3.85	.72	.88	3.09
V151	.97	.17	-5.59	29.47	1.46	.63	-.18	2.39
V152	.12	.32	2.37	3.63	3.86	.62	5.06	-.80
V153	.01	.11	9.38	86.63	4.32	.54	1.88	-.35
V154	.06	.24	3.75	12.19	3.99	.79	-.39	2.99
V155	.15	.36	1.99	1.98	3.94	.63	-.20	-.74
V156	.06	.24	3.76	12.26	4.15	.83	-.98	-.26
V157	.11	.31	2.56	4.57	3.95	.71	-.89	.89
V158	.05	.23	4.01	14.20	4.04	.59	2.81	.37
V159	.52	.50	-.09	-2.01	2.80	.92	1.68	2.09
V160	.01	.11	9.35	85.96	4.21	.50	2.22	1.59
V161	.02	.14	7.16	49.56	4.30	.56	1.08	.78
V162	.00	.06	16.43	270.0	4.48	.61	-.39	-.40
V163	.61	.49	-.46	-1.80	3.01	1.16	.61	-.65
V164	.29	.46	.91	-1.19	3.79	.86	.51	-.14
V165	.10	.29	2.75	5.62	3.92	.65	2.57	-.14
V166	.00	.00	.	.	4.35	.58	-.06	.43
V167	.09	.29	2.88	6.32	3.84	.67	1.14	6.53
V168	.72	.45	-1.01	-.98	2.54	1.08	3.32	1.84
V169	.11	.32	2.48	4.19	3.85	.65	.49	-.69
V170	.14	.349	2.07	2.28	4.05	.84	-1.16	-.22
V171	.84	.365	-1.89	1.56	2.19	.94	.51	3.12
V172	.04	.19	4.92	22.38	4.30	.53	-.66	.98
V173	.06	.24	3.75	12.19	4.19	.64	.94	4.23
V174	.04	.19	4.67	19.98	4.02	.63	-.75	4.14
V175	.08	.27	3.08	7.57	3.90	.66	-1.56	-.02
V176	.02	.14	7.18	49.96	4.17	.56	.55	1.12
V177	.09	.28	2.99	6.98	3.96	.69	-.31	.10
V178	.89	.32	-2.48	4.19	2.14	.92	-.91	.22
V179	.05	.22	4.19	15.75	4.19	.77	-.27	1.25
V180	.37	.49	.52	-1.74	3.4	1.06	-.33	1.13
V181	.96	.19	-4.67	19.98	1.55	.79	1.26	1.96
V182	.03	.17	5.56	29.09	4.31	.58	.12	.82
V183	.51	.50	-.03	-2.01	3.09	1.03	3.49	.12

V184	.50	.50	-.01	-2.02	3.06	1.02	-.67	.72
V185	.08	.27	3.08	7.52	4.16	.89	3.84	.86
V186	.06	.24	3.62	11.18	4.25	.63	-.17	2.54
V187	.03	.18	5.19	25.19	4.08	.54	7.44	.02
V188	.13	.34	2.16	2.67	3.82	.74	.73	7.71
V189	.07	.26	3.38	9.48	3.92	.75	1.97	-.12
V190	.03	.16	6.00	34.25	4.20	.53	1.69	2.54
V191	.01	.12	8.03	62.96	4.28	.56	.89	-.65
V192	.98	.15	-6.52	40.79	1.40	.55	5.94	.75
V193	.01	.12	8.05	63.21	4.32	.62	.79	-.52
V194	.18	.38	1.72	.96	3.78	.81	.41	1.75
V195	.23	.42	1.29	-.35	3.64	.76	.057	.23
V196	.11	.31	2.54	4.47	3.84	.67	-.35	-.74
V197	.71	.46	-.91	-1.19	2.68	1.04	2.96	-.97
V198	.26	.44	1.09	-.81	3.42	1.01	.14	1.11
V199	.06	.23	3.90	13.33	4.06	.64	2.21	.25
V200	.15	.36	2.00	2.03	4.07	.72	-.48	-1.02
V201	.09	.29	2.89	6.41	3.97	.76	2.87	-.96
V202	.03	.18	5.21	25.30	4.15	.54	-.55	.60
V203	.30	.46	.89	-1.22	3.53	.83	.418	.27
V204	.65	.48	-.64	-1.61	2.57	.94	.02	-.02
V205	.01	.09	11.53	131.97	4.11	.54	-1.20	1.22
V206	.66	.47	-.69	-1.52	2.60	.93	3.82	3.25
V207	.94	.23	-3.90	13.33	1.64	.82	1.49	5.26
V208	.24	.43	1.25	-.44	3.58	.95	.92	.44
V209	.01	.12	8.09	63.96	4.01	.54	1.14	-.17
V210	.00	.00	.	.	4.22	.49	3.34	.20
V211	.15	.36	1.92	1.69	4.01	.72	1.02	-.39
V212	.04	.19	4.92	22.38	4.28	.59	.08	.38
V213	.00	.06	16.40	269.00	4.23	.46	3.71	-.89
V214	.10	.29	2.75	5.58	3.92	.72	.59	1.07
V215	.01	.11	9.35	85.96	4.18	.54	3.94	.37
V216	.01	.09	11.53	131.97	4.20	.56	-.29	1.39
V217	.04	.19	4.64	19.71	4.08	.58	1.28	-.02
V218	.01	.09	11.45	129.97	4.17	.63	-.62	.32
V219	.08	.28	3.06	7.43	3.82	.75	1.52	.77
V220	.02	.15	6.48	40.29	4.16	.63	1.44	.59
V221	.06	.23	3.85	12.93	3.99	.64	1.67	1.65
V222	.89	.32	-2.48	4.19	2.2	1.02	-.46	2.58
V223	.25	.43	1.17	-.64	3.54	.82	.23	-.83
V224	.10	.30	2.66	5.12	4.07	.68	-.65	1.08
V225	.97	.16	-5.98	33.97	1.45	.55	-.08	.454
V226	.03	.17	5.55	28.97	4.16	.56	2.35	2.22
V227	.84	.37	-1.86	1.47	2.09	.83	-.00	1.37
V228	.06	.24	3.74	12.06	3.97	.63	1.27	2.82
V229	.87	.34	-2.15	2.64	1.99	.75	1.12	-.18
V230	.10	.30	2.68	5.19	3.90	.66	.63	-.57
V231	.07	.25	3.47	10.12	4.00	.65	-.15	3.16
V232	.16	.37	1.87	1.52	3.64	.74	2.65	.85

V233	.06	.237	3.74	12.06	4.02	.71	1.14	-.54
V234	.01	.11	9.33	85.63	4.38	.56	-.04	1.11
V235	.83	.37	-1.79	1.20	2.33	.82	-.72	2.12
V236	.04	.19	4.89	22.07	4.02	.52	1.08	2.59
V237	.62	.49	-.49	-1.77	2.99	.90	.01	.13
V238	.85	.36	-1.98	1.93	2.02	.96	.98	-.05
V239	.00	.06	16.28	265.00	4.07	.52	.49	.96
V240	.16	.37	1.86	1.47	3.79	.83	.65	.54
V241	.06	.24	3.73	11.99	3.96	.65	1.92	2.11
V242	.96	.19	-4.65	19.79	1.76	.79	4.79	-.23
V243	.01	.12	8.06	63.46	4.10	.58	.56	-.21
V244	.53	.50	-.11	-2.00	3.08	.94	1.05	.74
V245	.85	.36	-1.92	1.70	2.18	.96	.74	-.51
V246	.02	.15	6.47	40.13	4.18	.50	.29	.84
V247	.03	.18	5.23	25.53	4.13	.59	1.69	.38
V248	.07	.25	3.46	10.06	4.16	.72	.01	1.19
V249	.08	.27	3.23	8.51	4.03	.67	-.81	.13
V250	.07	.25	3.47	10.12	4.03	.57	1.58	-.65
V251	.09	.29	2.81	5.92	4.01	.73	-.18	1.56
V252	.31	.47	.80	-1.37	3.30	1.02	.59	.99
V253	.89	.32	-2.43	3.93	2.14	.91	1.08	1.82
V254	.54	.50	-.15	-1.99	2.90	1.27	-.62	.28
V255	.18	.39	1.65	.74	3.64	.97	.29	.38
V256	.87	.34	-2.21	2.88	2.42	.82	.41	1.48
V257	.76	.43	-1.22	-.52	2.49	.99	.78	.84
V258	.00	.00	.	.	4.36	.62	-.63	.76
V259	.93	.26	-3.36	9.38	1.85	.83	-1.21	.32
V260	.04	.19	4.65	19.79	4.01	.63	.47	-.13
V261	.01	.11	9.33	85.63	4.15	.56	4.27	2.13
V262	.41	.49	.36	-1.89	3.25	1.07	.33	8.70

Note: Problematic items are indicated in bold.

According to Table 4.1, there were 94 (bolded) problematic items in the dichotomous response scale and nine (bolded) problematic items in the polytomous response scale. The whole set of problematic items was not excluded for both versions. Instead, different items were excluded from further analysis for each version, depending on which items were deemed unsuitable for factor analysis. To allow for valid comparisons, the problematic items identified in both response scales are reported in Table 4.2.

Table 4.2: Problematic items identified in the dichotomous and polytomous response scales

Clusters / factors	Dichotomous response scale	Polytomous response scale
Conscientiousness	36 items of which 13 were identified as problematic (36%)	36 items of which one was identified as problematic (2.78%)
Emotional Stability	33 items of which seven were identified as problematic (21%)	33 items of which two were identified as problematic (6.06%)
Extraversion	31 items of which three were identified as problematic (9.67%)	None of the items of the polytomous response scale were problematic
Facilitating	17 items of which six were identified as problematic (35%)	None of the items of the polytomous response scale were problematic
Integrity	20 items of which 11 were identified as problematic (55%)	20 items of which one was identified as problematic (5%)
Intellect	15 items of which four were identified as problematic (26%)	None of the items of the polytomous response scale were problematic.
Openness	24 items of which ten were identified as problematic (41%)	24 items from which three were identified as problematic (12.5%)
Relationship Harmony	36 items of which 18 were identified as problematic (50%)	36 items of which one was identified as problematic (2.77%)
Soft-heartedness	38 items of which 21 were identified as problematic (55%)	38 items from which one was identified as problematic (2.63% problematic)

Based on the above findings concerning the 250 items included in this study (12 of the 262 SAPI items were not used for the purpose of the study as they relate to social desirability), it appears that the dichotomous response scale had 37.2% problematic items, whereas the polytomous response scale had only 3.6% problematic items. It is therefore possible to conclude that a high/low mean (0.95 and above and 0.05) for the dichotomous response scale and a mean (of 4.50 and above) for the polytomous response scale represent over measurement in the sense that the items could be too easily endorsed. The next section focuses on the following stage of the statistical analysis procedure, as described in Chapter 3.

4.3 FACTOR ANALYSIS

Factor analysis was conducted to identify the major psychologically meaningful factors that account for the correlations between the items. The factors had to be psychologically meaningful, and therefore each item had to be analysed individually with each factor it loaded onto in the pattern matrix. Upon removal of the unsatisfactory items for both the dichotomous and polytomous response scales of the nine SAPI factors, items were subjected to principal axis factoring with Oblimin rotation. The pattern matrices for both inventories were evaluated to determine whether each of the items was well defined with loadings > 0.28 . The number of items to be retained was guided by eigenvalues > 1 and scree plot evaluations. The following strategy for factor analysis was followed:

- Each of the nine factors and sub-factor structures for both the dichotomous and polytomous response scales are presented and interpreted in terms of item loadings.
- The reliability of the sub-factors for both response scales is reported.
- A comparison is made between the dichotomous and polytomous response scales.
- Based on the comparison, the psychometric properties of both response scales are compared with the qualitative SAPI factor structure.
- The overall reliability of all nine clusters is reported.
- Based on the empirical evidence, a final recommendation is given of the most suitable response scale to be utilised.

4.3.1 Conscientiousness

4.3.1.1 *The dichotomous response scale for Conscientiousness*

The dichotomous response scale for Conscientiousness indicated that 20 of the 23 items loaded on to four factors, explaining 41.75% of the total variance⁷. The four-factor solution was considered best as opposed to the three- or five-factors solution,

⁷ All the statistical analyses are included on the attached compact disc (Appendix E).

owing to the significance of the items for interpretable results. The final 20 items had absolute values above 0.28. The pattern of loadings is indicated in Table 4.3.

Table 4.3: Pattern matrix for the dichotomous response scale restricted to four factors for Conscientiousness

Items	Factor			
	1	2	3	4
I keep to deadlines	.55			
I do things on time	.55			
I do what I say	.47			
I am thorough in my work	.46			
I complete tasks even if they are difficult	.45			
I tidy up when I make a mess	.36			
I am always prepared	.32			
I do things accurately	.29			
I stay within the rules		-.79		
I obey rules		-.76		
I follow set rules		-.41		
I am an achiever			-.56	
I am motivated by my work			-.53	
I check for errors in work that has been done			-.42	
I have definite goals in life			-.38	
I finish things I have started				-.55
I stay focused on my task	.29			-.43
I stick to my decision				-.31
I have difficulty in concentrating				.31
I am focused on winning				-.28

Note: Only loadings above .28 are displayed.
Variables are listed in the order of their highest factor loadings.

The four distinctive factors that materialised were labelled Orderliness and organised, Obedient, Achievement-oriented and Dedication. These factors underlie the Conscientiousness items. In the Orderliness and organised factor, themes of being organised, punctual and timeous emerged. In the Obedient factor, themes of being disciplined and obedient emerged. In the Achievement-oriented factor, themes

such as performance, career and future oriented emerged. Lastly, in the Dedication factor, themes such as determined, purposeful and perseverant emerged.

After each factor had been determined, the reliability for each of the four factors was analysed independently. Eleven items loaded negatively and had to be recoded and reverse-scored. Table 4.4 illustrates the Cronbach alpha for each factor of the Conscientiousness cluster.

Table 4.4: Reliability statistics for the dichotomous response scale restricted to four factors for Conscientiousness

Factor	Cronbach alpha	N of items
Orderliness and organised	.66	8
Obedient	.72	3
Achievement-oriented	.55	4
Dedication	.51	5

Table 4.4 indicates that the factor, Obedient, showed a reasonable level of reliability, although the factor included only three items, two⁸ of which had high loadings of 0.76 and 0.79. The Orderliness and organised factor also had an acceptable Cronbach alpha value of 0.66, although the factor had eight items, most of the items had lower loadings of between 0.29 and 0.55. This loading was markedly low and could indicate that the items of the cluster had a larger measurement error than expected (Hair, Black, Babin, Anderson, & Tatham, 2006).

4.3.1.2 The polytomous response scale for Conscientiousness

Analysis of the polytomous response scale for Conscientiousness showed that 31 of the 37 items loaded on three factors, explaining 38.60% of the total variance. The three-factor solution was considered a better option than the four-or five-factor solution, as it gave more interpretable results. In addition, the final 31 items all had absolute values above 0.28. The pattern of loadings is displayed in Table 4.5.

⁸ "I stay within the rules" and "I obey rules"

Table 4.5: Pattern matrix for the polytomous response scale restricted to three factors for Conscientiousness

Items	Factor		
	1	2	3
I set goals for myself	.76		
I have definite goals in life	.63		
I am an achiever	.61		-.33
I am committed to what I do	.60		
I am determined in the things I do	.56		
I am a motivated person	.53		
I have direction in life	.47		
I am focused on winning	.43		
I am motivated by my work	.42		
I am involved in my work	.41		
I want things to be neat	.41	.32	
I learn from previous problems	.38		
I keep to deadlines		.61	
I do things on time		.56	
I am thorough in my work		.56	
I take care of detail	.28	.50	
I stay within the rules		.48	
I do things accurately		.45	
I obey rules		.43	
I complete tasks even if they are difficult		.42	
I am precise in my work	.28	.40	
I check for errors in work that has been done	.29	.29	
I tidy up when I make a mess		.29	
I stay focused on my task			-.52
I am always prepared			-.50
I follow set rules			-.46
I work in an organised manner			-.46
I can be distracted			.35
I finish things I have started			-.34
I think ahead	.31		-.33
I do something until I get it right	.28		-.31

Note: Only loadings above .28 are displayed.

The three distinctive factors that emerged were labelled Achievement-oriented and ambitious, Dedication and perfectionistic and Orderliness and organised. These factors underlie the Conscientiousness items. In the Achievement oriented and ambitious factor, themes that emerged were performance, career and future oriented. In the Dedication and perfectionistic factor, themes such as determined, purposeful and perseverance emerged. Lastly, in the Orderliness and organised factor, themes of being organised, punctual and timeous emerged.

After each factor had been determined, the reliability for each of the three factors was analysed individually. Seven items that loaded negatively had to be re-coded and reverse-scored. The following items in Table 4.6 illustrate the Cronbach alpha for each factor for the Conscientiousness cluster.

Table 4.6: Reliability statistics for the polytomous response scale restricted to three factors for Conscientiousness

Factor	Cronbach alpha	N of items
Achievement-oriented	.84	12
Dedication and perfectionistic	.82	11
Orderliness and organised	.57	8

From Table 4.6 it is evident that the two factors, Achievement-oriented and Dedication and perfectionistic, showed an acceptable value for the Cronbach alpha coefficient (Field, 2009). The Achievement-oriented factor included 12 items, four⁹ of which had acceptable loadings of between 0.60 and 0.76. The Dedication and perfectionistic factor had 11 items of which only one¹⁰ had a reasonable level of acceptance.

4.3.1.3 Comparison between the dichotomous and polytomous response scales for Conscientiousness

For the dichotomous response scale, the factor analysis indicated that a four-factor solution was more suitable than a three-factor solution owing to the significance of

⁹ “I set goals for myself”, “I have definite goals in life”, “I am an achiever” and “I am committed to what I do”
¹⁰ “I keep to deadlines”

the items for the interpretable results¹¹. In terms of the polytomous response scale, the analysis indicated that a three-factor solution would be suitable. For the Orderliness and organised factor, both the dichotomous and polytomous response scales loaded the factor with the same single¹² item. The Obedient factor was only identified for with the dichotomous response scale, which loaded it with three items. Both the dichotomous and polytomous response scales loaded the Dedication factor, although none of the items loaded the same. For the Achievement-oriented factor, both the dichotomous and polytomous response scales loaded the factor with the same three¹³ items.

4.3.1.4 Determining the factor structure of Conscientiousness

The qualitative SAPI stage identified five sub-clusters within the Conscientiousness cluster: Achievement orientation, Dedication, Orderliness, Self-discipline and Thoughtlessness (Nel et al., 2012). The analysis of the data from the dichotomous response scale resulted in the identification of four factors (Orderliness and organised, Obedient, Achievement orientation and Dedication) that replicated most of the sub-clusters contained in the Conscientiousness cluster. The only sub-cluster that did not load on the dichotomous response scale was the Thoughtless sub-cluster. The analysis of the data from the polytomous response scale resulted in the identification of three factors (Achievement-Oriented and ambitious, Dedication and perfectionistic and Orderliness and organised), which replicated some of the sub-clusters of the Conscientiousness cluster. The two sub-clusters that did not load on the polytomous response scale were the Self-disciplined and Thoughtless sub-clusters.

In conclusion, the comparison of the structure of the Conscientiousness cluster from the qualitative study with the structure produced by the factor analysis of both the dichotomous and polytomous response scales suggests that although the factor structure produced by the dichotomous response scale compared favourably to the qualitative personality structure, the reliability is too low and the scale cannot be

¹¹ Therefore, some of the factors may have as few items as two, although four items are usually needed to indicate a factor.

¹² "I am always prepared"

¹³ "I am an achiever"; "I am motivated by my work"; and "I have definite goals in life"

used. Therefore, despite the fact that the polytomous response scale does not exactly replicate the qualitative personality structure it should be used in preference to the dichotomous response scale. The reason for this is because each individual item complements the factor label and each factor is more reliable. Hence, the polytomous response scale is more suitable for measuring the Conscientiousness cluster.

4.3.2 Emotional Stability

4.3.2.1 The dichotomous response scale for Emotional Stability

Analysis of the dichotomous response scale for Emotional Stability indicated that 18 of the 26 items loaded onto three factors, explaining 28.98% of the total variance. The three-factor solution was suitable for use due to the significance of the items for interpretable results. Eight items with absolute values below 0.28 were removed, leaving 18 items. The pattern of loadings is presented in Table 4.7.

Table 4.7: Pattern matrix for the dichotomous response scale restricted to three factors for Emotional Stability

Items	Factor		
	1	2	3
I worry a lot	.55		
I am afraid of people judging me	.54		
I am afraid of some people	.53		
I am afraid that bad things may happen	.51		
I do things that I later regret	.40		
I easily get nervous	.39		
I find it difficult to trust others	.36		
I cry easily	.31		
I control my emotions		.65	
I accept things as they are		.49	
I am pleased with what I have		.42	
I am calm in most situations		.41	
I calm down quickly		.39	-.32

I remain cheerful even when there are problems	.37	
I get angry over minor issues		.74
I get angry easily		.65
I am difficult to please		.39
I want to be noticed		.28

Note: Only loadings above .28 are displayed.
Variables are listed in the order of their highest factor loadings.

Three distinctive factors materialised, namely Fearfulness, Balance and Ego strength. These factors underlie the Emotional Stability items. In the Fearfulness factor, themes emerged of being fearful and impulsive. In the Balance factor, themes emerged such as even-tempered and content. In the Ego strength factor, themes emerged of being short-tempered, attention seeking and demanding.

After the factors had been determined, each factor's reliability was analysed individually. No item was identified that loaded negatively and it was possible to continue with the reliability analysis for each factor. Table 4.8 illustrates the Cronbach alpha for each factor of the Emotional Stability cluster.

Table 4.8: Reliability statistics for the dichotomous response scale restricted to three factors for Emotional Stability

Factor	Cronbach alpha	N of items
Fearfulness	.70	8
Balance	.64	6
Ego strength	.57	4

Table 4.8 indicates that two factors (Fearfulness 0.70 and Balance 0.64) showed reasonable levels of reliability. The Fearfulness factor consisted of eight items, of which none were above the acceptable threshold value. The Balance factor had six items, of which only one¹⁴ had an acceptable Cronbach alpha value of 0.65.

¹⁴ "I control my emotions"

4.3.2.2 The polytomous response scale for Emotional Stability

Analysis of the polytomous response scale for Emotional Stability indicated that 26 of the 31 items loaded on to three factors, explaining 38.50% of the total variance. The three-factor solution was considered to be more suitable than a four- or five-factor solution. In addition, the final 26 items had absolute values above 0.28. The pattern of loadings is indicated in Table 4.9.

Table 4.9: Pattern matrix for the polytomous response scale restricted to three factors for Emotional Stability

Items	Factor		
	1	2	3
I get angry easily	.72		
I get angry over minor issues	.55		
I worry a lot	.54		
I speak before I think	.45		
I control my emotions	-.45	.28	
I complain about everything	.41		
I cry easily	.38		
I am difficult to please	.34		
I feel emotions deeply	.33		
I easily get nervous	.32		.31
I want people to listen to me	.31		
I do things without thinking too much in advance	.31		
I can handle difficult situations		.72	
I can deal with difficulties in my life		.46	-.38
I act in a mature manner		.45	
I admit when I am wrong	-.34	.39	
I am pleased with what I have		.38	
I am calm in most situations		.33	
I want to be respected		.33	
I accept things as they are		.33	
I want to be noticed		.29	
I am afraid of some people			.53

I am afraid that bad things may happen	.43
I never get what I want	.40
I find it difficult to trust others	.38
I do things that I later regret	.34

Note: Only loadings above .28 are displayed.

Variables are listed in the order of their highest factor loadings.

The three distinctive factors that materialised were labelled Emotional control and sensitivity, Balance and Fearfulness. These factors underlie the Emotional Stability items. In the Emotional control and sensitivity factor, themes of being short-tempered, impulsive, attention seeking and emotional emerged. In the Balance factor, themes of being even-tempered, courageous, coping, mature and content emerged. Lastly, in the Fearfulness factor, themes emerged of being fearful and complaining.

After each factor had been determined, the reliability of each of the three factors was analysed independently. Only one item loaded negatively and had to be recoded and reverse-scored. Table 4.10 illustrates the Cronbach alpha for each factor of the Emotional Stability cluster.

Table 4.10: Reliability statistics for the polytomous response scale restricted to three factors for Emotional Stability

Factor	Cronbach alpha	N of items
Emotional control and sensitivity	.67	12
Balance	.63	9
Fearfulness	.49	3

From Table 4.10 it is evident the factors Emotional control and sensitivity and Balance had reasonable Cronbach alpha coefficients and can therefore be considered as acceptable, although not preferred (Field, 2009). The Emotional control and sensitivity factor contained 12 items, but only one¹⁵ had a high loading of 0.72. The Balance factor had nine items of which only one¹⁶ had a high loading of 0.72.

¹⁵ "I get angry easily"

¹⁶ "I can handle difficult situations"

4.3.2.3 Comparison between the dichotomous and polytomous response scale for Emotional Stability

For both the dichotomous and polytomous response scales, the factor analysis, with due consideration of the significance of the items for interpretable results¹⁷, indicated that a three-factor solution was preferable to a two- or four-factor solution. The dichotomous and polytomous response scales both loaded on the Fearfulness factor, with only two¹⁸ items common to the two solutions. The dichotomous and polytomous response scales also both loaded the Balance factor, with three¹⁹ items loading the same. Only the dichotomous response scale loaded the Ego strength factor, whereas only the polytomous response scale loaded the Emotional control and sensitivity factor. To summarise, of the three factors identified by both scales, two factors loaded similarly.

4.3.2.4 Determining the factor structure of Emotional Stability

In the SAPI model the Emotional Stability cluster consists of six sub-clusters, namely Ego strength, Emotional sensitivity, Emotional control, Neuroticism, Courage and Balance (Nel et al., 2012). The results of this study found that the dichotomous response scale yielded three factors (Fearfulness, Balance and Ego strength) that replicated some of the sub-clusters within the Emotional Stability cluster. The three sub-clusters that did not load on the dichotomous response scale were Emotional sensitivity, Emotional control and Neuroticism. The polytomous response scale yielded three factors (Emotional control and sensitivity, Balance and Fearfulness) that replicated the sub-clusters within the Emotional Stability cluster. The only two sub-clusters that did not load on the polytomous response scale were the Ego strength and Neuroticism sub-clusters, since both Emotional control and Emotional sensitivity loaded on to the same factor. In conclusion, the comparison of the structure of the Emotional Stability cluster from the qualitative study with the results of the factor analyses for the two response scales, suggested that the polytomous response scale was more suitable for measuring the Emotional Stability cluster.

¹⁷ Therefore some of the factors may have only two items, although usually a factor should consist of a minimum of four items.

¹⁸ "I am afraid of some people" and "I am afraid that bad things may happen"

¹⁹ "I am calm in most situations"; "I am pleased with what I have"; and "I accept things as they are"

4.3.3 Extraversion

4.3.3.1 The dichotomous response scale for Extraversion

The dichotomous response scale for Extraversion showed that 19 of the 28 items loaded on to four factors, explaining 45.30% of the total variance. The four-factor solution was preferable to a three factor solution, owing to the significance of the items that provided the most interpretable results. The final 19 items had absolute values above 0.28. The pattern of loadings is indicated in Table 4.11.

Table 4.11: Pattern matrix for the dichotomous response scale restricted to four factors for Extraversion

Items	Factor			
	1	2	3	4
I connect with people easily	.75			
I make friends easily	.70			
I am easy to talk to	.59			
I chat to everyone	.45			
I have good social skills	.38			
I laugh a lot	.33			
I make jokes with everyone	.30			
I turn to others when I have a problem		.58		
I make others laugh		.49		
I enjoy telling funny stories		.41		.34
I enjoy playing tricks on others		.35		
I share my feelings		.35		
I enjoy playing with others		.35		
I am quiet in front of people			.65	
I am seen as quiet by others			.65	
I talk a lot			-.54	
I punish mistakes				.44
I am a good storyteller				.40
I want what I ask for				.30

Note: Only loadings above .28 are displayed.

Variables are listed in the order of their highest factor loadings.

The four distinctive factors that emerged for this response scale were labelled Positive emotionality, Sociability, Talkativeness and Disciplining. These factors underlie the Extraversion items. The themes that emerged from the Positive emotionality factor were outgoing, talkative, cheerful, humorous, playful and extrovert. Themes such as emotional sharing, sociable, communicative, playful and humorous emerged from the Sociability factor. Themes that emerged from the Talkativeness factor were shy, introvert and reserved (antonym of talkative). Lastly, the themes that emerged from the disciplining factor were disciplining, confident and strict.

After each factor had been determined, the reliabilities for each of the four factors were analysed independently. Only one item loaded negatively and had to be recoded and reverse-scored. Table 4.12 indicates the Cronbach alpha for each factor of the Extraversion cluster.

Table 4.12: Reliability statistics for the dichotomous response scale restricted to four factors for Extraversion

Factor	Cronbach alpha	N of items
Positive emotionality	.72	7
Sociability	.59	6
Talkativeness	.67	3
Disciplining	.37	3

According to Table 4.12 the Positive emotionality factor showed a reasonable level of reliability (0.72), containing seven items with two²⁰ items loading high. The Talkativeness factor also demonstrated an acceptable value of 0.67, consisting of six items of which none had an acceptable threshold value.

4.3.3.2 The polytomous response scale for Extraversion

The polytomous response scale for Extraversion indicated that 28 of the 31 items loaded on three factors, explaining 34.04% of the total variance. The three-factor solution was the most suitable to use for interpretation. The final 28 items had absolute values above 0.28. The pattern of loadings can be found in Table 4.13.

²⁰ "I connect with people easily" and "I make friends easily"

Table 4.13: Pattern matrix for the polytomous response scale restricted to three factors for Extraversion

Items	Factor		
	1	2	3
I enjoy telling funny stories	.62		
I talk a lot	.61		
I make friends easily	.56	.28	
I make jokes with everyone	.55		
I make others laugh	.52		
I connect with people easily	.46	.38	
I have many friends	.46		
I am a good storyteller	.43		
I am seen as quiet by others	-.42		
I am quiet in front of people	-.41		
I laugh a lot	.36		
I chat to everyone	.35		
I am easy to talk to		.51	
I share my feelings		.50	
I tell people when I disagree with them		.50	
I am open about my mistakes		.50	
I have good social skills	.40	.46	
I make others feel good		.46	
I turn to others when I have a problem		.39	
I defend my points of view		.29	
I have a positive outlook on life		.28	
I want to be obeyed			.46
I want what I ask for			.43
I punish mistakes			.41
I enjoy playing tricks on others			.41
I control others			.39
I say what I think			.37
I act impulsively			.34

Note: Only loadings above .28 are displayed.
Variables are listed in the order of their highest factor loadings.

The analysis indicated the existence of three distinctive factors, namely Positive emotionality and talkativeness, Sociability and expressiveness and Dominance and power oriented. These factors underlie the Extraversion items. In the Positive emotionality and talkativeness factor themes of being captivating, talkative, cheerful,

humorous, playful and being a storyteller emerged. In the Sociability and expressiveness factor themes such as emotional sharing, sociable, communicative, straightforward and optimistic emerged. Lastly, in the Dominance and power oriented factor themes of being authoritative, disciplining and strict emerged.

After each factor had been determined, the reliability for each of the three factors was analysed. Two items loaded negatively and were recoded and reverse-scored. Table 4.14 presents the Cronbach alpha for each factor of the Extraversion cluster.

Table 4.14: Reliability statistics for the polytomous response scale restricted to three factors for Extraversion

Factor	Cronbach alpha	N of items
Positive emotionality and talkativeness	.81	12
Sociability and expressiveness	.71	9
Dominance and power orientated	.60	7

According to Table 4.14 the Cronbach alpha coefficients of all three factors, Positive emotionality and talkativeness, Sociability and expressiveness, and Dominance and power orientated, are high and can therefore be considered acceptable (Hair et al., 2006). The Positive emotionality and talkativeness factor consisted of 12 items, of which two²¹ had acceptable threshold values of 0.61 and 0.62. The Sociability and expressiveness factor consisted of nine items, of which none had acceptable threshold values. The Dominance and power orientated factor consisted of seven items, none of which had acceptable threshold values.

4.3.3.3 Comparison between the dichotomous and polytomous response scales for Extraversion

For the dichotomous response scale, the factor analysis indicated that a four-factor solution was more suitable than a three-factor solution owing to the significance of interpretation. In terms of the polytomous response scale, the analysis indicated that a three-factor solution would be most appropriate. The dichotomous and polytomous

²¹ "I enjoy telling funny stories" and "I talk a lot"

response scales both loaded the Positive emotionality factor, although the polytomous response scale also loaded some items for Talkativeness. Five²² items loaded the same for both response scales. The dichotomous and polytomous response scales both loaded the Sociability factor, with two²³ items loading the same. For the Sociability factor, there was a difference between the items that loaded on the factor for the different response scales. The dichotomous response scale loaded items on to the Talkativeness factor, which the polytomous response scale did not recognise. The dichotomous and polytomous response scales both loaded the Disciplining and dominance factor, with two²⁴ items loading the same.

In addition, the factor analysis yielded an interesting finding for the dichotomous response scale. Once the dichotomous response scale for Extraversion had been restricted to only three factors, none of the Dominance items loaded on the factor. Also, in terms of the reliability for each factor, the Disciplining/dominance and power oriented factor had the lowest reliability (0.37 for the dichotomous response scale and 0.60 for the polytomous response scale) of all the factors.

4.3.3.4 Determining the factor structure for Extraversion

The SAPI structure for the Extraversion cluster contained four sub-clusters: Dominance, Expressiveness, Positive emotionality and Sociability (Nel et al., 2012). The analysis of the dichotomous response scale identified four factors (Positive emotionality, Sociability, Talkativeness and Disciplining) that replicated the Extraversion cluster. The analysis of the polytomous response scale identified three factors (Positive emotionality and talkativeness, Sociability and expressiveness and Dominance and power oriented) that replicated the Extraversion cluster. In conclusion, a comparison of the structure of the Extraversion cluster from the qualitative study with the factor analysis of both the dichotomous and polytomous response scales suggested that the polytomous response scale would be more suitable for measurement of the Extraversion cluster as the reliability was higher.

²² "I chat to everyone"; "I connect with people easily"; "I make friends easily"; "I laugh a lot" and "I make jokes with everyone"

²³ "I share my feelings" and "I turn to others when I have a problem"

²⁴ "I want what I ask for" and "I punish mistakes"

4.3.4 Facilitating

4.3.4.1 The dichotomous response scale for Facilitating

An analysis of the dichotomous response scale for Facilitating found that all 11 items loaded on to three factors, explaining 52.35% of the variance. The three-factor solution was considered suitable for interpretation. The pattern of loadings is indicated in Table 4.15.

Table 4.15: Pattern matrix for the dichotomous response scale restricted to three factors for Facilitating

Items	Factor		
	1	2	3
I help people realise their potential	.66		
I am an example for others	.56	-.28	
I guide people in life	.55		
I am a source of inspiration to people	.52		
I teach people ways of doing things	.36		
I make others better persons		.52	.36
I care about other people's future		.49	
I give advice to others about their future	.34	.46	
I manage people well			.57
I am a good leader			.45
I tell stories with a moral			.33

Note: Only loadings above .28 are displayed.

Variables are listed in the order of their highest factor loadings.

The analysis indicated the existence of three distinctive factors, namely Guidance and influential, Encouraging and Leading. These factors underlie the Facilitating items. In the Guidance and influential factor themes of being influential, guiding and teaching emerged. In the Encouraging factor themes emerged such as uplifting, aspirations and advising. Lastly, in the Leading factor themes of being a leader and telling stories with a moral emerged.

The reliability for each of the three factors was analysed independently. None of the items loaded negatively and the reliability analysis for each factor could be established separately without having to make any changes to the scoring of the items. Table 4.16 indicates the Cronbach alpha for each factor of the Facilitating cluster.

Table 4.16: Reliability statistics for the dichotomous response scale restricted to three factors for Facilitating

Factor	Cronbach alpha	N of items
Guidance and influential	.71	5
Encouraging	.59	3
Leading	.45	3

According to Table 4.16 the Cronbach alpha for the Guidance and influential factor has an acceptable threshold value of 0.71, although it contained only 5 items of which only one²⁵ had an acceptable threshold value of 0.66 (Cortina, 1993; Field, 2009; Hair et al., 2006; Robins et al., 2007).

4.3.4.2 The polytomous response scale for Facilitating

An analysis of the polytomous response scale indicated that 15 of the 17 items loaded on three factors, explaining 50.10% of the variance. The three-factor solution was considered suitable for interpretation. The final 15 items had absolute values above 0.28. The pattern of loadings is displayed in Table 4.17.

Table 4.17: Pattern matrix for the polytomous response scale restricted to three factors for Facilitating

Items	Factor		
	1	2	3
I manage people well	.57		
I tell stories with a moral	.46		
I guide people in life	.45		
I give advice to others about their future	.44		
I teach people ways of doing things	.42		

²⁵ "I help people realise their potential"

I make others better persons	.41	-.28	
I help people realise their potential	.37		-.34
I people to achieve their goals		-.75	
I wish others to be successful		-.55	
I motivate others to improve	.41	-.48	
I encourage people to develop		-.48	
I am an example for others			-.77
I care about other people's futures		-.43	-.50
I am a source of inspiration to people			-.40
I am a good leader			-.31

Note: Only loadings above .28 are displayed.

Variables are listed in the order of their highest factor loadings.

The three distinctive factors that emerged were labelled Guidance, Encouraging and Leading. These factors underlie the Facilitating items. Themes of advising, uplifting, guiding and teaching emerged in the Guidance factor. Themes such as aspiration for others and encouraging emerged in the Encouraging factor. Finally, in the Leading factor themes of being a role model, influential and leading emerged.

The reliability for each of the three factors was analysed individually. Eight items loaded negatively and had to be recoded and reverse-scored. Table 4.18 illustrates the Cronbach alpha for each factor of the Facilitating cluster.

Table 4.18: Reliability statistics for the polytomous response scale restricted to three factors for Facilitating

Factor	Cronbach alpha	N of items
Guidance	.77	7
Encouraging	.75	4
Leading	.65	4

Table 4.18 indicates that all three factors, Guidance, Encouraging and Leading, yielded acceptable Cronbach alpha coefficients. The Guidance factor contained seven items, none of which had an acceptable loading. The Encouraging factor contained only four items, of which one²⁶ had an acceptable threshold value of 0.75.

²⁶ "I wish people to achieve their goals"

The Leading factor also contained only four items, of which one²⁷ had an acceptable value of 0.77.

4.3.4.3 Comparison between the dichotomous and polytomous response scales for Facilitating

For both the dichotomous and polytomous response scales, the factor analysis indicated that a three-factor solution as more suitable than a four-factor solution. For the Guidance factor, both the dichotomous and polytomous response scales loaded three²⁸ items in the same way. The dichotomous and polytomous response scales both loaded the Encouraging factor, but none of the items loaded in the same way. The dichotomous and polytomous response scales both loaded the Leading factor, but only one²⁹ item loaded the same.

4.3.4.4 Determining the factor structure of Facilitating

According to the SAPI project the Facilitating cluster consists of two sub-clusters, labelled Guidance and Encouraging others (Nel et al., 2012). When comparing the analysis of the dichotomous and polytomous response scales, the results indicated that both response scales loaded the same three factors (Guidance and influential, Encouraging and Leading), and this factor structure replicated the Facilitating cluster. The Cronbach alpha coefficient was therefore used to determine which response scale would be more suitable (as discussed earlier in this chapter). The polytomous response scale had the highest loading and it was therefore considered more suitable for measuring the Facilitating cluster.

²⁷ “I am an example for others”

²⁸ “I guide people in life”; “I teach people ways of doing things”; and “I help people realise their potential”

²⁹ “I am a good leader”

4.3.5 Integrity

4.3.5.1 The dichotomous response scale for Integrity

An analysis of the dichotomous response scale for Integrity found that eight of the nine items loaded on two factors, explaining 45.38% of the variance. The two-factor solution was considered more suitable than a three-factor solution owing to the significance of the items for interpretation and the fact that only one item loaded on the third factor. The final eight items that loaded on two factors consisted of items that had absolute values above 0.28. Only one item was subsequently removed because the absolute value was less than 0.28. The pattern of loadings is indicated in Table 4.19.

Table 4.19: Pattern matrix for the dichotomous response scale restricted to two factors for Integrity

Items	Factor	
	1	2
I tell the truth	.64	
I cheat	-.61	
I keep my promises	.56	
I do the right thing	.35	
I disappoint others	-.35	
I give everyone a chance		.60
I treat all people equally		.53
I favour some people above others		-.29

Note: Only loadings above .28 are displayed.

Variables are listed in the order of their highest factor loadings.

The two distinctive factors that materialised were labelled Integrity and Fairness. These factors underlie the Integrity items. In the Integrity factor, themes of being truthful, trustworthy, morally conscious and responsible emerged. In the Fairness factor, themes such as being fair and discriminative emerged.

The reliability for each of the two factors was analysed independently. Three items loaded negatively and were recoded and reverse-scored. Table 4.20 illustrates the Cronbach alpha for each factor of the Integrity cluster.

Table 4.20: Reliability statistics for the dichotomous response scale restricted to two factors for Integrity

Factor	Cronbach alpha	N of items
Integrity	.61	5
Fairness	.43	3

Table 4.20 indicates that the Cronbach alpha of the Integrity factor can be regarded as an acceptable value (Cortina, 1993; Field, 2009; Hair et al., 2006; Robins et al., 2007). The Integrity factor contained five items of which two³⁰ had acceptable loadings of between 0.61 and 0.64.

4.3.5.2 The polytomous response scale for Integrity

An analysis of the polytomous response scale found that all 19 items loaded on to two factors, which explained 33.62% of the variance. The two-factor solution was considered preferable to three- or four-factor solutions owing to the significance of the items for interpretation and the fact that the negative items loaded positively and the positive items loaded negatively. The final 19 items had absolute values above 0.28 and none of the items were removed. The pattern of loadings is indicated in Table 4.21.

Table 4.21 Pattern matrix for the polytomous response scale restricted to two factors for Integrity

Items	Factor	
	1	2
I am a true friend to others	.56	
I tell the truth	.55	
I am loyal to others	.54	
I keep my promises	.51	
I keep others' secrets	.50	
I am a friend one can rely on	.48	
I take responsibility for my mistakes	.45	
I am honest with other people	.44	
I do the right thing	.34	-.31
I pay my debts	.31	

³⁰ "I tell the truth and I cheat"

I do what is expected of me	-.65
I am truthful in what I do	-.51
I try to fool others	.45
I disappoint others	.44
I discriminate against people	.41
I give everyone a chance	-.38
I cheat	.35
I treat all people equally	-.35
I favour some people above others	.34

Note: Only loadings above .28 are displayed.
Variables are listed in the order of their highest factor loadings.

The analysis indicated the existence of two distinctive factors, namely Integrity and Unfairness and dishonest. These factors underlie the Integrity items. In the Integrity factor themes of being truthful, trustworthy, responsible, honest, loyal and morally conscious emerged. In the Unfairness and dishonest factors themes of pretending, dishonest, irresponsible and unfair emerged.

The reliability for each of the two factors was analysed. Four items loaded negatively and were recoded and reverse-scored. Table 4.22 indicates the Cronbach alpha for each factor of the Integrity cluster.

Table 4.22: Reliability statistics for the polytomous response scale restricted to two factors for Integrity

Factor	Cronbach alpha	N of items
Integrity	.77	10
Unfairness and dishonest	.70	9

Table 4.22 indicates that the two factors, Integrity and Unfairness and dishonest had reliabilities of 0.70 and above. This indicates that the factors had acceptable Cronbach alphas. The Integrity factor consisted of 10 items, none of which had an acceptable value. The Unfairness and dishonest factor consisted of nine items, of which one³¹ had an acceptable value of 0.65.

³¹ "I do what is expected of me"

4.3.5.3 Comparison between the dichotomous and polytomous response scales for Integrity

For both the dichotomous and polytomous response scales, the factor analysis indicated that a two-factor solution would be preferable to three- or four-factor solutions. The dichotomous and polytomous response scales both loaded on the Integrity factor, with three³² items loading similar. The dichotomous and polytomous response scales both loaded the Fairness and unfairness factor. The dichotomous response scale loaded a positive factor, Fairness, while the polytomous response scale loaded a negative factor, Unfairness. Three³³ items loaded the same for both response scales.

4.3.5.4 Determining the factor structure for Integrity

According to the SAPI project the Integrity cluster consists of two sub-clusters, namely Integrity and Fairness (Nel et al., 2012). The analysis of the dichotomous data identified two factors (Integrity and Fairness), which replicated the Integrity cluster. The polytomous response scale also yielded two factors (Integrity and Unfairness and dishonest), although the second factor was stated in the opposite direction (negative versus positive) to that contained in the second sub-cluster of the qualitative personality structure. In conclusion, a comparison of the structure of the Integrity cluster from the qualitative study with the factor analysis of both the dichotomous and polytomous response scales suggested that the polytomous response scale would be more suitable for measuring the Integrity cluster based on the reliability and factor structure.

³² "I tell the truth"; "I keep my promises"; and "I do the right thing"

³³ "I give everyone a chance"; "I treat all people equally", and "I favour some people above others"

4.3.6 Intellect

4.3.6.1 The dichotomous response scale for Intellect

An analysis of the dichotomous response scale found that 10 of the 11 items loaded on two factors, explaining 34.59% of the total variance. The two-factor solution was considered more suitable than a three-factor solution because only one item loaded on the third factor. In addition, the final 10 items had absolute values above 0.28. One item was removed because its absolute value was less than 0.28. The pattern of loadings is displayed in Table 4.23.

Table 4.23: Pattern matrix for the dichotomous response scale restricted to two factors for Intellect

Items	Factor	
	1	2
I have knowledge about many things	.83	
I solve problems in new ways	.35	
I make good decisions	.35	
I undertake new initiatives	.31	
I understand other people	.29	
I am able to plan things		.43
I am able to learn quickly		.36
I can sell things to other people		.35
I am a good speaker		.34
I explain ideas to others clearly		.32

Note: Only loadings above .28 are displayed.
Variables are listed in the order of their highest factor loadings.

The two distinct factors that emerged were labelled Competent and innovative and Articulative and enterprising. These factors underlie the Intellect items. In the Competent and innovative factor themes of being knowledgeable, Intellective and innovative emerged. In the Articulative and enterprising factor themes of being Intellective, creative, enterprising and articulative emerged. The reliability for each of the two factors was analysed independently. None of the items loaded negatively. Table 4.24 indicates the Cronbach alpha for each factor of the Intellect cluster.

Table 4.24: Reliability statistics for the dichotomous response scale restricted to two factors for Intellect

Factor	Cronbach alpha	N of items
Competent and innovative	.53	5
Articulative and enterprising	.45	5

Table 4.24 shows that the individual factors yielded low and unacceptable reliabilities. These loadings were substantially low and could indicate that the items under disciplining had a larger measurement error than expected (Hair et al., 2006).

4.3.6.2 The polytomous response scale for Intellect

An analysis of the polytomous response scale for Intellect indicated that 12 of the 15 items loaded on three factors, explaining 52.34% of the total variance. The three-factor solution was considered to be more suitable than a two-factor solution owing to the significance of the items for interpretation. In addition, three items were removed because their absolute values were less than 0.28. This resulted in 12 items remaining. The pattern of loadings is indicated in Table 4.25.

Table 4.25: Pattern matrix for the polytomous response scale restricted to three factors for Intellect

Items	Factor		
	1	2	3
I am easily understood	.64		
I am able to learn quickly	.64		
I explain ideas to others clearly	.53		
I am able to plan things	.31		
I am able to understand others' feelings		-.72	
I understand other people		-.68	
I am able to relate to people	.40	-.43	
I think of new ideas			.67
I solve problems in new ways			.49
I have knowledge about many things			.46
I am a good speaker			.45

I can sell things to other people	.39
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Note: Only loadings above .28 are displayed.
Variables are listed in the order of their highest factor loadings.

The analysis indicated three distinctive factors, namely Reasoning and Intellect, Understanding and Competent and skilfulness. These factors underlie the Intellect items. In the Reasoning and Intellect factor themes of being intellectual and articulative emerged. In the Understanding factor themes of social intellect and understanding surfaced. In the Competent and skilfulness factor themes of being creative, knowledgeable and articulative emerged.

After each factor had been determined, the reliability for each factor was analysed independently. Three items loaded negatively and were recoded and reverse-scored. Table 4.26 indicates the Cronbach alpha for each factor of the Intellect cluster.

Table 4.26: Reliability statistics for the polytomous response scale restricted to three factors for Intellect

Factor	Cronbach alpha	N of items
Reasoning	.68	4
Understanding	.70	3
Competent and skilfulness	.63	5

Table 4.26 indicates that all three factors had similar reliability loadings of 0.60 and above. The Understanding factor had the highest reliability and was the only factor that contained negative loadings. The reliability statistics for the polytomous response scale can therefore be considered to be acceptable, although not preferred (Field, 2009).

4.3.6.3 Comparison between the dichotomous and polytomous response scales for Intellect

For the dichotomous response scale, the factor analysis indicated that a two-factor solution would be more suitable than a three-factor solution. This was because only one item loaded on to the third factor; however, when restricted to only two factors the item loaded again. For the polytomous response scale, the analysis indicated

that a three-factor solution would be suitable. The dichotomous and polytomous response scales did not load the same factors for the Intellect cluster. In relation to the Competent and innovative factor, both the dichotomous and polytomous response scales loaded a similar factor, although this factor was labelled Competent and skilfulness for the polytomous response scale. In both response scales, two³⁴ items loaded the same. The Articulative and enterprising factor only loaded on the dichotomous response scale, whereas the Understanding factor only loaded on the polytomous response scale.

4.3.6.4 Determining the factor structure of Intellect

According to the SAPI project the Intellect cluster consisted of four sub-clusters, namely Aesthetics, Reasoning, Skilfulness and Social Intellect (Nel et al., 2012). The dichotomous response scale loaded two factors (Competent and innovative and Articulative and enterprising), which are different from the qualitative personality structure. The polytomous response scale loaded three factors (Reasoning, Understanding and Competent and skilfulness), which more closely replicate the qualitative structure of the Intellect cluster. The analysis of both response scales indicated that the polytomous response scale was more suitable for measuring the Intellect cluster based on the factor replication and high reliability.

4.3.7 Openness

4.3.7.1 The dichotomous response scale for Openness

When the principal axis factoring was first computed, the Openness cluster terminated the analysis. Each item had to be analysed individually to determine which items were problematic. After the investigation it was determined that four items³⁵ were problematic and these items were removed from further analysis. An analysis of the dichotomous response scale then indicated that 6 of the 10 items loaded on two factors, which explained 28.66% of the variance. The two-factor

³⁴ "I have knowledge of many things"; and "I solve problems in new ways"

³⁵ "I take risks", "I seek adventure", "I believe in the importance of tradition", and "I do what I want to do"

solution was deemed more suitable than a three-factor solution owing to the significance of the items for interpretation. The final 6 items had absolute values above 0.28. The pattern of loadings is displayed in Table 4.27.

Table 4.27: Pattern matrix for the dichotomous response scale restricted to two factors for Openness

Items	Factor	
	1	2
I am full of new ideas	.49	
I have a lot of imagination	.43	
I have many interests	.32	
I dress well	.29	
I find pleasure in studying		
I am curious about the world		.48
I am a religious person		-.28
I find it important to have money		
I make my own decisions		
I am different from others		

Note: Only loadings above .28 are displayed.
Variables are listed in the order of their highest factor loadings.

The two distinctive factors that emerged were labelled Progressiveness and Individualism and curiosity. These factors underlie the Openness items. In the Progressiveness factor, themes of being innovative and imaginative emerged. In the Individualism and curiosity factor, themes such as independent, individualism, worldly and open-mindedness surfaced.

The reliability for each of the two factors was analysed independently. Only one item loaded negatively and was recoded and reverse-scored. Table 4.28 indicates the Cronbach alpha for each factor of the Openness cluster.

Table 4.28: Reliability statistics for the dichotomous response scale restricted to two factors for Openness

Factor	Cronbach alpha	N of items
Progressiveness	.41	4
Individualism and curiosity	.18	2

According to Table 4.28 the factors both had very low reliabilities. These loadings were substantially low and could indicate that the items had a larger measurement error than expected (Hair et al., 2006). The Progressiveness factor had the highest loading of 0.41. This loading is still considered unacceptable (Cortina, 1993; Field, 2009; Robins et al., 2007).

4.3.7.2 *The polytomous response scale for Openness*

An examination of the polytomous response scale found that 18 of the 21 items loaded on two factors, which explained 27.61% of the variance. The two-factor solution was considered more suitable than a three- or four-factor solution owing to the significance of the items for interpretation. The final 18 items had absolute values above 0.28. The pattern of loadings is indicated in Table 4.29.

Table 4.29: Pattern matrix for the polytomous response scale restricted to two factors for Openness

Items	Factor	
	1	2
I respect my culture	.54	
I encourage others to study	.53	
I find pleasure in studying	.52	
I believe in the importance of tradition	.48	
I pray for others	.48	
I am a religious person	.44	
I am willing to try out new things	.35	-.32
I find it important to have money	.31	
I am open to new information		
I dress well		
I do what I want to do		
I make my own decisions		
I am eager to learn		
I seek adventure		-.63
I am full of new ideas		-.54
I am curious about the world		-.52
I take risks		-.45
I have a lot of imagination		-.40
I have many interests		-.34

I search for answers when I do not have them	-.30
I am different from others	-.29

Note: Only loadings above .28 are displayed.

Variables are listed in the order of their highest factor loadings.

The two distinctive factors that emerged were labelled Independence, religiosity and traditional, Open-mindedness, individualism and curiosity. These factors underlie the Openness items. In the Independence, religiosity and traditional factor, themes of being eager to learn, traditional and religious surfaced. In the Open-mindedness, individualism and curiosity factor, themes of being progressiveness, curious, unique and open-minded emerged.

After determining each factor, the reliability of each factor was analysed. Eight items loaded negatively and were recoded and reverse-scored. Table 4.30 indicates the Cronbach alpha for each factor of the Openness cluster.

Table 4.30: Reliability statistics for the polytomous response scale restricted to two factors for Openness

Factor	Cronbach alpha	N of items
Independence, religiosity and traditional	.67	8
Open-mindedness, individualism and curiosity	.67	8

Table 4.30 indicates that both factors had a reliability of 0.67 for eight items. The Cronbach alphas for both factors are an acceptable threshold value (Field, 2009).

4.3.7.3 Comparison between the dichotomous and polytomous response scales for Openness

For the dichotomous response scale, the factor analysis and reliability indicated that a two-factor solution was more suitable than a three- or four-factor solution. An analysis of the polytomous response scale also indicated that two factors would be more suitable. The dichotomous and polytomous response scales both loaded the Individualism and Curiosity factor, with some of the items loading the same. Only

three³⁶ items had similar loadings for both response scales. The dichotomous response scale loaded the Progressiveness factor, whereas the polytomous response scale loaded the Independence, religiosity and traditional factor, therefore no items loaded the same.

4.3.7.4 Determining the factor structure of Openness

According to the SAPI project the Openness cluster consisted of the following four sub-clusters: Broad-mindedness, Epistemic curiosity, Materialism and Openness to experience (Nel et al., 2012). The dichotomous response scale loaded two factors (Progressiveness and Individualism and curiosity) that are not the best replica of the qualitative personality structure. In addition, the reliabilities of these factors were so low that the scale is unsuitable for use. The polytomous response scale also loaded two factors (Independence, religiosity and traditional and Open-mindedness, individualism and curiosity). This factor solution is a better replica of the qualitative personality structure and therefore the polytomous response scale is considered more suitable for measuring the Openness cluster.

4.3.8 Relationship Harmony

4.3.8.1 The dichotomous response scale for Relationship Harmony

An analysis of the dichotomous response scale indicated that 10 of the 18 items loaded on three factors, explaining 53.45% of the variance. The three-factor solution was considered more suitable than a four-factor solution owing to the significance of the items for interpretation. In addition, the final 10 items had absolute values above 0.28. The pattern of loadings is indicated in Table 4.31.

³⁶ "I am full of new ideas", "I have a lot of imagination", "I have many interests"

Table 4.31: Pattern matrix for the dichotomous response scale restricted to three factors for Relationship Harmony

Items	Factor		
	1	2	3
I make fun of others	.78		
I make jokes about other people	.74		
I help people to solve their arguments		.82	
I help others to make peace with each other		.78	
I challenge people in front of others			.51
I create tension between others			.44
I think I am more important than others	.33		.39
I am better than others			.37
I interfere in the lives of others			.34
I choose the people I want to speak to			.32

Note: Only loadings above .28 are displayed.

Variables are listed in the order of their highest factor loadings.

The three distinctive factors were labelled Provoking, Peacekeeping and Arrogant. These factors underlie the Relationship Harmony items. In the Provoking factor themes such as gossiping, embarrassing and being spiteful emerged. In the Peacekeeping factor themes of being a peacemaker and solving problems emerged. In the Arrogant factor themes of being superior, troublesome and self-opinionated emerged.

After each factor had been determined, the reliability for each factor was analysed. Only two items loaded negatively and were recoded and reverse-scored. Table 4.32 indicates the Cronbach alpha for each factor of the Relationship Harmony cluster.

Table 4.32: Reliability statistics for the dichotomous response scale restricted to three factors for Relationship Harmony

Factor	Cronbach alpha	N of items
Provoking	.71	2
Peacekeeping	.77	2
Arrogant	.53	6

Table 4.32 indicates that two of the factors (Provoking and Peacekeeping) had reasonably high reliabilities of 0.71 and above.

4.3.8.2 *The polytomous response scale for Relationship Harmony*

An analysis of the polytomous response scale found that 28 of the 35 items loaded onto four factors, explaining 40.47% of the variance. The four-factor solution was considered more suitable than three- or five-factor solutions owing to the significance of the items for interpretation. In addition, the final 28 items had absolute values above 0.28. The pattern of loadings is displayed in Table 4.33.

Table 4.33: Pattern matrix for the polytomous response scale restricted to four factors for Relationship Harmony

Items	Factor			
	1	2	3	4
I help people to solve their arguments	.63	.35		
I accept people with their problems	.63			
I help others with their work	.62			
I talk to others to resolve differences	.61			
I allow others to ask me questions	.61			
I help others to make peace with each other	.60			.37
I relate well to others	.58			
I ignore people	-.55			
I accept others	.54			
I share helpful ideas	.52			
I make others feel comfortable	.39			
I forgive others when they have hurt me by mistake	.36			
I accept change	.35			
I make others feel at home	.34		.33	
I speak politely to others	.29			
I work well with others	.28			
I make jokes about other people		.58		
I make fun of others		.51		
I provoke others		.46		
I challenge people in front of others		.42		
I talk about others in their absence		.40		

I create tension between others		.37	
I spread rumours about others		.31	
I interfere in the lives of others		.31	
I think I am more important than others			.66
I am better than others			.54
I speak calmly			.53
I apologise if I have made a mistake	.30		.46

Note: Only loadings above .28 are displayed.

Variables are listed in the order of their highest factor loadings.

The four distinctive factors that materialised were labelled Approachability, Provoking, Arrogant and Peacekeeping. These factors underlie the Relationship Harmony items. In the Approachability factor themes of being open to others, accommodating, approachable, welcoming and flexible emerged. In the Provoking factor themes such as gossiping, embarrassing and being spiteful emerged. In the Arrogant factor themes of being superior, troublesome and self-opinionated emerged. Lastly, in the Peacekeeping factor themes of being a peacemaker and solving problems emerged.

After determining each factor, the reliability for each factor was analysed individually. Only one item loaded negatively and was recoded and reverse-scored. Table 4.34 indicates the Cronbach alpha for each factor of the Relationship Harmony cluster.

Table 4.34: Reliability statistics for the polytomous response scale restricted to four factors for Relationship Harmony

Factor	Cronbach alpha	N of items
Approachability	.85	16
Provoking	.67	8
Arrogant	.64	2
Peacekeeping	.50	2

Table 4.34 indicates that the Approachability factor had the highest reliability loading. This factor also contained the highest number of items of all the factors. Three of the four factors can be considered to be reliable (Approachability, Provoking, Arrogant) as they yielded Cronbach alpha's of 0.64 and above.

4.3.8.3 Comparison between the dichotomous and polytomous response scales for Relationship Harmony

For the dichotomous response scale, the factor analysis and reliability indicated that a three-factor solution was most suitable. For the polytomous response scale, the analysis indicated that a four-factor solution was preferable³⁷. The dichotomous and polytomous response scales both loaded the same Provoking factor, with two³⁸ items loading the same. The scales both loaded the same Peacekeeping factor, although none of the items loaded the same. The scales also both loaded the Arrogant factor, with only two³⁹ items loading the same. Only the polytomous response scale loaded the Approachability factor.

4.3.8.4 Determining the factor structure of Relationship Harmony

According to the SAPI project the Relationship Harmony cluster consisted of the following four sub-clusters: Approachability, Conflict-seeking, Interpersonal Relatedness and Meddlesome (Nel et al., 2012). The analysis of the dichotomous response scale resulted in three factors, namely Provoking, Peacekeeping and Arrogant. This factor structure is different from that of the qualitative personality structure. The analysis of the polytomous data revealed four factors, namely Approachability, Provoking, Arrogant and Peacekeeping. This factor solution best replicated the Relationship Harmony cluster. In conclusion, the comparison of factor structures for the Relationship Harmony cluster for the two response scales suggested that the polytomous response scale was more suitable for measuring the Relationship Harmony cluster.

³⁷ Therefore some of the factors may have as little items as two, although four items are known to indicate a factor.

³⁸ "I make fun of others" and "I make jokes about other people"

³⁹ "I think I am more important than others" and "I am better than others"

4.3.9 Soft-Heartedness

4.3.9.1 The dichotomous response scale for Soft-Heartedness

An analysis of the dichotomous response scale found that 14 of the 17 items loaded on three factors, explaining 35.88% of the total variance. The three-factor solution was considered more suitable than the four-factor solution because it was more clearly interpretable. In addition, the final 14 items had absolute values above 0.28. The pattern of loadings is indicated in Table 4.35.

Table 4.35: Pattern matrix for the dichotomous response scale restricted to three factors for Soft-Heartedness

Items	Factor		
	1	2	3
I have hurt others with my words	.47		
I hurt others	.45		
I criticise others' mistakes	.40		
I have humiliated others	.35		
I make people do things for me	.35		
I have done things that are against the law	.31		
I use others for my own purposes		.60	
I only care about my own things		.40	
I have taken things that do not belong to me	.36	.38	
I distrust other people's opinions		.33	
I have a low opinion of others		.28	
I make people feel special			.59
I protect others			.52
I ask people if they are all right			.44

Note: Only loadings above .28 are displayed.
Variables are listed in the order of their highest factor loadings.

The analysis indicated three distinctive factors, namely Hostility, Egoism and Compassion and active support. These factors underlie the Soft-Heartedness items. In the Hostility factor themes of being critical, abusing and verbally aggressive

emerged. In the Egoism factor themes of being self-centred, selfish and undermining emerged. In the Compassion and active support factor themes of being protective and caring emerged. After each factor had been determined, the reliability for each factor was analysed. No items that loaded negatively were identified. Table 4.36 illustrates the Cronbach alpha for each factor of the Soft-Heartedness cluster.

Table 4.36: Reliability statistics for the dichotomous response scale restricted to three factors for Soft-Heartedness

Factor	Cronbach alpha	N of items
Hostility	.51	6
Egoism	.47	5
Compassion and active support	.52	3

Table 4.36 indicates that all the factors yielded reliabilities below 0.60 (Field, 2009). In addition, the Cronbach alpha of the Soft-Heartedness scale was under the acceptable threshold value and the scale is therefore not reliable (Cortina, 1993; Field, 2009; Robins et al., 2007).

4.3.9.2 The polytomous response scale for Soft-Heartedness

An analysis of the polytomous response scale indicated that 36 of the 37 items loaded on three factors, explaining 36.14% of the total variance. The three-factor solution was considered more suitable than the four-factor solution due to the significance of the items for interpretation. In addition, the final 36 items had absolute values above 0.28 and only one item was removed. The pattern of loadings is indicated in Table 4.37.

Table 4.37: Pattern matrix for the polytomous response scale restricted to three factors for Soft-Heartedness

Items	Factor		
	1	2	3
I support others when they experience problems	.77		
I help others when they are in need	.73		

I listen to other people's problems	.66		
I am friendly towards others	.66		
I make people feel special	.61		
I help others solve their problems	.58		
I share what I have with others	.53		
I make time for others	.52		
I am kind to others	.52		
I protect others	.50		
I consider others' needs	.50	-.28	
I give my attention to others	.43		
I feel sympathy for people who have problems	.43		
I respect others' opinions	.43		
I ask people if they are all right	.43		
I treat others in a careful way	.40		
I take others' feelings into account	.35	-.35	
I only care about my own things		.59	
I threaten people		.52	
I start fights with others		.49	
I only think of myself		.48	
I make others feel stupid		.48	
I abuse my power over others		.44	
I use others for my own purposes		.43	.43
I make people do things for me		.39	
I keep my things for myself		.38	
I focus on others' weak points		.37	
I have done things that are against the law		.33	
I insult people		.32	
I have a low opinion of others		.29	
I have humiliated others			.57
I have hurt others with my words			.51
I hurt others			.50

I criticise others' mistakes	.42
I have taken things that do not belong to me	.38
I distrust other people's opinions	.37

Note: Only loadings above .28 are displayed.
Variables are listed in the order of their highest factor loadings.

The three distinctive factors that emerged from this analysis were labelled Compassion, Egoism and carelessness, and Hostility. These factors underlie the Soft-Heartedness items. In the Compassion factor themes of being caring, loving and protective emerged. In the Egoism and carelessness factor themes of being self-centred, selfish, exploiting and undermining emerged. In the Hostility factor themes of being critical, abusive and verbally aggressive emerged.

After each factor was determined, the reliability for each of the three factors was analysed and no items loaded negatively. Table 4.38 illustrates the Cronbach alpha for each factor of the Soft-Heartedness cluster.

Table 4.38: Reliability statistics for the polytomous response scale restricted to three factors for Soft-Heartedness

Factor	Cronbach alpha	N of items
Compassion	.88	17
Egoism and carelessness	.77	13
Hostility	.67	6

From Table 4.38 it is evident that all three of the factors yielded acceptable reliabilities (Cortina, 1993; Field, 2009; Robins et al., 2007). The Compassion factor was the only factor that contained items⁴⁰ with an acceptable threshold value of between 0.61 and 0.77.

⁴⁰ "I support others when they experience", "I help others when they are in need", "I listen to other people's problems", "I am friendly towards others" and "I make people feel special"

4.3.9.3 Comparison between the dichotomous and polytomous response scales for Soft-Heartedness

For both the dichotomous and polytomous response scales, the factor analysis indicated that it would be preferable to reduce the number of factors to three. The scales both loaded the Hostility factor with four⁴¹ items loading the same. The dichotomous and polytomous response scales both loaded the Egoism factor, although the polytomous response scale also loaded items from the Carelessness factor. For both response scales, two⁴² items loaded the same. The scales both loaded the Compassion factor, although the dichotomous response scale also loaded items from the Active support factor. For both response scales, four⁴³ items loaded the same.

4.3.9.4 Determining the factor structure of Soft-Heartedness

According to the SAPI project the Soft-Heartedness cluster consisted of six sub-clusters, namely Amiability, Egoism, Gratefulness, Hostility, Empathy and Active support (Nel et al., 2012). The analysis of both response scales (as discussed earlier in this chapter), indicated that the polytomous response scale was better suited to measuring the Soft-Heartedness cluster. The results indicated that the polytomous response scale loaded three factors (*Compassion, Egoism and carelessness and Hostility*) that best replicated the Soft-Heartedness cluster. The dichotomous response scale also loaded three factors (*Hostility, Egoism and Compassion and active support*), that were similar to the qualitative personality cluster but the reliabilities for these factors were too low. In conclusion, a comparison of the structure of the Soft-Heartedness cluster from the qualitative study with the factor analysis of the two response scales suggested that the polytomous response scale was better suited to measuring the Soft-Heartedness cluster.

⁴¹ "I hurt others"; "I criticise others' mistakes"; "I have humiliated others"; and "I have hurt others with my words"

⁴² "I have taken things that do not belong to me"; and "I distrust other people's opinions"

⁴³ "I hurt others"; "I criticise others' mistakes"; "I have humiliated others"; and "I have hurt others with my words"

4.4 RELIABILITY ANALYSIS

The third step of the data analysis involved reliability analysis. This was conducted separately for each cluster as the clusters are relatively homogeneous constructs. The sample size ($N = 490$) also played a role in this decision. The sample size for the dichotomous response scale was $n = 269$, and for the polytomous response scale, $n = 206$. For comparative purposes, the Cronbach alpha coefficients of all nine clusters for both the dichotomous and polytomous response scales are indicated in Table 4.39. The Cronbach alpha coefficient measures internal consistency and ideally the loading should be as close to 1.00 as possible. Internal consistency was applied in order to determine whether the items of a measurement were consistent throughout the test (Salkind, 2013). The acceptable threshold value for the Cronbach alpha coefficient was 0.70 and above. However, in exploratory research a loading above 0.60 is sometimes considered acceptable (Cortina, 1993; Field, 2009; Robins et al., 2007). The Cronbach alpha coefficients for the dichotomous response scale ranged from 0.52 to 0.86. The only exceptions were the Integrity cluster with a loading of 0.21 and the Openness cluster with a loading of 0.33. The Cronbach alpha coefficients for the polytomous response scale ranged from 0.53 to 0.87, with the exception of the Openness cluster with a loading of 0.45. Table 4.39 indicates the Cronbach alpha for each cluster.

Table 4.39: Cronbach’s Alpha Coefficients per Cluster Scale

Cluster	Dichotomous Response Scale	Number of Items in Scale	Polytomous Response Scale	Number of Items in Scale
Conscientiousness	.71	20 of 23	.87	31 of 37
Emotional Stability	.59	18 of 26	.64	26 of 31
Extraversion	.65	19 of 28	.83	28 of 31
Facilitating	.86	11 of 11	.83	15 of 17
Integrity	.21	8 of 9	.53	19 of 19
Intellect	.65	10 of 11	.60	12 of 15
Openness	.33	6 of 10	.45	18 of 21
Relationship Harmony	.53	10 of 18	.66	28 of 35
Soft heartedness	.52	14 of 17	.66	36 of 37
Mean	.56		.67	

Table 4.39 indicates that the dichotomous response scale had lower internal consistency than the polytomous response scale for the measurement of the same constructs. However, the dichotomous response scale was at a disadvantage from the beginning due to the large number of problematic items that had to be removed from further analysis. The polytomous response scale therefore contained more items than the dichotomous response scale. The dichotomous response scale loaded higher loadings of the overall Cronbach alpha coefficients for two clusters (Facilitating and Intellect).

4.5 CONCLUSION

This section of the study compared the psychometric properties of the dichotomous and polytomous response scales applied in the SAPI inventory. Based on the above comparison, the polytomous response scale was identified as the most suitable response scale for use in all the nine clusters, despite the fact that the dichotomous response scale loaded higher overall Cronbach alpha coefficients for Facilitating and Intellect. It is important to note that dichotomously scored items tend to have lower Cronbach alpha coefficients because of restricted variance. This means that these items are often less reliable. It is therefore optimal for dichotomous measures to have more items in order to increase the internal consistency (Robins et al., 2007). The analysis determined that the polytomous response scale best replicated the qualitative South African personality factor structure for the purpose of the study.

4.6 CHAPTER SUMMARY

In this chapter, the results of the data analysis were reported and interpreted. Firstly, the factor analysis and rotation method were investigated and used for all nine clusters. The principal axis factoring was performed with the Oblimin rotation. The aim of the factor analysis was to determine what factor solution would be most suitable and also to determine the significance of the items for interpretable results in all nine clusters for both the dichotomous and polytomous response scales. Based on the factor analysis, it was possible to identify themes that emerged from each specific factor.

Secondly, after the best factor solution had been identified, reliability analysis was conducted using the Cronbach alpha coefficient. In terms of the Cronbach alpha coefficient for all nine clusters, the results indicated that the polytomous response scale had higher reliability loadings than the dichotomous response scale. The Cronbach alpha coefficients for the dichotomous response scale ranged from 0.52 to 0.86, with the exception of the Integrity and Openness clusters which had loadings of 0.21 and 0.33 respectively. The Cronbach alpha values for the polytomous response scale ranged from 0.45 to 0.87.

Based on the findings reported above it was concluded that the polytomous response scale would best replicate the factor structure of the SAPI inventory.

Chapter 5 discusses the achievement of the objectives of the study, draws conclusions and indicates the limitations of the study. Recommendations are also made for future research.

CHAPTER 5

CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

The chapter discusses the conclusions relating to the achievement of the research objectives. It summarises the implications and limitations of the main findings and makes recommendations for future research.

5.1 ACHIEVEMENT OF THE OVERALL RESEARCH OBJECTIVE

The overall purpose of the study was to determine whether the dichotomous or the polytomous response scale of the SAPI inventory would be more effective in measuring personality. The recommendations made in the study concerning which response scale to use were based on three criteria: the number of items retained after the analysis of skewness and kurtosis; the factor structure – interpretability and proximity to qualitative model; and the reliability. Based on these criteria it was determined that the polytomous response scale is more effective in measuring personality using the SAPI. This scale had fewer problematic items, better factor loadings and higher internal reliability than the dichotomous scale.

5.2 ACHIEVEMENT OF THE GENERAL RESEARCH OBJECTIVE

A general research objective was formulated to guide and direct the study. This objective was to determine whether the dichotomous or polytomous response scale administered online would be more suitable to use for the SAPI.

In order to address this objective, the dichotomous and polytomous response scales were discussed in detail (see Chapter 2, section 2.7). In brief, the dichotomous response scale consists of a variable with only two response options (for example, yes and no or agree and disagree). The participants are therefore unable to choose extreme points as there are no extreme points. The polytomous response scale is expressed in a variable with more than two response options (for example, agree, strongly agree, disagree and strongly disagree). The use of polytomous response

scales allows for superior variability in the response categories, and can therefore lead to more valid and reliable measuring. A review of previous literature was unable to definitively prove which response scale would be most suitable for measuring the SAPI inventory factor structure. Bond and Fox (2007, p. 220) contended that the “response scale that is optimal for analysis may not always be the best method for communicating with the respondents.”

The present study found that, based on the quality of the data, the polytomous response scale had more functional psychometric properties than the dichotomous response scale. To address the general research objective, specific cut-offs were used to allow the researcher to use as many items as possible for analysis (see Chapter 3, section 3.5.2). Items with a negative number were not of importance for the study, as the negative values represented the fact that the SAPI inventory had overestimated the predictions (Field, 2009). EFA revealed that 37.2% of the items in the dichotomous response scale were problematic, whereas only 3.6% of the items in the polytomous response scale were problematic. For the dichotomous response scale, the Integrity and Soft-Heartedness clusters had the highest percentage of problematic items (55%). For the polytomous response scale, the Openness cluster had the highest percentage of problematic items (12.5%). It was concluded that a high/low mean (0.95 and above and 0.05 and below) for the dichotomous response scale and a high mean (of 4.50 and above) for the polytomous response scale was indicative of items that were too easy to endorse.

The discussion concerning online personality assessments complemented the general objective of the study by aiding in the selection of an administration method that was convenient and suitable not only for the SAPI inventory, but also for the response scale chosen and the target population. The results of the present study support the literature findings discussed in Chapter 2. Therefore, although online and or web-based assessments were deemed the most suitable method to use in the study, this method of administration did not yield a high response rate. From a total of 1313 students registered for the subjects Administrative Management IA and IIA, only 490 students completed the inventory.

5.3 ACHIEVEMENT OF THE SPECIFIC RESEARCH OBJECTIVES

This section discusses the two specific research objectives presented in Chapter 1 (see section 1.5). The first specific research objective was to determine which response scale would best replicate or be representative of the preliminary qualitative personality factor structure. This objective was addressed by identifying the major psychologically meaningful factors that accounted for the correlations between the items. The factor structures of the dichotomous and polytomous response scale were compared (see Chapter 3, section 3.5.2 for a discussion of the steps taken in this comparison). Based on the analysis in Chapter 4 (see section 4.3), it was determined that the polytomous response scale best replicates the preliminary qualitative personality structure across all nine clusters. This was determined based on the fact that the factor structure of the polytomous response scale loaded similarly to the qualitative personality structure. In addition, when the factor structure was analysed on a qualitative level (previous qualitative research studies on the SAPI) for both the dichotomous and polytomous response scales, the factor structure composition of the polytomous response scale made more sense from a practical interpretable perspective. The polytomous response scale therefore best replicated the qualitative South African personality factor structure. However, it should be noted that the dichotomous response scale was also perceived as reasonably high in terms of factor replication.

The second specific research objective involved identifying the differences between the dichotomous and polytomous response scales in relation to their ability to reliably measure personality. In addressing this objectives specific cut-offs were used (see Chapter 3). In the third step of the analysis, the Cronbach alpha coefficients of all nine clusters for both the dichotomous and polytomous response scales were identified. The acceptable value for the Cronbach alpha coefficient was considered to be 0.70, although in exploratory research a loading above 0.60 is usually considered acceptable (Cortina, 1993; Field, 2009; Robins et al., 2007). For the purpose of the study, values for the Cronbach alpha coefficient that were lower than 0.60 were regarded as unacceptable (Maree, 2010). Most of the Cronbach alpha coefficients for the dichotomous response scale ranged from 0.52 to 0.86, with the exceptions of the Integrity cluster (0.21) and the Openness cluster (0.33). The

Cronbach alpha coefficients for the polytomous response scale ranged from 0.53 to 0.87, with the exception of the Openness cluster with a loading of 0.45. This analysis showed that the dichotomous response scale had lower internal consistency than the polytomous response scale in the measurement of the same construct. However, the dichotomous response scale was at a disadvantage due to all the problematic items that had to be removed from further analysis. It is important to note that dichotomous items tend to have lower Cronbach alpha coefficients because of restricted variance. Importantly, it should be noted that an alpha of 0.60 in a dichotomous scale indicates greater reliability than the same loading in a polytomous scale. It is therefore optimal for dichotomous measures to have a larger number of items to increase the internal consistency (Robins et al., 2007). The polytomous response scale therefore had higher overall reliability than the dichotomous response scale.

5.4 LIMITATIONS OF THE RESEARCH STUDY

This section focuses on some of the limitations during and after the study. Three specific categories of limitations apply to this study (sample, language and socially acceptable responses). Firstly, the sample for the study included only first- and second-year undergraduate students enrolled at one tertiary institution. The sample could therefore not be regarded as being representative of the population. Self-selection played a vital role in the sample size because sample size was determined by the respondents' willingness to participate in the study. Some respondents may have been disinclined to answer or complete the whole inventory because of personal and academic responsibilities.

Secondly, the respondents' home language may have influenced the results because only 12.5% of the respondents indicated that English was their first language. Some of the respondents may have had difficulty understanding the items or may have misinterpreted the items of the inventory. This may have influenced their performance and the findings of the study.

Thirdly, survey research bias can easily occur when testing multicultural groups because the respondents may be inclined to provide socially acceptable responses

based on their individual perceptions. The respondents may have been inclined to answer the inventory in a way that they believed would positively influence the lecturer's perception of them. For example, some respondents may have agreed or strongly agreed with certain items such as "I am eager to learn" and "I want to learn new things". Also, the respondents may have been inclined to answer the questions randomly by just clicking on an option in the dichotomous response scale as it may have been easier to only choose between two response categories. In contrast, it may have been more difficult for the respondents to answer the questions using the polytomous response scale. The results of the study can therefore not be generalised to the wider population.

5.5 IMPLICATIONS OF THE RESEARCH FINDINGS

The specific research findings provide valuable insight as they go a step further than merely replicating the findings of previous research studies conducted on the SAPI project. These previous studies have all focused on a single cluster of the nine-factor personality structure. The study extends the scholarly literature on the SAPI because it made use of all nine clusters and administered the inventory using two distinct response scales (the dichotomous response scale and the polytomous response scale). The study compared the two types of response scales in relation to the measurement of personality in order to determine whether the nine-factor personality structure items loaded better on the dichotomous or polytomous response scale.

One of the principal results of the study is that it contributes to the current personality measurements in terms of the type of response scales in use in South Africa. From an academic perspective, the study contributes to academic practice by allowing for more accurate reliability comparisons in cross-cultural assessment, excluding group differences. The results of the study should enable researchers to develop better guidelines for good practice.

5.6 RECOMMENDATIONS FOR FUTURE RESEARCH

In order to overcome some of the limitations listed above, this section makes recommendations in accordance with the limitation categories. The first recommendation is that this study should be replicated by a researcher who is familiar with different cultures and who is able to ensure that the study includes a wider population. This could be done by using a larger sample and ensuring that the biographical variables are more equally distributed across the groups or categories. The second recommendation for future research would be to investigate the impact that the home language of the respondents may have on the results. Thirdly, future researchers should make the objective and reason for the study clear to the students in an effort to encourage them to answer the inventory honestly. Since this inventory was only administered online computer anxiety could have influenced the respondents' performance and the response rate. It is therefore recommended that future research focus more on the method of administration that would best suit the sample. This is an important consideration because of the paucity of research on identifying a specific method that would be ideal for all respondents.

5.7 RECOMMENDATIONS FOR FUTURE RESEARCH ON THE SAPI PROJECT

When replicating the study for the SAPI project, it is first recommended that the item properties of all nine clusters should be re-investigated so that additional sources of differential item functioning can be identified for further elimination or revision of items. This would ultimately refine the SAPI inventory and structure. Also, the factor solutions should be reconsidered for factors with only two items as these factors are not likely to stand cross-validation. The second recommendation is to overcome the language barrier by administering the inventory in all 11 official languages in order to accommodate each participant in his/her home language.

The third recommendation would be for the researcher to make use of the Mplus statistical analysis program, instead of the SPSS program, as this program allows the researcher to treat the dichotomous response scale data as categorical.

According to Hopwood and Donnellan (2010) psychometric experts frequently state that EFA is “primarily a data-driven approach, whereas CFA is theoretically grounded” (Byrne, 2005, p. 17). Therefore, the final recommendation when replicating the study would be to use CFA instead of EFA to substantiate the factor structure found in this study. Another alternative is to explore the use of exploratory structural equation modelling (ESEM), as it is an integration of both CFA and EFA (Marsh et al., 2010). The reason for considering ESEM is that many measuring instruments have well defined EFA structures that are not supported by CFA (Marsh et al., 2010). Also when analysing cross-cultural data, CFA is too unwieldy due to equality constraints to be practical. It may therefore be more appropriate to use ESEM (Asparouhov & Muthén, 2013).

5.8 CHAPTER SUMMARY

The outcome of the overall research objective was based on an exploratory factor analysis and concludes that the polytomous response scale was more suitable for measuring the preliminary personality structure of the SAPI. The limitations in terms of the sample, language and socially acceptable responses of this study that could influence the reliability and validity of the research outcomes are discussed, as well as the specific implications of the findings. Lastly, several recommendations are proposed for future research to include a wider population, investigate the impact of home language and computer anxiety on the results, and to focus more on the method of administration that would best suit the sample.

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APPENDICES

APPENDIX A: The informed consent and letter of introduction



Faculty of Economic and
Management Sciences

**Informed consent for participation in an academic
research study**

Department of Human Resource Management

**ASSESSING THE FACTOR STRUCTURE OF THE SOUTH AFRICAN
PERSONALITY INVENTORY BY EMPLOYING A DICHOTOMOUS AND A
POLYTOMOUS RESPONSE SCALE**

Research conducted by:

Miss D. Van Wyk(27076297)

Cell: 082 521 0285

Dear Respondent

You are invited to participate in an academic research study conducted by Dalinda van Wyk, a Masters student from the Department of Human Resource Management at the University of Pretoria.

The purpose of this survey study is to investigate which response scale will be most appropriate to use when assessing personality and its effect on equivalence through an exploratory and qualitative study within the SAPi context.

Please note the following:

- This study involves an anonymous survey. Your name will not appear on the inventory and the answers you give will be treated as strictly confidential. You cannot be identified in person based on the answers you give.
- Your participation in this study is very important to us. You may, however, choose not to participate and you may also stop participating at any time without any negative consequences.
- Please answer the questions in the attached inventory as completely and honestly as possible. This should not take more than 40minutes of your time.
- The results of the study will be used for academic purposes only and may be published in an academic journal. We will provide you with a summary of our findings on request.
- Please contact my supervisor, Prof D. Meiring (Deon.Meiring@up.ac.za) if you have any questions or comments regarding the study.

Please sign the form to indicate that:

- You have read and understand the information provided above.
- You give your consent to participate in the study on a voluntary basis.

Respondent's signature

Date

Department of Business Management
Postgraduate programmes
www.unisa.ac.za
+27(0) 12-429-2340

Dear Students

You are invited to participate in an academic research study conducted by the employees at the University of South Africa and the University of Pretoria, who are administrating inventories as part of the research.

We are currently conducting a study and count on your **participation to assist** us to investigate what the profile of the first and second year students are.

Participation in this study will **benefit** the student in that they will receive academic recognition in the second assignment.

HOW:

Each student is required to complete **2 inventories**.

The student numbers will be divided into groups. You should complete the group questionnaire that you are divided into and you will receive **3 marks** for completing that questionnaire.

After that you will receive a new group number of which you should complete the second inventory. After you completed the inventory you will receive **another 3 marks**. For completing both inventories you will receive **6 extra marks** to your final mark.

This will ultimately **increase** the student's **overall year mark** which can benefit the student in numerous ways.

Thank you in anticipation of your participation.

Sincerely

Dalinda van Wyk

APPENDIX B: The South African Personality Inventory

Memo

TO: To Whom It May Concern
CC: Professor Deon Meiring and the SAPI Project Team
SUBJECT: The South African Personality Inventory (SAPI)

The inventory can only be provided on request, due to limited copyright permission.

Thank you for understanding

Sincerely
Dalinda Prinsloo

Copyright © 2012 all rights reserved SAPI Project Team

APPENDIX C: Official ethical clearance letter from Unisa

20 July 2012

Dear Mrs Dalinda van Wyk

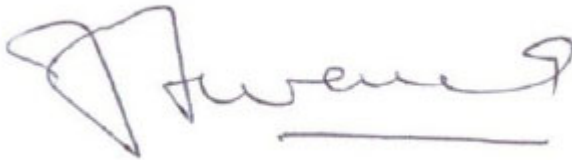
YOUR APPLICATION FOR RESEARCH ETHICS CLEARANCE: ASSESSING THE FACTOR STRUCTURE OF THE SOUTH AFRICAN PERSONALITY INVENTORY BY EMPLOYING A DICHOTOMOUS AND A POLYTOMOUS RESPONSE SCALE

Thank you for resubmitting your application for ethics review after considering the feedback from the CEMS Research Ethics Review Committee.

The CEMS Ethics Review Committee is satisfied that you have addressed all the concerns raised at our meeting of 18 January 2012.

Ethical clearance has therefore been granted to you for your research project.

Best regards



Prof JS Wessels
ON BEHALF OF THE CEMS ETHICS REVIEW COMMITTEE



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APPENDIX D: Statistical analysis on Compact Disc

APPENDIX E: Possible research article – Abstract and Accredited journal identified

ABSTRACT

ASSESSING THE FACTOR STRUCTURE OF THE SOUTH AFRICAN PERSONALITY INVENTORY BY EMPLOYING A DICHOTOMOUS AND A POLYTOMOUS RESPONSE SCALE

Most personality instruments currently used in South Africa are imported from abroad and therefore have limited utility in the South African context as they have been developed for a specific group. The introduction of technology has resulted in personality measuring instruments increasingly being administered by means of computer-based assessments. The dramatic increase in computer-based assessments has sparked debate regarding the use of various response scale categories in personality assessment.

The current study aimed to determine whether a dichotomous or a polytomous response scale administered by means of computer-based assessments would be more suitable for measuring the preliminary personality structure of the SAPI.

Hence the significance of the study extends current literature by using all nine clusters separately in order to assess the effectiveness of the dichotomous and polytomous response scales. This study is original and unique in the sense that it contributes to study of the current personality measurements being used in South Africa.

The participants were first- and second-year undergraduate students enrolled at a tertiary institution (N = 490). The inventory consisted of 262 closed-ended personality statements and was administered in both the dichotomous (“agree” and “disagree”) and polytomous (“strongly agree”, “agree”, “somewhat agree/disagree”, “strongly disagree” and “disagree”) response scale form. The results, which were based on an exploratory factor analysis, revealed by comparing the factor structures of the dichotomous and polytomous response scales, the polytomous response scale was determined to be more suitable for measuring the preliminary personality structure of the SAPI.

The conclusion was based on two specific criteria. Firstly, the factor structure across the polytomous response scale loaded similarly to the qualitative personality structure that was conceptualised in the first phase of the SAPI project. Secondly, Cronbach alpha coefficients, ranging from 0.60 to 0.87 across the nine factors, with the exception of the Integrity and Openness clusters with values of 0.45 and 0.53 respectively, for the polytomous response scale were higher than those yielded by the dichotomous response scale.

SA Journal of Industrial Psychology

Structure and style of your quantitative research article

This document provides an overview of the structure and style of your quantitative research article to be submitted to the *SA Journal of Industrial Psychology*. A quantitative research article provides an overview of innovative research in a particular field within or related to the focus and scope of the journal, presented according to a clear and well-structured format (between 5000 and 7000 words, excluding references, with a maximum of 60 references).

When presenting your article in English, please use British English, that is, according to the Oxford English Dictionary, and remember to set your version of Microsoft Word to UK English. Avoid Americanisms (e.g. use ‘-ise’ and not ‘-ize’).

- **Language:** Manuscripts must be written in British English or Afrikaans.
- **Line numbers:** Insert continuous line numbers.
- **Font:**
 - **Font type:** Times New Roman
 - **Symbols font type:** Times New Roman
 - **General font size:** 12 pt
- **Line spacing:** 1.5
- **Alignment:** Justified
- **Headings:** Ensure that formatting for headings is consistent in the manuscript.
 - First-level headings: normal case, bold, 14 pt
 - Second-level headings: normal case, underlined, 14 pt
 - Third-level headings: normal case, bold, 12 pt
 - Fourth-level headings: normal case, bold, 12 pt, in-line, followed by a colon
- **References:** All references in text should be cross-referenced with MS Word’s cross-reference function. For further instructions please [click here](#) or [here](#).

Our publication system supports a limited range of formats for text and graphics. Text files can be submitted in the following formats only:

- Microsoft Word (.doc): **We cannot accept Word 2007 DOCX or PDF files.** If you have created your manuscript using Word 2007, you must save the document as a Word 2003 file before submission.

- Rich Text Format (RTF) documents (uploaded during Step 2 of the submission process). Users of other word processing packages should save or convert their files to RTF before uploading. Many free tools are available that will make this process easier.

For quantitative research, manuscripts should strictly comply with the following structure layout:

- **Cover letter**
- **Manuscript title**
- **Abstract**
 - Orientation
 - Research purpose
 - Motivation for the study
 - Research approach, design and method
 - Main findings
 - Practical/managerial implications
 - Contribution / Value-add
- **Introduction (first-level heading)**
 - Orientation (no heading)
 - Research purpose and objectives (second-level heading)
 - Literature review (second-level heading)
- **Research design (first-level heading)**
 - Research approach (second-level heading)
 - Research method (second-level heading)
 - Research participants (third-level heading)
 - Measuring instruments (third-level heading)
 - Research procedure and ethical considerations (third-level heading)
 - Statistical analysis (third-level heading)
- **Results (first-level heading)**
- **Discussion (first-level heading)**
 - Outline of the results (second-level heading)
 - Practical implications (second-level heading)
 - Limitations and recommendations (second-level heading)
 - Conclusion (second-level heading)
- **Acknowledgements (first-level heading)**
- **References (first-level heading)**

Page 1: Cover Letter

The first page of your submission should contain a **compulsory cover letter**. It should always be presented in English. You should provide all of the following elements in **table format**:

- **Article title:** Provide a short title of 50 characters or less.
- **Significance of work:** Briefly state the significance of the work to theory, empirical research and practice.
- **Full author details:** Provide title(s), full name(s), position(s), affiliation(s) and contact details (postal address, email, telephone and cellular number) of each author.
- **Corresponding author:** Identify to whom all correspondence should be addressed.
- **Authors' contributions:** Briefly summarise the nature of the contribution made by each of the authors listed.
- **Summary:** A list containing the number of words, pages, tables, figures and/or other supplementary material should accompany the submission.

Page 2 and onwards

Title

The article's full title should contain a maximum of 95 characters (including spaces).

Abstract

- Do not cite references in the abstract.
- Abbreviations should be avoided in the abstract.
- The abstract should be written in English.
- The abstract should be no longer than 250–300 words and must be written in the past tense. The abstract should give a succinct account of the objectives, methods, results and significance of the work. The structured abstract for an original research article should consist of seven paragraphs, labelled as follows:
 - **Orientation:** A brief theme sentence to alert the reader to the overall issue or problem area addressed in this article.
 - **Research purpose:** A statement of the main research aim or purpose of the study.
 - **Motivation for the study:** The rationale or motivation for the study.
 - **Research design, approach and method:** A brief explanation of the research design, approach and method, with specific reference to the target population and the sample size.
 - **Main findings:** A summary of the main results/findings of the study.

- **Practical/managerial implications:** A summary of the practical or managerial implications.
- **Contribution/value-add:** A concluding statement indicating the contribution or value-add of the study in addressing gaps or contradictions in the literature.

Introduction (first-level heading)

The introduction contains an orientation section and two subsections (second level-headings): the research purpose and objectives and the literature review.

The introduction (orientation) to the study should comprise an opening paragraph that provides the reader with a brief orientation to and contextualisation of the manuscript and the key variables of relevance to the study. It should contain a thought-provoking introductory statement on the broad theme or topic of the research (to compel the reader to read further) and explain the role of the relevant key variables in this study. Cite the most important and recently published studies previously conducted on this topic or that have any relevance to this study (i.e. provide a high-level synopsis of the most recent research literature on this topic). The contextualisation section should be written from the standpoint of readers, that is, without specialist knowledge in that area, and must clearly state and illustrate the introduction to the research, the problem statement and the aims in the context of previous work bearing directly on the subject.

- **Research purpose and objectives (second-level heading):** This is the second subsection under the introduction. Indicate the most important controversies, gaps and inconsistencies in the literature to be addressed by this study. In view of the above trends, state the core research problem, research questions and specific research objectives that will be addressed in this study and provide the reader with an outline of what to expect in the rest of the article. Gaps in the research literature should be clearly pointed out to substantiate the necessity and importance of the intended study. The research purpose and objectives section contains the following additional elements of discussion (none of these should be separate headings in the manuscript, but each of these elements should be clearly addressed):
 - **Research questions:** Flowing from the problem statement are the primary research questions underpinning the research. These research questions should flow from the aforementioned sections to contextualise the research objectives and approach.
 - **Research objectives:** Research objectives should flow from the research questions and provide an indication of what will be investigated in the article. State the core research

problem and specific research objectives that will be addressed in this study. This section is comprised of two components:

- **General objective:** The general objective should summarise the encompassing theme or objective of the research in a single sentence.
- **Secondary objectives:** The secondary objectives refer to the specific objectives of the study.
- **Contribution to field:** Explain the study's academic (theoretical and methodological) and practical merit and/or importance (i.e. provide the value-add and/or rationale for the study).
- **What will follow:** Provide the reader with an outline of what to expect in the rest of the article.
- **Literature review (second-level heading):** The literature review is the third subsection under the introduction and provides a brief and concise overview of the literature under a separate second-level heading, e.g. literature review. A synthesis and critical evaluation of the literature (not a compilation of citations and references) should at least include or address the following elements:
 - Conceptual (theoretical) definitions of all key concepts. The topic should be clearly anchored in a meta-theoretical (paradigmatic) context.
 - A critical review and summary of previous research findings (theories, models, frameworks, etc.) on the topic. Apart from classical references, authors should ensure that the literature review reflects the most recent research on the topic in order to ensure the contemporary relevance of the work.
 - A clear indication of the gap in the literature and the necessity to address this void.
 - A clearly established link should exist between the formulated research questions and objectives and theoretical support from the relevant literature.
 - The research hypotheses should flow from the literature review. The research hypotheses should be clearly linked to the research questions and objectives.

Research design (first-level heading)

The research design section includes two subsections (second-level headings) and four sub-subsections (third-level headings) flowing from the research method section:

- **Research approach (second-level heading):** A brief description of the research approach followed in the study should be included. This section should orient the reader to the paradigm through which the research will be presented and interpreted.

This section contains a brief description of one or two sentences and should include references.

- **Research method (second-level heading):** Under the research method the authors provide descriptions on the following third-level headings:
 - **Research participants (third-level heading):** A description of the target population, sampling frame and the sampling procedure are provided here. The obtained sample size and response rate are reported. The research participants are normally described in terms of their demographical details such as age, gender, race and occupational sector. Other characteristics, such as home language, highest academic qualification, etc., may also be provided, depending on the relevance to the study objectives.
 - **Measuring instrument(s) (third-level heading):** This section describes the measuring instrument(s) used in the study or the way in which constructs were operationalised. Fourth-level headings (for each scale) are in bold and end with a colon. These types of headings are directly followed (in the same line) by a sentence (the same as with bullets above). Besides clearly referencing the origin of the scale, this section should clearly explain the basic scale design, the number of dimensions and the items per dimension covered by the scale. The response rating scale should also be reported. In the case of newly developed scales, exemplary examples of items in each dimension should be provided as well as an example of the response rating scale. In the case of scale development and validation studies, it should also be indicated which items are reverse scored and how total scores are calculated. This section should also report on the reliability and validity of the scale (as reported in other studies) as well as the rationale for using the scale in the study. Finally, this section should report the internal consistency reliability of the scales as obtained for the present sample.
 - **Research procedure and ethical considerations (third-level heading):** This section sets out the procedure used for the collection of the data for the study. Specific attention should be given to the clarity of the research procedure for possible replication purposes. The procedure section also comments on matters pertaining to research ethics. The authors are to discuss the various ethical implications and considerations of the article. This section should highlight aspects pertaining to recruitment procedures, informed consent and human and data protection. This section is usually no longer than one paragraph.
 - **Statistical analysis (third-level heading):** Normally, only a brief mention of the statistical procedures employed in the analysis of the data is provided. In the event of

unusual or new statistical techniques, a brief description of each should then also be provided under this heading. The description of familiar statistical procedures is otherwise incorporated into the presentation of the results. The statistical procedures should be clearly aligned with the research objectives and the research hypotheses.

Authors should ensure that all of these aspects are clearly evident in the research design section.

Results (first-level heading)

This section reports the results from the statistical procedures in a systematic manner.

The reporting of the results must be clearly linked to the research objectives and research hypotheses. Tables may be used or models (diagrams/figures) may be drafted to indicate key components of the results of the study.

- The body of the Results section is a text presentation of the key statistical results and includes references to each of the tables and figures.
- Organise the results based on the sequence of tables and figures you will include in the manuscript. Tables and figures must be provided after the list of references. Indicate in the body of the work approximately where tables and figures should be placed.
- Statistical test summaries (e.g. test name, p-value) are usually reported parenthetically in conjunction with the biological results they support.
- All units should conform to the SI convention and be abbreviated accordingly. Metric units and their international symbols must be used throughout, along with the decimal point (not the decimal comma).
- The APA 6th edition notation style for reporting tables and statistical values must be followed.
- Present the results of your experiment/research data in a sequence that will logically support (or provide evidence against) the hypothesis or answer the question stated in the introduction.

Discussion (first-level heading)

The discussion section interprets and explains the statistical results reported in the results section. Authors must take care not to report statistical results in this section.

This section normally contains the following five elements (it is suggested that sub-headings are used in this section):

- **Outline of the results (second-level heading):** Restate the main objective of the study and reaffirm the importance of the study by restating its main contributions. Summarise the results in an interpretative manner in relation to each stated research objective or

research hypothesis. Link the findings back to the research literature and to the results reported by other researchers. Provide explanations for unexpected results.

- **Practical implications (second-level heading):** Reaffirm the importance of the study by restating its main contributions and provide the implications for the practical implementation your research.
- **Limitations and recommendations (second-level heading):** Point out the possible limitations of the study and provide suggestions for future research. Provide the recommendations emerging out of the current research.
- **Conclusion (second-level heading):** The conclusions section should state clearly the main conclusions of the research and give a clear explanation of their importance and relevance, with recommendations for future research. Provide a brief conclusion that restates the objectives, the research design, the core results and their meaning (findings). The conclusion section should also clearly highlight the specific contribution of the research to the field, discipline and practice of Industrial Psychology.

Acknowledgements (first-level heading)

If during your study you received any significant help in conceiving, designing, or carrying out the work, or received materials from someone who did you a favour by supplying them, you must acknowledge their assistance and the service or material provided. Authors should always acknowledge outside reviewers of their drafts and any sources of funding that supported the research.

- **Competing interests (second-level heading):** A competing interest exists when your interpretation of data or presentation of information may be influenced by your personal or financial relationships with other people or organisations that can potentially prevent you from executing and publishing unbiased research. Authors should disclose not only any financial competing interests, but also any non-financial competing interests that may cause them embarrassment were they to become public after the publication of the manuscript. Where an author claims no competing interests, the listing will read: ‘The authors declare that they have no financial or personal relationship(s) which may have inappropriately influenced them in writing this article.’
- **Authors’ contributions (second-level heading):** This section is necessary to give appropriate credit to each author, and to the authors’ applicable institutions. The individual contributions of authors should be specified with their affiliation at the time of the study and completion of the work. An ‘author’ is generally considered to be someone who has made substantive intellectual contributions to a published

study. Contributions made by each of the authors must be listed, along the lines of the following (please note the use of author initials):

- J.K. (University of Pretoria) was the project leader, L.M.N. (University of KwaZulu-Natal) and A.B. (University of Stellenbosch) were responsible for experiment and project design. L.M.N. performed most of the experiments. P.R. made conceptual contributions and S.T. (University of Cape Town), U.V. (University of Cape Town) and C.D. (University of Cape Town) performed some of the experiments. S.M. (Cape Peninsula University of Technology) and V.C. (Cape Peninsula University of Technology) prepared the samples, calculations were performed by C.S. J.K. (Cape Peninsula University of Technology) and U.V. wrote the manuscript.

References (first-level heading)

Begin the reference list on a separate page with no more than 60 references. The *SA Journal of Industrial Psychology* uses the **APA referencing style**, details of which can be downloaded from the journal website. **Note: No other style will be accepted.**