THE FURTHER DEVELOPMENT AND EVALUATION OF A GENERIC INDIVIDUAL NON-MANAGERIAL PERFORMANCE MEASURE

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DECLARATION

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ABSTRACT

If it can be assumed that the connotative meaning of performance (Kerlinger & Lee, 2000) is not unique to specific managerial and non-managerial jobs, this opens up the possibility of developing generic managerial and non-managerial competency models simply because it becomes easier to assemble a sufficiently large sample to convincingly empirically test the model. This in addition then also opens up the possibility of developing and validating generic managerial and non-managerial prediction models.

The question is whether industry should be expected to develop and empirically test explanatory structural models that explain variance in managerial and non-managerial performance. Myburgh (2013) argued that they should not. Moreover, Myburgh (2013) argued that the inability of the discipline of industrial psychology to develop a generic non-managerial performance model has, let down the practice of industrial psychology. Myburgh (2013) consequently took the first step towards building a generic non-managerial structural competency model by proposing a performance structural model in which she mapped twelve generic non-managerial competencies on eight generic non-managerial outcomes. She, however, did not empirically test her proposed non-managerial performance model. She in addition developed and psychometrically evaluated the construct validity of the Generic Performance Questionnaire (GPQ). The GPQ attempts to assess the level of competence that employees in entry-level non-managerial position achieve on the competencies that comprise the generic non-managerial performance construct (Myburgh & Theron, 2014).

The objective of the current study is to continue with the research where Myburgh (2013) left off towards the development of a valid comprehensive non-managerial individual employee competency model. The primary objective of the current study is to re-examine the performance structural model proposed by Myburgh (2013), to modify the model if this is deemed necessary and empirically test the fit of the model as well as the statistical significance of the paths in the model (provided adequate fit has been achieved). Re-examining the performance structural model proposed by Myburgh (2013) entails reflecting on the question whether any critical competencies have been excluded from the model and whether any redundant or inappropriate

competencies have been included. It in addition entails reflecting on the question whether critical outcomes have been excluded from the model and whether any redundant or inappropriate outcomes have been included. It lastly entails reflecting on the question whether any structural linkages are lacking in the current model and whether any of the existing paths should be removed.

The item analysis findings in the current study were compatible with the position that the subscales of the GCQ and the GOQ validly and reliably measured the latent performance dimensions they were designated to reflect. Only two subscales were able to pass the unidimensionality assumption in that the eigenvalue greater than one rule extracted only one factor and the percentage of large residual correlations were low enough to reflect an accurate representation of the observed inter-item correlation. For eight subscales the eigenvalue greater than one rule extracted a single factor, however the percentage of large residual correlations proved to be too high. The small sample size imposed certain limitations on the initial objectives of the study which meant that only the GOQ measurement model could be evaluated. The hypothesis of exact fit was not rejected ($p>.05$). Confidence in the measurement model was negatively impacted by five insignificant measurement error variances. In addition, two of the measurement error variances were negative. Fortunately, the negative estimates were statistically insignificant ($p>.05$).

Recommendations for future research are made. Practical managerial implications are discussed.

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CHAPTER 1

INTRODUCTION, RESEARCH OBJECTIVE AND OVERVIEW OF THE STUDY

1.1 INTRODUCTION

Globalisation has led to the über-competitive nature of the business environment organisations find themselves in today and has increased the pressure on organisations to operate as efficiently as possible. In order to survive in the cutthroat business environment of today organisations need to minimise their input and maximise their output. As a result, organisations are constantly looking at new ways to optimise the use of the limited resources available to them in an attempt to gain a competitive advantage.

Labour is the human resources at the disposal of an organisation and is responsible for the transformation of the natural, financial and technological resources into products or services. Labour is the life-giving resource that mobilises the other factors of production. In other words, labour is the production factor that is responsible for the effective and efficient utilisation of the other factors of production. The competitive advantage of consistent high economic growth in organisations more specifically lies in the performance of the employees who are the carriers of the production factor labour. Therefore, the human resource imperative is to contribute to the effectiveness and efficiency of organisations' core business by optimising the performance of their employees in a manner that adds value to the organisation.

In this argument, it is important to clearly explicate what performance actually means. Performance is typically not seen as a construct that encompasses a behavioural domain and an outcome domain or that the two domains are structurally inter-related. Various scholars (Campbell, 1991; Hunt, 1996; Bartram, 2005) seem to be of the opinion that performance should be interpreted behaviourally. On the other hand, Bernardin and Beatty (1984) define performance in a manner that emphasises the outcome domain. However, despite the conflicting views of these scholars they all tend to leave open the proverbial "backdoor" by mentioning whichever domain they neglected.

Myburgh (2013, p. 22) defined performance in a manner that encompasses both the behavioural and outcome domain:

> Performance is the nomological network of structural relations existing between an inter-related set of latent behavioural performance dimensions [abstract representations of bundles of related observable behaviour] and an inter-related set of latent outcome variables valued by the organisation and that contribute to organisational goals.

Myburgh and Theron (2014) argue that this more extensive interpretation of the performance construct is necessary because of the fact that in the final analysis employees are expected to perform specific behaviours well because these behaviours are instrumental in the achievement of specific outcomes. In the final analysis, jobs exist to achieve specific outcomes.

The human resource function attempts to influence employee performance interpreted in this more extensive manner through an integrated array of human resource interventions. A distinction can be made between two broad categories of interventions. Milkovich, Boudreau and Milkovich (2008) distinguish between flow and stock interventions. Flow interventions attempt to change the make-up of the work force by influencing the flow of employees into, through and out of the organisation by adding, removing or reassigning employees, whilst assuming that the changes will lead to improvements in performance, which in turn will lead to improvements in the quality, quantity and the production cost of the particular product or service[1] (Milkovich & Boudreau, 1994). Alternatively, stock interventions aim to influence employee stock by trying to change the characteristics of the work force in their existing work situation or position. The assumption is again that these changes will lead to improvements in performance which in turn will lead to improvements in the quality, quantity and the production cost of the particular product or service (Boudreau, 1991).

Selection is an important flow intervention. Selection essentially attempts to control the performance levels that are achieved by employees in different hierarchical levels in the organisation by regulating the flow into and up the organisation (Theron, 2007).

[1] It is acknowledged that there might be a tautological error in the foregoing reasoning in that it could be argued that *the quality, quantity and the production cost of the particular product or service* constitutes the output that the employee is responsible for and hence forms part of the performance construct. If, however, it is argued that each employee only contributes to a part of the total product or service then the dilemma is resolved.

1.2 THE NEED FOR A GENERIC COMPETENCY MODEL

If organisations want to improve performance interpreted in this more extensive manner, in a purposeful and rational way (and not through trial and error) through any flow or stock intervention, it is paramount not only to understand: a) what performance is, but also b) what causes performance. This is therefore also true of personnel selection. The human resource profession needs to assume that differences in performance among employees is not a chance phenomenon, the outcome of a random event, but rather can be explained in terms of a complex psychological mechanism that regulates the level of performance that employees achieve. The psychological mechanism comprises a structurally interrelated set of (malleable and non-malleable) person characteristics and situational characteristics. The nomological network of person-centred and situational variables is considered complex in the sense that these variables are richly interconnected, that feedback loops from performance back to specific malleable person-centred variables create a dynamic system, and probably most importantly, that the explanation for performance lies spread across the entire mechanism (Cilliers, 1998). The question is therefore how to obtain a valid description of this complex psychological mechanism that acknowledges these key characteristics of complex systems.

Competency modelling seems to provide an effective method to achieve such a description. Competency modelling is quite a vexed topic (Schippmann, Ash, Battista, Carr, Eyde, Hesketh, Kehoe, Pearlman, Prien & Sanchez, 2000) and therefore it is important to clarify exactly what it entails. The semantic confusion stems from the different interpretations connected to competency modelling by authors in different countries and institutions. These interpretations can be broken down into two basic views. The first view has its origins in the USA and describes competencies as attributes that are causally related to success, in other words, the personal characteristics required to be successful. The second stems from the UK and views competencies as bundles of behaviours that are causally related to outcomes (Theron, 2016). Likewise, Bartram (2005, p. 1187) defines competencies as “sets of behaviours that are instrumental in the delivery of desired results or outcomes”. To clarify, the UK view can be understood as behaviours through which attributes are put into action (Bartram, 2006).

Saville and Holdsworth (SHL) identified the necessary components of a competency model, namely (Bartram, 2006, p. 4):

- "**Competencies:** sets of desirable behaviours
- **Competency potential:** the individual attributes necessary for someone to produce the desired behaviours
- **Competency requirements:** the demands made upon individuals within a work setting to behave in certain ways and not to behave in others. In addition to instructions received (i.e. the line manager's setting of an individual employee's goals), contextual and situational factors in the work setting will also act to direct an individual's effort and affect the individual's ability to produce the desired sets of behaviour. These requirements should normally derive from the organisational strategy and from a competency profiling of the demands made on people by the job
- **Results/Outcomes:** The actual or intended outcomes of behaviour, which have been defined either explicitly or implicitly by the individual, his or her line manager or the organisation."

It is important to mention that the competency model of SHL incorporates both the USA and the UK views, whereby competencies as defined by the USA school of thought refers to competency potential and competencies as defined by the UK school of thought is included as competencies. Stellenbosch takes competency modelling one step further by integrating SHL's stance on competency modelling with a structural model. Myburgh (2013, p. 4) is part of this school of thought and describes a competency model as:

> A three-domain structural model that maps a network of causally inter-related person characteristics onto a network of causally inter-related key performance areas and that maps the latter onto a network of causally inter-related outcome variables. The effect of the person characteristics on the performance dimensions and the effect of the latter on the outcome variables are in turn moderated by environmental variables.

Typically, selection procedures are developed for specific positions in the organisation (Myburgh, 2013). This would imply the need to develop a competency model for each of those specific positions in the organisation. Very often, however, only a limited number of employees occupy any given specific position in the organisation. This complicates the empirical testing of the competency model developed for a specific position. The complication stems from the use of structural equation modelling, to empirically test a competency model. In order for structural equation modelling to be credible, the use of a large sample is a necessity (Kelloway, 1998). Unfortunately, more often than not organisations do not have enough employees in a specific job to meet the sample requirements for structural equation modelling. The tendency to develop separate selection procedures for each specific position in the organisation is rooted in the assumption that the make-up of performance is different for each job.

Ironically, this assumption is the catalyst for a possible solution. It is completely fair and logical to say that on a detailed level of analysis, the make-up of performance is different for each job, but at the same time there is enough "correspondence between jobs on a higher level of aggregation to assume the existence of a generic non-managerial performance construct" (Myburgh, 2013, p. 6). Upon further inspection, there is some substance to this argument. The state of the modern working environment is ever changing and requires employees to have a more generally applicable skill set. For this reason, organisations are starting to define jobs in a more holistic way. Employees are frequently faced with a broad range of challenges and need to be able to act accordingly. The scope of these challenges is not unique and employees in similar positions should face similar challenges. Myburgh (2013) is of the opinion that it should be possible to define a generic non-managerial performance construct. Furthermore, if this multidimensional construct can be successfully operationalised with a generic non-managerial performance questionnaire, it would lead to considerable progress in terms of the development of an individual@work structural (or competency) model (Myburgh, 2013).

1.3 THE NEED FOR AN ACTUARIAL PREDICTION MODEL

A valid and credible explanation for employee performance in the positions for which the selection procedures are being developed is a necessary but not sufficient requirement for an effective selection procedure. An explicit directive on how to integrate information on the determinants of performance to acquire an estimate of the performance level that could be expected from an applicant is also required (Myburgh, 2013). Granted that each organisation only has a limited number of positions available, the onus of selection will always be to identify applicants that will deliver the highest level of performance. Given that data regarding actual performance is not available when a selection decision has to be made, as it will only reveal itself when an applicant has started to work, practitioners are forced to use predictions of future performance to decide who to appoint. Myburgh (2013, p. 2) argues as follows in this regard:

> Even though it is logically impossible to directly measure the performance construct at the time of the selection decision, it can nonetheless be predicted at the time of the selection decision if: (a) variance in the performance construct can be explained in terms of one or more predictors (b) the nature of the relationship between these predictors and the performance construct has been made explicit; and (c) predictor information can be obtained prior to the selection decision in a psychometrically acceptable format. The only information available at the time of the selection decision that could serve as such a substitute would be psychological, physical, demographic or behavioural information on the applicants. Such substitute information would be considered relevant to the extent that the regression of the (composite) criterion on a weighted (probably, but not necessarily, linear) combination of information explains variance in the criterion. Thus, the existence of a relationship, preferably one that could be articulated in statistical terms, between the outcomes considered relevant by the decision maker and the information actually used by the decision maker, constitute a fundamental and necessary, but not sufficient, prerequisite for effective and equitable selection decisions.

To derive these criterion predictions decision makers can either combine predictor information obtained on applicants clinically or mechanically (Barrick, Field & Gatewood, 2011). The mechanical prediction model that combines the predictor data to derive a criterion estimate can be developed subjectively by the clinician, distilled through bootstrapping from the practices of the clinician or derived statistically or mathematically from historical criterion and predictor data sets (Barrick et al., 2011). The latter refers to an actuarial prediction model (Barrick et al., 2011). If the clinical method is used the decision maker will have to process all the predictor information derived using his/her own judgement. If the mechanical method is used the human factor is eliminated and the conclusions are derived via “empirically established relationships between data and the condition or event of interest” (Dawes, Faust & Meehl, 1989, p. 1668). Meehl (1954) caused a lot of controversy when he reviewed studies comparing the two broad approaches to combine predictor data to arrive at criterion inferences. The findings of Meehl (1954) showed that mechanical predictions trumped clinical predictions more often than not. Meehl’s (1954) original findings have since been repeatedly corroborated in numerous studies (Binning & Barrett, 1989; Gatewood & Feild, 2001; Grove & Meehl, 1996; Grove, Zald, Lebow, Snitz & Nelson, 2000; Grove & Loyd, 2006; Highhouse, 2008; Colarelli & Thompson, 2008).

However, in order to use the actuarial method, an actuarial prediction model has to be developed and validated, which requires a sample of criterion and predictor data obtained for employees occupying the position for which the selection procedure is being developed. This validation sample should, however, exceed a specific minimum sample size to allow the derivation of a stable regression equation that describes the relationship between the criterion and the predictors in the selection battery. Again unfortunately, in many instances, companies do not have access to large enough samples to allow this.

The inability to develop an actuarial prediction model gives rise to the concern that the ideal of the Employment Equity Act (Republic of South Africa, 1998) to root out unfair indirect discrimination in personnel selection might remain an unachievable ideal. Cleary (1968) defines unfair indirect discrimination as a situation where the clinical or mechanical inferences derived from a battery of predictors contain systematic, group-related error. This systematic, group-related error will occur when the relationship between the criterion and the predictors differs in terms of intercept and or slopes, but this is ignored when deriving the criterion inferences (Theron, 2007). The extent to which clinical inferences are contaminated by systematic, group-related error can be statistically determined in essentially the same manner that predictive bias would be evaluated in the case of an actuarial prediction model (provided data for a sufficiently large[2] validation sample is available). If an actuarial prediction model suffers from predictive bias this can be easily corrected by adding ‘group’ as a main effect and/or in interaction with the weighted composite of predictors to the prediction model. However, if clinical criterion inferences would contain systematic, group-related error, the concern exists whether the clinical mind would be able to successfully adapt the manner in which it derives criterion estimates. The current study would contend that the clinical mind will find it distinctly more difficult to consistently add ‘group’ as a main effect and/or in interaction with the weighted composite of predictors to the clinical

[2] The sample size that would be required to evaluate clinical or mechanical criterion inferences for predictive bias via moderated multiple regression will be less than the sample that would be required to develop the actuarial prediction model.

prediction model. It could be argued that Meehl's (1954) finding that mechanical predictions trumped clinical predictions more often than not is due to the clinical mind finding it more difficult (relative to a statistical procedure like regression) to distil the nature of the criterion-predictor relationship and to consistently use that understanding of this relationship to predict criterion performance from information on the predictors. Problems with selection fairness occurs when the nature of the criterion-predictor relationship differs across groups, but this fact is ignored when deriving criterion estimates. When the nature of the criterion-predictor relationship differs across groups the challenge faced by the clinical mind is increased even further. Therefore, under conditions of predictive bias it seems reasonable to argue that it becomes even more likely that mechanical predictions will be more valid than clinical predictions.

1.4 THE NEED FOR A GENERIC NON-MANAGERIAL COMPETENCY MODEL AND ASSOCIATED ACTUARIAL PREDICTION MODEL

If it can be assumed that the connotative meaning of performance (Kerlinger & Lee, 2000) is not unique to specific managerial and non-managerial jobs, this opens up the possibility of developing generic managerial and non-managerial competency models. This is the case because it becomes easier to assemble a sufficiently large sample to convincingly empirically test the model. This in addition then also opens up the possibility of developing and validating generic managerial and non-managerial actuarial prediction models.

The question is whether industry should be expected to develop and empirically test explanatory structural models that explain variance in managerial and non-managerial performance. Myburgh (2013) argued that they should not. Moreover, Myburgh (2013) argued that the inability of the discipline of industrial psychology to develop a generic non-managerial performance model has let down the practice of industrial psychology. Myburgh (2013) consequently took the first step towards building a generic non-managerial structural competency model by proposing a performance structural model in which she mapped twelve generic non-managerial competencies on eight generic non-managerial outcomes. She, however, did not empirically test her proposed non-managerial performance model. She in addition developed and psychometrically evaluated the construct validity of the Generic Performance Questionnaire (GPQ). The GPQ attempts to assess the level of competence that employees in entry-level non-managerial positions achieve on the competencies that comprise the generic non-managerial performance construct (Myburgh & Theron, 2014).

1.5 RESEARCH OBJECTIVES

The objective of the current study is to continue with the research where Myburgh (2013) left off towards the development of a valid comprehensive non-managerial individual employee competency model. The primary objective of the current study is to re-examine the performance structural model proposed by Myburgh (2013), to modify the model if this is deemed necessary and empirically test the fit of the model as well as the statistical significance of the paths in the model (provided adequate fit has been achieved). Re-examining the performance structural model proposed by Myburgh (2013) entails reflecting on the question whether any critical competencies have been excluded from the model and whether any redundant or inappropriate competencies have been included. It further entails reflecting on the question whether critical outcomes have been excluded from the model and whether any redundant or inappropriate outcomes have been included. It lastly entails reflecting on the question whether any structural linkages are lacking in the current model and whether any of the existing paths should be removed.

Testing the generic non-managerial performance structural model in which the first-order competencies are structurally mapped on the outcome variables will require quite a large sample due to the large number of freed parameters in the comprehensive model. In addition, the discriminant validity of the GPQ provided reason for concern (Myburgh, 2013). The (potentially modified) generic non-managerial performance structural model developed by Myburgh (2013) will consequently be reduced by proposing and testing a second-order competency factor structure and structurally mapping these on the outcome variables (provided the second-order measurement model fits).

The objectives of the study consequently are to:

a) Critically re-examine Myburgh's (2013) constitutive definition of the generic performance construct as it applies to non-managerial, individual positions;
b) Adapt the Generic Performance Questionnaire (GPQ) developed by Myburgh (2013) to obtain self-rater assessments of the competencies comprising the generic, non-managerial, individual performance construct;

c) Develop a Generic Outcome Questionnaire (GOQ) to obtain self-rater assessments of the competencies comprising the generic, non-managerial, individual performance construct;
d) Evaluate the construct validity of the (revised) GCQ and the GOQ by evaluating the fit of the measurement models implied by the architecture of the instruments and the constitutive definition of the generic performance construct;
e) Develop and empirically test the fit of a second-order generic non-managerial competency measurement model;
f) Develop and empirically test the reduced generic non-managerial performance structural model that structurally maps the second-order competencies on the outcome variables.

1.6 OUTLINE OF THE STRUCTURE OF THE THESIS

The competencies and outcomes proposed by Myburgh (2013) are critically reviewed in Chapter 2. This chapter also investigates additional competencies and outcomes that warrant possible inclusion in the model. Furthermore, Chapter 2 also aimed to identify second-order latent behavioural competencies. Chapter 3 continues with the research methodology, which encompasses the substantive research hypothesis, the research design, the statistical hypotheses, the sampling procedures, the development of the GCQ and the GOQ, the statistical analyses that the study intended to perform and the evaluation of statistical assumptions. Chapter 4 provides an evaluation of research ethics, specifically informed consent and institutional permission. Chapter 5 offers the results of the psychometric evaluation of the generic non-managerial performance measure via item analysis, exploratory factor analysis and confirmatory factor analysis. Chapter 6 concludes with a discussion of the findings and recommendations for future research.

CHAPTER 2

CRITICAL REVIEW OF THE COMPETENCIES AND OUTCOMES INCLUDED IN THE MYBURGH NON-MANAGERIAL GENENERIC PERFORMANCE MODEL

2.1 INTRODUCTION

Myburgh (2013) argued that in its inability to develop a generic non-managerial performance model, the discipline of industrial psychology has let down the practice of industrial psychology. Consequently, Myburgh (2013) took the first step towards building a generic non-managerial structural competency model by proposing a performance structural model in which she mapped twelve generic non-managerial competencies on eight generic non-managerial outcomes and by developing and validating a Generic Performance Questionnaire (GPQ) to measure the twelve competencies. Re-examining the performance structural model proposed by Myburgh (2013) entails reflecting on the question whether any critical competencies have been excluded from the model and whether any redundant or inappropriate competencies have been included. It in addition entails reflecting on the question whether critical outcomes have been excluded from the model and whether any redundant or inappropriate outcomes have been included. It lastly entails reflecting on the question whether any structural linkages are lacking in the current model and whether any of the existing paths should be removed. Furthermore, testing Myburgh's (2013) proposed model in which the first-order competencies are mapped on the outcome variables will require a very large sample, because of the large number of freed parameters in the comprehensive model. This problem will be further aggravated if the current study would extend the current performance structural model in terms of additional competencies, outcomes and/or structural paths. The (potentially modified) generic non-managerial performance structural model developed by Myburgh (2013) consequently needs to be reduced by proposing and testing a second-order competency factor structure and structurally mapping these second-order competencies on the outcome variables and to test this reduced performance structural model (provided the second-order measurement model fits).

2.2 COMPETENCY MODELLING

An appropriate analogy to describe the current state of competency modelling would be the relationship between a parent and a teenager. Similar to the relationship between a parent and a teenager, competency modelling is marred by lexical confusion and palpable discord regarding best practice. To put it in perspective, researchers still do not agree on a definition of competencies and what the best way is to measure them (Shippmann et al., 2000). Furthermore, in the recent past some experts have maligned competency modelling, because of its, at times, questionable use by practitioners who had no formal training or education as psychologists. On the other hand, however, Shippmann et al. (2000) and Kurz and Bartram (2002) have witnessed increased rigour in the development of competency models, which has led to the use of competency modelling for various human resource and strategic applications.

Additionally, the semantic confusion stems from the different interpretations connected to competencies by authors in different countries and institutions. In Chapter 1 these interpretations have been broken down into two basic views. The first interpretation, which has its origins in the USA, views competencies as attributes that are causally related to success. The second interpretation, which has its origins in the UK, views competencies as bundles of behaviours that are causally related to success (Theron, 2016).

SHL's position on the core components of a competency model (Bartram, 2006) brought some order in the semantic confusion. For the purpose of the current study the following four domains are distinguished in a competency model:

- A competency potential domain of structurally inter-related person characteristics that are causally mapped;
- A competencies domain of structurally inter-related behaviours that are causally mapped;
- An outcomes domain of structurally inter-related outcomes that the job exists to achieve;
- A situational characteristics domain of structurally inter-related latent variables that characterise the context in which the employee has to display competence on the competencies.

In order to address some of the confusion surrounding competency modelling, a distinction needs to be made between competence and competency. Bartram (2006) notes that it is quite unfortunate that the words “competence” and “competency’ are so similar, because they describe two qualitatively different but nonetheless related constructs. In the current study, these two pivotal terms are interpreted as follows:

- Competence refers to whether the level of performance that an employee achieves on a competency or an outcome exceeds a specific critical value that reflects the standard that has been set
- Competencies refer to the abstract theme shared by bundles of related behaviour that, along with outcomes as the abstract theme in bundles of related results, constitute job performance

Furthermore, as was argued in Chapter 1, a competency model has typically been seen as a list of competencies or a number of competency lists connected to each other. The current study, however, interprets the term in a far more extensive manner. The interpretation used in the current study combines the distinction made by Saville and Holdsworth (Bartram, 2005) between competency potential, competencies, situational characteristics and outcomes as four domains of latent variables relevant to employee performance with the concept of a structural model (Diamantopoulos & Siguaw, 2000). A competency model is therefore defined in the current study as a four-domain structural model in which a structurally inter-related set of competency potential latent variables are structurally mapped onto a structurally inter-related set of latent competencies. These are in turn structurally mapped onto a set of structurally inter-related set of latent outcome variables. A structurally inter-related set of situational latent variables moderate the effect of competency potential on competencies, moderate the effect of competencies on outcomes and exert main effects on the latent variables comprising the other three domains.

For the purpose of the current study, research was restricted to the mapping of a structurally inter-related set of second-order generic non-managerial competencies on a nomological network of structurally interlinked set of outcome latent variables for which non-managerial employees are typically held accountable, based on the non-managerial performance structural model (see Figure 2.1) proposed by Myburgh (2013).

2.3 REVIEW OF MYBURGH'S PROPOSED COMPETENCIES

Myburgh (2013) proposed twelve first-order generic non-managerial competencies that made up the baseline structure of her generic performance model for non-managerial personnel depicted in Figure 2.1. The twelve competencies were obtained by reviewing a number of performance models, including:

- Campbells' eight-factor hierarchical performance model (1990)
- Hunt's nine-factor model of entry-level job performance (1996)
- Bartram's big eight competency model (2002)
- Schepers' Work Performance Questionnaire (2003)

Table 2.1 provides a summary of the twelve first-order competencies proposed by Myburgh (2013). The rationale offered by Myburgh (2013) for the inclusion of the twelve competencies identified was reviewed and, where necessary, amended.

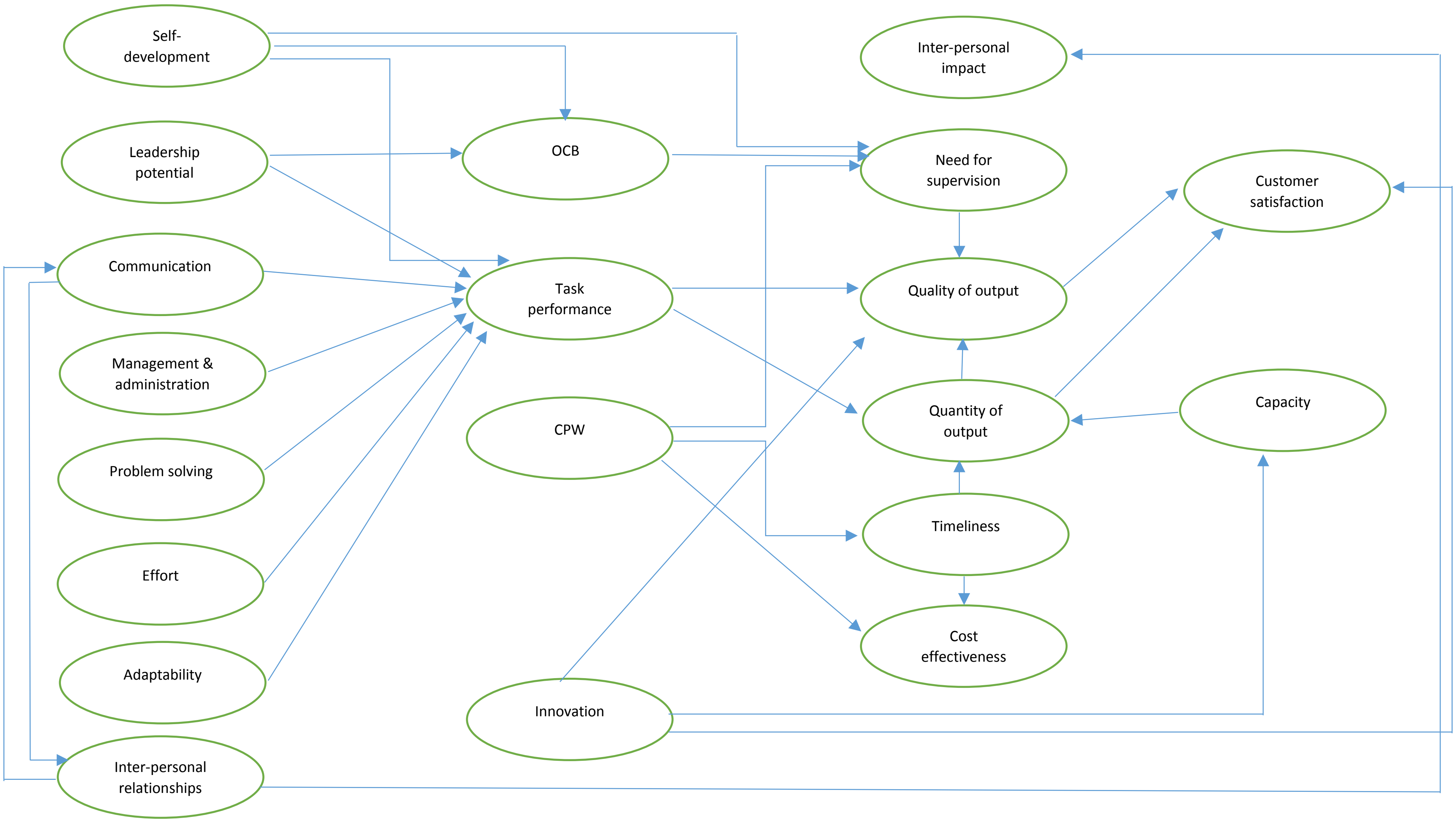

Figure 2. 1 Myburgh's proposed generic non-managerial individual performance structural model

Table 2. 1

Myburgh's summary of the performance dimensions included in her proposed generic non-managerial performance model"

Dimension Number	First-order Dimension Name	First-order Dimension Definition
1	Task performance[3]	The extent to which the employee effectively performs activities that contribute to the organisation's technical core, performs the foundational, substantive or technical tasks that are essential for a specific job effectively, successfully completes role activities prescribed in the job description and achieves personal work objectives.
2	Effort	The extent to which the employee devotes constant attention towards his work, uses resources like time and care in order to be effective on the job, shows willingness to keep working under detrimental conditions and spends the extra effort required for the task.
3	Adaptability	The extent to which the employee adapts and responds effectively in situations where change is inevitable, manages pressure effectively and copes well with setbacks, shows willingness to change his/her schedules in order to accommodate demands at work.
4	Innovating	The extent to which the employee displays creativity, not only in his/her individual job but also on behalf of the whole organisation, shows openness to new ideas and experiences, handles novel situations and problems with innovation and creativity, thinks

[3] Myburgh (2013, p. 70) also included the following in her summary definition of the task competency: "core task productivity is defined as the quantity or volume of work produced and describes the ratio inputs in relation to the outcomes achieved." The current study chose to exclude this formulation because it refers to a latent outcome variable rather than a competency.

		broadly and strategically, supports and drives organisational change
5	Leadership potential	The extent to which the employee empowers others, brings out extra performance in other employees, supports peers, helping them with challenges they face, motivates and inspires other employees, models appropriate behaviour, initiates action, provides direction and takes responsibility.
6	Communication	The extent to which the employee communicates well in writing and orally, networks effectively, successfully persuades and influences others, relates to others in a confident and relaxed manner.
7	Interpersonal relations	The extent to which the employee relates well with others, interacts on a social level with colleagues and gets along with other employees, displays pro-social behaviours, cooperates and collaborates with colleagues, displays solidarity with colleagues, supports others, shows respect and positive regard for colleagues, acts in a consistent manner with clear personal values that compliment those of the organisation.
8	Management	The extent to which the employee plans ahead and works in a systematic and organised way, follows directions and procedures, articulates goals for the unit, organises people and resources, monitors progress, helps to solve problems and to overcome crises, effectively coordinates different work roles.
9	Analysing and problem-solving	The extent to which the employee applies analytical thinking in the job situation, identifies the core issues in complex situations and problems, learns and utilises new technology, resolving problems in a logical and systematic way, behaves intelligently, making decisions through by deducing the

		appropriate option from available information
10	Counterproductive work behaviour	The extent to which the employee displays behaviour that threatens the wellbeing of an organisation, shows unwillingness to comply with organisational rules, interprets organisational expectations incorrectly, fails to maintain personal discipline, is absent from work, not punctual, steals, misuses drugs, displays confrontational attitudes towards co-workers, supervisors, and work itself, his/her behaviour hinders the accomplishment of organisational goals.
11	Organisational citizenship behaviour	The extent to which the employee displays voluntary behaviour contributing towards the overall effectiveness of the organisation, volunteers to carry out task activities that are not formally part of his/her job description, follows organisational rules and procedures, endorses, supports, and defends organisational objectives, shows willingness to go the extra mile, voluntarily helps colleagues with work, shows willingness to tolerate inconveniences and impositions of work without complaining, is actively constructively involved in organisational affairs.
12	Self-development	The extent to which the employee takes responsibility for his/her own career development, works on the development of job relevant competency potential and competencies, seeks opportunities for self-development and career advancement.

(Myburgh, 2013, p. 70)

2.3.1 TASK PERFORMANCE

Jobs are created to achieve a specific objective – to produce a product or a service or some component thereof for a specific market of consumers or clients. Every job comprises specific tasks that are instrumental in achieving the outcomes for which the job has been created. The current study defines a job as a set of inter-related behavioural tasks, constraints and opportunities necessary for the delivery of a product or service (Myburgh, 2013). Some of these behavioural tasks are unique to a specific position, whereas others are more generally applicable across different positions. Myburgh (2013) argues that the first aspect of any employee's performance that should be considered is the level of competence shown in the completion of these job-specific and non-job-specific behavioural tasks. Since *task performance* is the headline act of any job, the inclusion of such a measure is a necessity. Myburgh (2013) mentions that employees primarily receive compensation for their contribution towards the completion of specific tasks. Furthermore, Myburgh (2013) argues that the *quality and quantity* of the product or service delivered, is dependent on the level of competence with which an employee completes his/her behavioural job tasks.

2.3.2 EFFORT

Myburgh (2013) describes *effort* as the time and care the employee uses to complete specific tasks, coupled with the willingness to keep working under detrimental conditions. Myburgh (2013) hypothesised that the amount of resources (e.g. attention, time, care) the employee invests to complete a task, should affect the *quality and quantity of the output*. She, however, hypothesised that the effect of *effort* on the *quantity and quality of output* would not be direct but would instead be mediated by the level of *task performance*. Consequently, the intensity and perseverance with which employees approach job-specific and non-job-specific behavioural tasks is expected to indirectly, via its impact on *task performance*, impact the *quality and quantity of their output* Myburgh (2013).

2.3.3 ADAPTABILITY

The unpredictability of the modern work environment has a direct impact on employees' ability to complete their tasks (*task performance*) (Myburgh, 2013). With this in mind, the ability to adapt to short-term change is crucial. The same principle is applicable to long-term systemic change taking place in the external and internal environment. For organisations to be successful, they need to be able to anticipate and adapt to short-term change as well as long-term systemic change (Myburgh, 2013). Consequently, the implication for employees is that they need to be able to exhibit behavioural flexibility and behavioural *adaptability* to change (Myburgh, 2013).

Lastly, Myburgh (2013) hypothesises that this competency can be expected to positively impact on the latent *task performance* dimension, even more so if the environment within which the organisation exists can be characterised as complex and dynamic[4].

2.3.4 INNOVATING

Innovation is another key requirement for sustained competitiveness within an ever-changing business environment. Organisations are forced to revaluate and reinvent the products and services they deliver to the market (Myburgh, 2013). That being said, for an organisation to be truly innovative, creativity and innovative change should stem not only from the top of the organisational hierarchy but should be diffused throughout the organisation (Myburgh, 2013). True competitive advantage, that is difficult to imitate and to causally explain, lies in the innovative behaviour of individual employees (Myburgh, 2013). Myburgh (2013) therefore argued that employees should be expected to display corporate entrepreneurship and come up with creative ideas and different ways of doing things, which would ultimately contribute to organisational success. Myburgh (2013) hypothesised that *innovating* should positively influence the latent outcome variable *customer satisfaction* and *organisational capacity* (Myburgh, 2013). Myburgh (2013) interpreted organisational capacity as wealth of resources available to the organisation.

2.3.5 SELF-DEVELOPMENT

The development of personnel is a key component in any organisation's strategy for sustained success. The primary focus of personnel development is to improve employee *task performance* (Myburgh, 2013). Many non-managerial jobs have mandatory development programs. The disadvantage of such programmes is that the individual employee is not making a proactive effort to improve her-/himself. It would be preferable that the organisation does not take sole responsibility for employee development. The ideal would be that individual employees should take responsibility for their own development. S*elf-development* can be described as the initiative to seek opportunities for growth and improvement in performance (Myburgh, 2013). Myburgh (2013) predicted that this latent performance dimension would impact positively on the

[4] It is acknowledged that an *environmental dynamism x adaptability* interaction effect on *task performance* is thereby implied that is not reflected in Figure 2.1

task performance dimension as well as on the *need for supervision* outcome variable. Furthermore, she also hypothesised that self-development should positively impact on the *organisational citizenship behaviou*r dimension of performance (Myburgh, 2013).

2.3.6 LEADERSHIP POTENTIAL

Myburgh (2013) acknowledges that the question whether leadership should be included in a generic performance model of non-managerial individual job performance is a contentious one. The reasoning behind the inclusion of the *leadership potential* dimension is based on the notion that the globalisation of the business environment has increased the importance of human capital and in order for organisations to get the most out of their human capital, their human capital needs to be empowered and inspired in order to reach their potential (Myburgh, 2013). Employees that show the potential to inspire others, model the appropriate behaviour and who have the ability to take ownership of their tasks will be able to perform at a higher level than employees who do not exhibit such behaviour (Myburgh, 2013). With this in mind, the inclusion of the leadership dimension is justified. It is important to remember that leadership as defined in this dimension will not only influence the performance of the individual in question, but it will also influence the performance of peers. This dimension was hypothesised to have a positive impact on *task performance* and *organisational citizenship behaviour* (Myburgh, 2013).

2.3.7 COMMUNICATION

The inter-dependent nature of organisations make *communication* a very influential determinant of organisational and individual success. For this reason, vertical as well as horizontal communication between employees is extremely important (Myburgh, 2013). Furthermore, the importance of *communication* is compounded the more modern (organic) the organisation structure becomes (Myburgh, 2013). However, this is also dependent on the characteristics of the external environment in which the organisation functions (Myburgh (2013). The more complex and dynamic the environment becomes, the more important an organic structure becomes and consequently the more important *communication* becomes.[5] The *communication* performance dimension encompasses both written and verbal domains. The

[5] It is acknowledged that an *environmental dynamism x communication* interaction effect on *task performance* is thereby implied that is not reflected in Figure 2.1.

communication performance dimension was hypothesised to impact positively on the *task performance* dimension (Myburgh, 2013).

2.3.8 INTER-PERSONAL RELATIONS

The argument for the inclusion of the *interpersonal relations* dimension is very similar to the argument regarding the *communication* dimension. The interdependent nature of organisations makes it extremely difficult for employees to achieve their outcomes if they are in conflict with their co-workers or if they have been ostracised by their co-workers and have to work in isolation. The quality of interpersonal interactions has a substantial influence on organisational functioning (Myburgh, 2013). Employees need to be able to relate to their colleagues, display consideration and socially acceptable behaviour. Myburgh (2013) hypothesised that performance on the *interpersonal relations* dimension should have a positive impact on the *task performance* dimension, mediated by the *communication* dimension and should positively impact the *inter-personal* outcome variable. Myburgh (2013) also hypothesised that a reciprocal structural relation should exist between the *communication* dimension and the *inter-personal relations* dimension.

2.3.9 MANAGEMENT

Almost any non-managerial position would require some form of planning, organising, coordinating and monitoring by the incumbent if he/she is to be successful (Myburgh, 2013). In spite of the fact that these functions are more commonly associated with managerial positions, if employees are able to ease their superior's managerial burden by being proactive and showing initiative, they would be considered successful (Myburgh, 2013). Myburgh (2013) hypothesised that performance on this *management* dimension would positively affect *task performance*.

2.3.10 ANALYSING AND PROBLEM-SOLVING

Almost any non-managerial position would require some form of problem-solving (Myburgh, 2013). The problem-solving performance dimension becomes increasingly important with progression up the organisational hierarchy (Myburgh, 2013). Performing a job can never be reduced to a limited number of familiar and established routines in response to familiar cues. The nature of the modern work environment necessitates problem-solving, because employees are inevitably confronted with new and unfamiliar problems on a day to day basis. In order to solve these problems, crystallised knowledge has to be transferred onto the problems (Myburgh, 2013). It was hypothesised that performance on this *analysing and problem-solving* dimension should positively impact the *task performance* dimension (Myburgh, 2013).

2.3.11 COUNTERPRODUCTIVE WORK BEHAVIOUR

The larger organisation, in which the jobs occupied by individual employees are imbedded, poses specific contextual behavioural expectations to these employees. Employees are required to comply with work-related organisational rules and to abstain from displaying behaviours that would negatively affect the organisation and its employees (Myburgh, 2013). *Counterproductive work behaviour* (CWB) refers to employee behaviour that does not comply with work-related organisational rules and/or that negatively affects the organisation and its employees. *Counterproductive work behaviour* (CWB) includes theft, unruliness, drug misuse, non-compliance with organisational rules, personal indiscipline, unauthorised absenteeism and social loafing (Myburgh, 2013). Myburgh (2013) hypothesised that *counterproductive work behaviour* should impact negatively on the *task performance* dimension as well as the *timeliness* outcome variable and to impact positively on the *need for supervision* outcome.

2.3.12 ORGANISATIONAL CITIZENSHIP BEHAVIOR

The specific contextual behavioural expectations that the larger organisation poses however, goes further than simply staying out of trouble. The employee is expected, to also display *organisational citizenship behaviour* (OCB). *Organisational citizenship behaviour* is best described as constructive, non-prescribed behaviour that contributes to the task performance of co-workers, facilitates the task of the leader and contributes to organisational success (Myburgh, 2013). The role that the organisation would want employees to play cannot be fully prescribed in their job descriptions. *Organisational citizenship behaviour* therefore refers to all the constructive non-prescribed activities that benefit the organisation and its members and that the organisation would like their employees to display (Myburgh, 2013). Myburgh (2013) hypothesised that *organisational citizenship behaviour* should negatively impact on the *need for supervision* outcome variable.

2.4 REVIEW OF ADDITIONAL COMPETENCES

The competencies proposed by Myburgh (2013) all justify inclusion in the generic non-managerial performance model, but it would be short-sighted not to investigate the possibility that her model might still be deficient and that there are additional competencies that deserve to be added the model.

2.4.1 EMPLOYEE GREEN BEHAVIOUR

The purpose of organisations is to combine and transform limited factors of production into products and services that the market values. Organisations do this because it offers the possibility of earning profit. Whether organisations successfully serve society in a rational manner can be judged by their profitability. Profit therefore serves as the incentive to serve society and as the barometer of the extent to which organisations succeed in doing so. Profitability, although a necessary condition for organisations to serve society in a rational manner, is not a sufficient criterion to evaluate whether organisations successfully serve society. Slaper and Hall (2011) identify two additional performance dimensions that should be mobilised to evaluate the success with which organisations serve society, based on the triple bottom line (TBL) concept proposed by John Elkington. In terms of the TBL the success with which organisations serve society should be evaluated in terms of profit, people and planet (Slaper & Hall, 2011).

Organisations are subsystems that form part of a bigger supra system, in which they are mutually dependent on each other. The TBL can be thought of as *provisos* under which organisations as subsystems have negotiated the right to utilise the limited resources of society. If any of these *provisos* are violated, punitive sanctions from the larger system threaten the sustainability of the subsystem.

Over the last thirty years the business environment has gone through fundamental changes. This is partly due to the fact that organisations have started to give recognition to the interconnectedness of economic, social and environmental sustainability and its impact on long term organisational sustainability (Ones & Dilchert, 2013). In the past, organisations behaved as if the resources offered by the planet earth are unlimited, or at least easily replenished. The focus was on short-term achievements and little long-term concern existed for the environment and the protection of the planet's resources. Over the last thirty years, there has been growing awareness that the earth does not have unlimited natural resources and that the current rate at which the earth's resources are exploited is not sustainable (Jowit, 2008). The economic activity of organisations has a big impact on the depletion of the earth's natural resources. Organisations are in essence fouling their own nest. The argument therefore presents a simple but inconvenient truth: if mankind is unable to survive because of self-inflicted resource shortages (food, water etc.) there will be no people left to run businesses or to conduct business with. With this in mind, organisations have started to view organisational environmental performance in a similar manner as economic performance (Ones & Dilchert, 2013).

Organisational performance is an expression of the collective performance of its employees, therefore organisations would not be able the reach their environmental sustainability goals if their employees do not exhibit the appropriate behaviour. For this reason, the inclusion of *employee green behaviour* in models of individual job performance is a necessity. *Employee green behaviour* can be defined as "scalable actions and behaviours that employees engage in that are linked with and contribute to or detract from environmental sustainability "(Ones & Dilchert, 2012, p. 87). Employee green behaviour is conceptualised as a multidimensional construct. To clarify the connotative meaning of the construct Ones and Dilchert (2012) created the Green Five taxonomy (Table 2.2), which explicates the dimensions that constitute *employee green behaviour*.

Table 2. 2

Green Five Taxonomy

GREEN FIVE CATEGORY	WHAT IT CONSTITUTES
Avoiding harm	• Preventing pollution • Monitoring environmental impact • Strengthening ecosystems

Table 2. 3

Green Five Taxonomy (continued)

GREEN FIVE CATEGORY	WHAT IT CONSTITUTES
Conserving	• Reducing use • Reusing • Repurposing • Recycling
Working sustainably	• Changing how work is done • Choosing responsible alternatives • Creating sustainable products and processes • Embracing innovation for sustainability
Influencing others	• Empowering and supporting others • Educating and training for sustainability
Taking initiative	• Putting environmental interests first • Initiating programs and policies • Lobbying and activism

It is not universally accepted that *employee green behaviour* should be seen as a distinct behavioural competency that, together with other competencies, constitutes employee performance (Ones & Dilchert, 2012; Ones & Dilchert, 2013). Ones and Dilchert (2013) argue that *employee green behaviour* should rather be seen as a focus area or a specific context in which other competencies are displayed. From this theoretical perspective, *employee green behaviour* can therefore form part of *task performance*, *organisational citizenship behaviour* and *counterproductive work behaviour* (Ones & Dilchert, 2012; Ones & Dilchert, 2013). According to this alternative position *employee green behaviour* will form part of *task performance* in an industry or organisation where employee green behaviours are part of the core requirements of a job (Ones & Dilchert, 2013). Where *employee green behaviour* is not viewed as an integral part of the core job requirements, but still contributes to the organisation's performance in a holistic sense, the alternative position would hold that *employee* *green behaviour* forms part of *organisational citizenship behaviour*. Lastly, the definition of *employee green behaviour* also mentions activities that detract from environmental sustainability. In terms of the alternative position advocated by Ones and Dilchert (2012; 2013) these activities (polluting, not recycling etc.) form part of the *counterproductive work behaviour domain* (Ones & Dilchert, 2013). The current study, however, differs from the position put forward by Ones and Dilchert (2012; 2013) in that it conceptualises *employee green behaviour* as a qualitatively distinct behavioural competency on which all employees in all organisations are expected to display competence in the long-term interest of the planet.

2.5 REVIEW OF MYBURGH'S PROPOSED OUTCOMES

Myburgh (2013) based the outcomes in the generic individual performance model that she proposed on the six latent performance outcomes identified by Bernardin and Beatty (1984). In contrast to most authors (Bartram, 2005; Campbell, 1991; Viswesvaran and Ones, 2000) who place the emphasis on behaviour, Bernardin and Beatty (1984) interpret performance in terms of the consequences of the behaviours. Visveswaran and Ones (2000, p. 222) explain Bernardin and Beatty's (1984) position as follows:

> Bernardin and Beatty (1984), define performance as the record of outcomes produced on a specific job function or activity during a specified time period.

The definition of performance used by Bernardin and Beatty (1984) is more focused on the performance outcomes reached which resulted in the use of their performance dimensions as outcome variables. These outcomes, as well as possible additional outcomes, will be discussed.

2.5.1 PROPOSED OUTCOMES

The latent performance outcomes identified by Bernardin and Beatty are:

- "Quality: The degree to which the process or result of carrying out an activity approaches perfection, in terms of either conforming to some ideal way of performing the activity or fulfilling the activity's intended purpose.
- Quantity: The amount produced, expressed in such terms as dollar value, number of units, or number of completed activity cycles.
- Timeliness: The degree to which an activity is completed, or a result produced, at the earliest time desirable from standpoints of both

coordinating with the outputs of others and maximising the time available for other activities.

- Cost-effectiveness: The degree to which the use of the organisation's resources (e.g. human, monetary, technological, material) is maximised in the sense of getting the highest gain or reduction in loss from each unit or instance of use of a resource.
- Need for supervision: The degree to which a performer can carry out a job function without either having to request supervisory assistance or requiring supervisory intervention to prevent an adverse outcome.
- Interpersonal impact: The degree to which a performer promotes feelings of self-esteem, goodwill, and cooperativeness among co-workers and subordinates."

(Bernadin & Russel; 1998, p. 243)

Myburgh (2013) stressed the importance of understanding the causal interrelationships between the six latent outcome variables. It is generally understood that if an organisation is to be successful the performance of employees should serve organisational strategy on an individual and a collective level (Myburgh, 2013). Organisational strategy requires certain standards of performance on each of the latent outcome variable for which the job exists. Organisational strategy is only really met when an employee achieves the standard of performance that has been set for all the latent outcome variables. Myburgh (2013, p. 41) used the following example:

> A task performed in accordance with the quality and quantity standards but not performed in accordance with the required time frame may not contribute towards reaching the organisation's strategic objective if prompt, high-quality mass production is the strategic intent of the organisation.

To ensure that the performance standards set for each latent outcome variable are met, the structural relationships existing between the latent outcome variables, between the behavioural competencies and between the behavioural competencies and the latent outcome variables should be properly understood. In order to achieve the set outcome standards, employees need to achieve a certain level of performance on the behavioural competencies that are structurally linked to the outcomes. The performance construct encompasses the structurally interlinked behavioural competencies and the latent outcome variables. To obtain a comprehensive appraisal of an employee's performance both the latent behavioural competencies and the latent outcome variables should therefore be measured. A valid understanding of any specific employee's performance cannot be obtained by looking at the measures obtained on the individual behavioural competencies and outcome variables in isolation. A valid understanding of any specific employee's performance lies in the structurally inter-related pattern of values across the whole network of structurally interlinked performance latent variables (Cilliers, 1998).

Moreover, the competency potential latent variables and the situational latent variables determining the level of competence on the behavioural competencies, and the manner in which they structurally combine, should be validly understood. Only if these conditions are met will it be possible to rationally and purposefully improve performance on those latent outcome variables where performance falls below the set outcome standards.

Myburgh (2013) also included *customer satisfaction* and *capacity* as latent outcome variables in the non-managerial performance structural model she proposed. However, she only mentioned customer satisfaction as a possible outcome variable once and did not provide a definition. *Customer satisfaction* in the current study is defined as the degree to which the product or service for which the job exists meets the expectations of the customers. *Customer satisfactio*n was hypothesised to be positively influenced by the *quality and quantity of output outcome variables* as well the *interpersonal-relations* competency dimension.

Myburgh (2013) interprets *capacity* as the wealth of the resources available to the organisation. The current study disagrees with Myburgh (2013) and argues that capacity should rather be interpreted as the wealth of job resources available to the individual. Bakker and Demerouti (2014) conceptualise job resources as organisational and job characteristics that provide the employee with physical, psychological, social or organisational support that assist in achieving work goals, reduce job demands and stimulate personal growth, learning and development. These include, inter alia, advancement, knowledge, appreciation, autonomy and financial rewards (Schaufeli & Taris, 2014). Used in this manner the term essentially corresponds to the definition provided by Spangenberg and Theron (2004, p. 23) when the term is used to refer to the wealth of the resources available to the organisational unit, "*Capacity* (wealth of resources) reflects the internal strength of the unit, including financial resources, profits and investment; physical assets and materials supply; and quality and diversity of staff."

It is true that there exists a leading and lagging structural order between latent outcome variables in which latent outcome variables that are positioned causally higher up in the nomological chain affect latent outcome variables that are positioned further "down-stream". Every latent variable that is influenced by an outcome variable should, however, not thereby be conceptualised as necessarily falling in the outcome domain. Latent outcome variables also influence the level of latent variables falling in the situational latent variable domain and in the competency potential domain via feedback loops. In the process of identifying additional latent outcome variables that are directly or indirectly affected by the level of competence achieved on the latent competencies it therefore becomes crucially important to decide whether such latent variables really belong in the outcome domain of the competency model. Given the manner in which the current study conceptualised *capacity* as a job resource, it suggests that capacity should not be treated as a latent outcome variable but rather as a situational latent variable in subsequent models.

Myburgh (2013, p. 42) expressed the need to include more latent outcome variables in the outcome domain and argued that:

> …it should be kept in mind that employees do not display specific work-related behaviours solely to achieve strategically important institutional outcomes. These work behaviours also serve individual outcomes that are valued by the employee. Employee satisfaction and some of the latent outcome variables listed above as relevant to the organisation (psychological empowerment, engagement organisational commitment) are examples of individual criteria.
>
> Moreover, the individual criteria in terms of which the employee would evaluate his/her satisfaction with his/her performance (Lofquist & Dawis, 1978) are of importance because they are structurally related to the institutional outcome criteria in terms of which the organisation would evaluate the satisfactoriness of an employee's work behaviour.

Although her argument is sound, the latent variables she refers to as individual outcomes are actually competency potential variables. According to Bartram (2006, p. 4) competency potential variables are: "the individual attributes necessary for someone to produce the desired behaviours." In other words, they are motives, personality traits, values, psychological states and cognitive abilities needed to achieve a desired outcome. The latent variables she refers to as individual outcomes should therefore rather be included in a future study as latent competency potential variables that are influenced via a feedback loop from the outcome latent variables.

2.5.2 REVIEW OF ADDITIONAL LATENT OUTCOME VARIABLES

Two additional latent outcome variables have been identified for inclusion in the outcome domain in the current study, namely, *market reputation* and *environmental impact*.

2.5.2.1 ENVIRONMENTAL IMPACT

The inclusion of the *employee green behaviour* competency (see paragraph 2.4.1 above) logically necessitates the inclusion of the *environmental impact* outcome variable. *Employee green behaviour* is required from every employee in the organisation, not as an objective in and by itself but rather to reduce the negative economic footprint of mankind on the planet. If there is not a corresponding outcome for the *employee green behaviour* competency, the latent outcome variables will not provide a sufficiently comprehensive coverage of the outcome performance domain. *Environmental impact* generally refers to the impact on the environment by organisations/industries via the creation of a product or the delivery of a service. In other words, *environmental impact* refers to the adverse effects on the environment caused by the functioning of organisations/industries. Ultimately *employee green behaviour,* as displayed by an organisation's employees collectively, is a necessary but not sufficient condition to control *environmental impact* via the five second-order factors constituting *employee green behaviour*. The level of competence that an individual employee achieves, however, cannot be expected to affect e*nvironmental impact.* Moreover, *environmental impact* in the foregoing sense is a variable that describes the performance of the employee collective and not the individual employee. In the case of the individual, e*nvironmental impact* refers to the impact on the environment that an individual employee has. *Employee green behaviour* is hypothesised to have a direct positive impact on *environmental impact.*

2.5.2.2 MARKET REPUTATION

Market reputation has also been identified as an additional outcome variable. *Market reputation* is based on the market share/scope/standing dimension of the unit performance construct conceptualised by Henning, Theron and Spangenberg (2004). Henning et al's. (2004, p. 28) definition of this dimension, "includes, market share (if applicable), standing, competitiveness and market-directed diversity of products or services, customer satisfaction and reputation for adding value to the organisation." For the purpose of this study it was decided to adapt their definition to individual performance. Therefore, the current study interprets *market reputation* as the manner in which an individual employee is perceived by co-workers, superiors and customers in terms of the quality and quantity of his work, his/her contribution to the overall competitiveness of the organisation and how these manifests in a reputation. *Market reputation* is seen as a viable outcome variable, because an individuals' standing in an organisation determines endorsements from colleagues, future career advancement, possible development opportunities as well as employee morale. In other words, if employees feel that a colleague's performance does not meet the required standards, it can have an adverse effect on team morale. A bad reputation could mean losing potential customers and can limit career advancement opportunities. *Quality of outputs, quantity of outputs* and *timeliness* are therefore hypothesised to have a direct positive impact on *market reputation.*

2.6 THE IDENTIFICATION OF SECOND ORDER LATENT BEHAVIOURAL COMPETENCIES

Empirically evaluating the fit of the structural model depicted in Figure 2.1 would require a large sample due to the number of freed model parameters involved. The problem is further aggravated by the addition of further competencies and outcome variables in the current study. In order to increase the practical feasibility of the study, it was decided to reduce the number of behavioural competencies by identifying second-order behavioural competencies and to map these on the latent outcome variables.

To identify the second-order behavioural competencies, two approaches were followed. The first was to qualitatively search for higher-order themes shared by first-order competencies, given their constitutive definitions. The second was to quantitatively search for higher-order themes shared by first-order competencies through exploratory factor analysis on the thirteen first-order competencies. The resultant Botes-Myburgh reduced generic non-managerial individual performance dimensions are identified and defined in Table 2.10.

2.6.1 THE QUALITATIVE IDENTIFICATION OF SECOND ORDER LATENT BEHAVIOURAL COMPETENCIES

Five higher-order themes were identified from the constitutive definitions of the thirteen[6] first-order competencies.

2.6.1.1 TASK EFFORT

The *task effort* second-order behavioural competency encompasses the *task performance* and *effort* first order behavioural competencies. The *task effort* second-order behavioural competency is defined as the time, care and attention an employee devotes to effectively perform the tasks that are essential for a specific job and that contributes to the organisation's technical core, successfully completes role activities described in the job description, even under detrimental conditions, and achieves personal work objectives.

2.6.1.2 PERSONAL GROWTH

Due to the unpredictable nature of the world of work employees are constantly confronted with problems and situations that cannot always be foreseen. The landscape is fast-paced and keeps on changing. Employees therefore continuously have to develop themselves, adapt and solve problems in innovative ways. The personal *growth* second-order competency encompasses the *self-development*, *problem-solving*, *adaptability* and *innovation* first-order competencies. It can be described as the extent to which employees take up the responsibility for their own development and the extent to which they utilise problem situations, opportunities to display creativity and confrontation with new ideas to learn and grow. The personal growth second-order competency acknowledges that there is no sharp divide between classroom learning and the action learning that occurs when prior knowledge is transferred onto novel problems (De Goede & Theron, 2010; Taylor, 1992).

[6] The thirteen first-order competencies comprise the twelve competencies proposed by Myburgh (2013) and the one additional competency proposed by the current study.

2.6.1.3 ORGANISATION-DIRECTED BEHAVIOUR

Organisational citizenship behaviour, *counterproductive work behaviour* and *employee green behaviour* are included in the *organisation-directed behaviour* second-order competency. It is described as employees' non-prescribed contribution to the organisation and rule compliance. This encompasses behaviours that benefit or harm the organisation, its employees and the environment within which the organisation operates. It includes voluntary behaviours (behaviours not formally stipulated) by employees that contribute to the overall effectiveness of the organisation, endorsement and support of organisational objectives, helping of colleagues, willingness to go the extra mile and abiding by the organisation's rules and procedures. At the same time, it includes behaviours that threaten the well-being of an organisation as well as the failure to maintain personal discipline, absenteeism, confrontational behaviour towards colleagues, theft, drug misuse, unwillingness to comply with organisational rules. Lastly, it also includes behaviours that contribute to or detract (OCB/CPW) from environment sustainability such as dumping, recycling etc.

This line of reasoning agrees with the suggestion made by Sackett and DeVore (2001) that, for some purposes, it may be useful to create an OCB–CWB composite and that this is permissible even if OCB and CWB are not that highly related.

2.6.1.4 COMMUNICATION AND INTERPERSONAL RELATIONSHIPS

This second order competency consists of the *communication* and *inter-personal relationships* first-order competencies. It is defined as the how well an employee communicates with others in any type of inter-personal communication: written/oral and professional/social. It includes how well employees network, persuade and influence others, relate to co-workers, display pro-social behaviour and act in a manner consistent with personal values that compliment those of the organisation.

2.6.1.5 LEADERSHIP AND MANAGEMENT

Leadership potential and *management* both load on the *leadership and management* second-order performance dimension. It can be described as the extent to which employees empower others, support peers, articulate goals for the unit, organise people and resources, provide direction and take responsibility; plan ahead and work in a systematic and organised way.

2.6.2 THE QUANTITATIVE IDENTIFICATION OF THE SECOND-ORDER LATENT BEHAVIOURAL COMPETENCIES

Rather than qualitatively examining the constitutive definitions of the thirteen latent behavioural competencies to identify common higher-order themes shared by the first-order competencies, dimension scores were calculated for each of the twelve first-order competencies measured by Myburgh (2013) via her GPQ, and the 12 x 12 inter-dimension correlation matrix calculated. The correlation matrix is shown in Table 2.3.

Table 2. 4

Inter-dimension correlation matrix calculated for the twelve GPQ dimensions.

	TASKP	EFFORT	ADAPT	INNO	LEADP	COMM	INTER	MANAGE	ANAPROB	CWB	OCB	SELFD
TASKP	1.000	.683	.639	.612	.563	.590	.553	.638	.604	.548	.579	.419
EFFORT	.683	1.000	.584	.571	.603	.595	.671	.642	.624	.561	.668	.438
ADAPT	.639	.584	1.000	.741	.548	.574	.520	.636	.600	.415	.558	.397
INNO	.612	.571	.741	1.000	.632	.638	.515	.604	.651	.428	.549	.411
LEADP	.563	.603	.548	.632	1.000	.670	.671	.662	.631	.545	.741	.536
COMM	.590	.595	.574	.638	.670	1.000	.642	.671	.709	.496	.629	.586
INTER	.553	.671	.520	.515	.671	.642	1.000	.658	.558	.728	.724	.414
MANAGE	.638	.642	.636	.604	.662	.671	.658	1.000	.725	.618	.712	.584
ANAPROB	.604	.624	.600	.651	.631	.709	.558	.725	1.000	.542	.665	.576
CWB	.548	.561	.415	.428	.545	.496	.728	.618	.542	1.000	.687	.458
OCB	.579	.668	.558	.549	.741	.629	.724	.712	.665	.687	1.000	.492
SELFD	.419	.438	.397	.411	.536	.586	.414	.584	.576	.458	.492	1.000

Myburgh (2013) did calculate the Φ matrix to evaluate the discriminant validity of the GPQ. She did not, however, calculate the observed score inter-dimension correlation matrix and neither did she factor analyse either matrix. To quantitatively examine the question how many second-order competencies underly the thirteen first-order competencies, the inter-dimension correlation matrix calculated from Myburgh's (2013) data was factor analysed.

2.6.2.1 EXPLORATORY FACTOR ANALYSIS (ONE-FACTOR SOLUTION)

SPSS 23 (SPSS, 2016) was used to perform principal axis factor analysis with oblique rotation on the correlation matrix shown in Table 2.3 using the default eigenvalue-greater-than-one rule to determine the number of factors that are extracted. The results of the factor analysis are shown in Table 2.4. Only one factor was extracted with eigenvalue greater than one. The scree plot also indicates the extraction of a single factor. This suggests that one second-order factor is required to explain the observed correlations between the twelve behavioural competencies measured by the subscales of the GPQ. All the dimensions have satisfactory loadings on the single factor (λ_{i1}>.5) (see Table 2.5).

Table 2. 5

Factor analysis for the twelve GPQ dimensions.

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Factor	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.555	62.959	62.959	7.165	59.708	59.708
2	.884	7.368	70.328			
3	.753	6.276	76.604			
4	.501	4.179	80.783			
5	.408	3.404	84.186			
6	.360	2.998	87.184			
7	.349	2.912	90.096			
8	.319	2.658	92.754			
9	.290	2.419	95.173			
10	.232	1.935	97.109			
11	.191	1.595	98.703			
12	.156	1.297	100.000			

As shown in Table 2.5 (below) the finding of a single-factor factor structure was disappointing. It reduced the number of first-order behavioural competencies too aggressively to still allow a fruitful but more parsimonious generic non-managerial performance structural model.

Table 2. 6

Single-factor structure for the GPQ

	Factor 1
TASKP	.757
EFFORT	.785
ADAPT	.730
INNO	.748
LEADP	.806
COMM	.804
INTER	.788
MANAGE	.850
ANAPROB	.816
CWB	.707
OCB	.833
SELFD	.617

The residual correlation matrix computed from the single-factor factor structure resulted in 24 (36.0%) non-redundant residuals with absolute values greater than .05.

The extracted single-factor factor solution therefore provided a reasonably credible explanation for the observed correlation matrix (Tabachnick & Fidell, 2001). The one extracted factor accounted for 59.708% of the variance in the data. Table 2.4, however, indicates that the eigenvalue of the second factor (.884) lies reasonably close to the (to some degree somewhat arbitrary chosen) Kaiser cut-off value of 1 that regulates the number of factors that are extracted. To examine whether the default eigenvalue-greater-than-one rule resulted in the extraction of too few factors, parallel analysis (O'Conner, 2000) was used to provide a further indication of the number of factors to extract.

2.6.2.2 PARALLEL ANALYSIS

When questioning the number of optimal factors to extract, researchers are faced with the numerous decision rules that can be found in literature. The two most popular decision rules are the eigenvalues-greater-than-one rule and the number of factors to the right of the elbow in the scree plot of the eigenvalues, both of which were used earlier. Unfortunately, both these decision rules are quite problematic (O'Connor, 2000). Firstly, the eigenvalues-greater-than-one rule has a tendency to either over- or underestimate the number of factors (O'Connor, 2000). This excessively mechanical and, to an extent, draconian rule can sometimes result in factors that are not as reliable as they seem (O'Connor, 2000). Secondly, the scree plot test requires: "eyeball searches of plots for sharp demarcations between the eigenvalues for major and trivial factors (O'Conner, 2000, p. 397). These demarcations are not always visible or there may be multiple demarcation points. Consequently, scree plot interpretations have low reliability, even when used by experts (O'Connor, 2000).

Parallel analysis provides a possible solution. O'Connor (2000, p. 399) explains parallel analysis as follows:

> Parallel analyses involve extracting eigenvalues from random data sets that parallel the actual data set with regard to the number of cases and variables. For example, if the original data set consists of 305 observations for each of 8 variables, then a series of random data matrices of this size (305 by 8) would be generated, and eigenvalues would be computed for the correlation matrices for the original data and for each of the random data sets. The eigenvalues derived from the actual data are then compared to the eigenvalues derived from the random data. In Horn's (1965) original description of this procedure, the mean eigenvalues from the random data

> served as the comparison baseline, whereas a currently recommended practice is to use the eigenvalues that correspond to the desired percentile (typically the 95th) of the distribution of random data eigenvalues (Cota, Longman, Holden, Fekken, & Xinaris, 1993; Glorfield, 1995, although see Cota, Longman, Holden, & Fekken, 1993, and Turner, 1998). Factors or components are retained as long as the *i*th eigenvalue from the actual data is greater than the *i*th eigenvalue from the random data.

Therefore, the number of factors for which the 95th percentile raw data eigenvalue is greater than the 95th percentile random data eigenvalue should be extracted. In this case two factors should be extracted because the 95th percentile raw data eigenvalue associated with the third factor (.320071) is smaller than the 95th percentile random data eigenvalue associated with the third factor (.346379). The random data eigenvalues are shown in Table 2.6 and the raw data eigenvalues are shown in Table 2.7.

Table 2. 7

Random Data Eigenvalues

	Root	Means	Prcntyle
1.	.000000	.478392	.559140
2.	.000000	.361334	.447903
3.	.000000	.271714	.346379
4.	.000000	.193114	.256054
5.	.000000	.123331	.176534
6.	.000000	.059656	.109415
7.	.000000	.001405	.047828
8.	.000000	-.055322	-.013307
9.	.000000	-.110917	-.072225
10.	.000000	-.166453	-.126653
11.	.000000	-.223425	-.183726
12.	.000000	-.290334	-.243906

Table 2. 8

Raw Data Eigenvalues

	Root	Eigen.
1.	.000000	7.212459
2.	.000000	.546349
3.	.000000	.320071
4.	.000000	.144449
5.	.000000	.054639
6.	.000000	.036972
7.	.000000	-.015500
8.	.000000	-.024247
9.	.000000	-.078525
10.	.000000	-.083116
11.	.000000	-.132105
12.	.000000	-.187741

2.6.2.3 EXPLORATORY FACTOR ANALYSIS (TWO- & THREE - FACTOR SOLUTION)

SPSS 23 (SPSS, 2016) was subsequently again used to perform principal axis factor analysis with oblique rotation on the correlation matrix shown in Table 2.3 but now specifying the extraction of two factors. The resultant obliquely rotated pattern matrix is shown in Table 2.8. The pattern matrix indicates the partial regression coefficients when regressing the observed first-order competency score on the two extracted factors. The partial regression weights therefore reflect the influence of each factor on the observed first-order competency score when statistically controlling for the second factor.

Table 2. 9

Forced two-factor pattern matrix for the GPQ

	Factor 1	Factor 2
TASKP	.755	.112
EFFORT	.783	-.029
ADAPT	.739	.341
INNO	.760	.381
LEADP	.804	-.047
COMM	.801	.077
INTER	.799	-.302
MANAGE	.847	-.016
ANAPROB	.813	.106
CWB	.723	-.370
OCB	.839	-.227
SELFD	.615	-.020

The results obtained for the two-factor factor structure were again quite disappointing, because no simple structure was obtained (Tabachnick & Fidell, 2001). Instead all the first-order competency dimension scores loaded high (λ_{i1}>.70) on factor 1, with the exception of the self-development competency that only returned a modest loading ($\lambda_{12,1}$=.615). Four first-order competencies returned low-modest (λ_{i2}>.30) loadings on the second factor, namely interpersonal relations and CWB (negative loadings) and innovation and adaptability (positive loadings). The nature of the dimensions with moderate loadings on the second factor make it difficult to determine the identity of the second factor. However, there are only 11 (16.0%) non-redundant residuals with absolute values greater than .05. This is indicative that the extracted two-factor factor solution offers quite a credible explanation for the observed inter-dimension correlation matrix.

The fact that all the first-order competency dimension scores loaded at least highish (λ_{i1}>.60) on factor 1 could point to the existence of a bifactor factor structure (DeMars, 2013; Reise, 2012). Reise**,** 2012, p. 1) explains a bi-factor measurement model as follows:

> A bifactor structural model specifies that the covariance among a set of item responses can be accounted for by a single general factor that reflects the common variance running among all scale items, and group1 factors that reflect additional common variance among clusters of items, typically, with highly similar content. It is assumed that the general and group factors all are orthogonal. Substantively, the general factor represents the conceptually broad "target" construct an instrument was designed to measure, and the group factors represent more conceptually narrow subdomain constructs.

A single narrow factor on which a subset of first-order competencies load, however, does not really make sense. A factor structure is required in which all first-order competencies load on the broad general performance factor, where each first-order competency load on a narrow factor and a distinction is made between at least two narrow factors. Consequently, SPSS 23 (SPSS, 2016) was subsequently again used to perform principal axis factor analysis with oblique rotation on the correlation matrix shown in Table 2.9 but now specifying the extraction of three factors.

Table 2. 10

Forced three-factor pattern matrix for the GPQ

	Factor 1	Factor 2	Factor 3
TASKP	.303	**.530**	.020
EFFORT	**.500**	.365	.011
ADAPT	.011	**.857**	-.015
INNO	-.056	**.806**	.125
LEADP	.369	.203	.333
COMM	.125	.274	**.521**
INTER	**.900**	.040	-.060
MANAGE	.325	.244	.389
ANAPROB	.083	.319	**.533**
CWB	**.833**	-.107	.063
OCB	**.667**	.078	.185
SELFD	.005	-.064	**.787**

The anticipated bi-factor structure did not emerge. The first-order factors that returned high loadings on the three factors did not share a convincing common theme. No convincing interpretation of the three second-order factors could be derived. There were 3 (4.0%) non-redundant residuals with absolute values greater than .05, which makes the three-factor solution highly credible.

2.6.3 CONCLUSION

The overall results of the attempt to quantitatively identify second-order latent behavioural competencies via exploratory factor analysis were discouraging and unfruitful. Both the 2-factor and 3-factor second-order solutions did not offer convincing higher-order structures. It was therefore decided that the five second-order factor solution proposed earlier should form the basis of the proposed Botes-Myburgh reduced generic non-managerial individual performance structural model.

2.7 DEFINITIONS OF THE SECOND-ORDER GENERIC NON-MANGERIAL INDIVIDUAL PERFORMANCE DIMENSIONS

The proposed reduced generic non-managerial performance structural model contains the five second-order latent behavioural competencies shown in Table 2.10. The manner in which the thirteen first-order competencies are hypothesised to load onto the five second-order competencies is also reflected in Table 2.10 along with the constitutive definitions of the second-order competencies. The generic non-managerial competency questionnaire (GCQ) that was developed as part of the current study measured the thirteen first-order competencies.

Table 2.11

Summary of the competencies in the reduced generic individual non-managerial performance structural model

First-order Dimension Name	Second-order Dimension Name	Second-order Dimension Definition
Task Performance Effort	Task Effort	The attention an employee devotes to his work to effectively perform activities that contribute to the organisation’s technical core, the tasks that are essential for a specific job, successfully completes role activities described in the job description and achieves personal work objectives. It also encompasses the expenditure of resources like the time and care spent to be effective on the job and the willingness to keep working under detrimental circumstances.

Table 2.12

Summary of the competencies in the reduced generic individual non-managerial performance structural model (continued)

First-order Dimension Name	Second-order Dimension Name	Second-order Dimension Definition
Self-development Problem solving Adaptability Innovation	Growth and problem solving	The extent to which employees develop themselves so that they are able to adapt and respond effectively to problem situations, display creativity and eagerness for new ideas in order to solve problems, support and drive organisational change, use analytical thinking to identify the core issues in complex situations and problems, and how these behaviours contribute to career advancement.
Organisational citizenship behaviour Counterproductive work behaviour Employee green behaviour	Organisational directed behaviour	Employees' non-prescribed contribution to the organisation and rule compliance. This encompasses behaviours that benefit or harm the organisation, its employees and the environment within which the organisation operates. It includes voluntary behaviours (behaviours not formally stipulated) by employees that contribute to the overall effectiveness of the organisation, endorsement and support of organisational objectives, helping of colleagues, willingness to go the extra mile and abiding by the organisation's rules and procedures. At the same time, it includes behaviours that threaten the well-being of an organisation as well as the failure to maintain personal discipline, absenteeism, confrontational behaviour towards colleagues, theft, drug misuse, unwillingness to comply with organisational rules. Lastly, it also includes behaviours that contribute to or detract (OCB/CPW) from environment sustainability such as dumping, recycling etc.
Communication Inter-personal relationships	Communication and inter-personal relationships	All types of inter-personal communication: written/oral and professional/social. It includes how well employees network, persuade and influence others, relate to co-workers, displaying pro-social behaviour, acting in a manner consistent with personal values that compliment those of the organisation.
Leadership potential Management	Leadership and management	The extent to which employees empower others, support peers, articulate goals for the unit, organise people and resources, provide direction and take responsibility; and plan ahead and work in a systematic and organised way.

No second-order factor structure was proposed for the first-order latent outcomes. The generic non-managerial outcome questionnaire (GOQ) that was developed as part of the current study contained subscales that measured the nine dimensions shown in Table 2.11.

Table 2. 13

Summary of the outcomes in the generic individual non-managerial performance structural model

Outcome Dimension Name	Definition
Quality of outputs	The degree to which the results of carrying out the job task approaches perfection, in terms of conforming to some set standard or fulfilling the activity's intended purpose.
Quantity of outputs	The amount produced, expressed in such terms as dollar value, number of units, or number of completed activity cycles.
Timeliness	The degree to which an activity is completed, or a result produced, at the earliest time desirable from standpoints of both coordinating with the outputs of others and maximising the time available for other activities.
Cost-effectiveness	The degree to which the use of the organisation's resources (e.g. human, monetary, technological, material) is maximised in the sense of getting the highest gain or reduction in loss from each unit or instance of use of a resource.
Need for supervision	The degree to which an employee carries out his/her job functions without either having to request supervisory assistance or requiring supervisory intervention to prevent an adverse outcome.
Interpersonal impact	The degree to which a performer promotes feelings of self-esteem, goodwill, and cooperativeness among co-workers and subordinates.
Customer satisfaction	The degree to which the product or service meets the expectations of your customers.
Environmental Impact	The impact on the environment by the organisation via the creation of a product or the delivery of a service.

Table 2. 14

Summary of the outcomes in the generic individual non-managerial performance structural model (continued)

Market reputation	The level at which an employee is perceived by co-workers, superiors and customers in terms of the quality and quantity of his work, his contribution to the overall competitiveness of the organisation as extraordinary and held in high esteem.

2.8 VALIDATING THE GENERIC NON-MANAGERIAL INDIVIDUAL PERFORMANCE STRUCTURAL MODEL

The next step in the development of the reduced generic individual non-managerial performance model is the theoretical validation of the proposed dimensions. The inclusion of new competencies and outcomes as well as the development of a second-order factor structure need to be justified via a convincing theoretical argument as to why competence on the identified competencies can legitimately be required from employees in non-managerial jobs. According to Myburgh (2013) a convincing theoretical rationale is needed as justification for the inclusion of any competency (in this case second-order competency).

The overarching goal of any organisation is to deliver a product or service to customers. In order to do that, organisations need a variety of jobs that link the production and delivery of products or services to the customer. Every job serves a particular purpose. That purpose could range from being part of the production process to delivering a service to a customer first-hand. In order for this process to be successful, the core activities of each of these jobs need to be competently performed. The amount of effort exerted in an attempt to complete the core activities and the perseverance to keep on going should determine the effectiveness of the employee to fulfil his/her core responsibilities, and also should have a direct impact on the *quality* and *quantity* of the product or service delivered. For this reason, it was decided to combine task performance and effort into the second order factor *task effort*. *Task effort* is expected to positively impact the *quality* and *quantity of output* outcome variables. In turn, these two outcome variables could be expected to be negatively linked with each other and to have a positive impact on *market reputation* and *customer satisfaction*.

The modern business environment changes rapidly and constantly bombard employees with new problems and different ways of doing things. Employees need to develop themselves, adapt and solve problems in innovative ways if they are to stay ahead of the curve. Employees need to identify key issues in complex situations and problems, drive organisational change and display creativity, all of which would contribute to superior performance and ultimately career advancement. The first-order competencies that make up *growth and problem solving* all have to do with growing, developing and embracing the challenges the changing environment throws at us. *Growth and problem solving* is hypothesised to have a negative impact on the *need for supervision* and a positive impact on *quality of outputs*. *Quality of outputs* is hypothesised to have a positive influence on *customer satisfaction* and *market reputation*, whilst the *quantity of output* is expected to have a positive influence on *market reputation* only.

Every job exists within an organisation and every organisation has specific contextual behavioural expectations (Myburgh, 2013). This includes an employee's non-prescribed contribution to the organisation, rule-compliance and their responsibility to the environment. Behaviours include endorsement and support of the organisation's objectives, helping colleagues, easing the responsibilities of superiors, maintaining personal discipline, theft, drug use, recycling, dumping etc. The *organisation-directed behaviours (ODB)* second-order competency combine the *OCB*, *CWB* and *employee green behaviour* first-order competencies, because they all represent behaviours that are directed at the organisation either in the interest of the organisation or to the detriment of the organisation. *ODB* is hypothesised to have a negative impact on the *need for supervision*, *cost effectiveness* and *environmental impact*.

Organisations are essentially a group of people working towards common objectives. In order for people to work together successfully they need to communicate well and build relationships. No employee can perform optimally if they are isolated from their co-workers (Myburgh, 2013). The second-order competency *communication and inter-personal relationships* should be understood as any type of inter-personal communication: written/oral and professional/social. It includes how well employees network, persuade and influence others, relate to co-workers, display pro-social behaviour and act in a manner consistent with personal values that compliment those of the organisation. The first-order competencies *inter-personal relationships* and *communication* both have to do with how you interact with colleagues and were combined to form the *communication and inter-personal relationships* second-order competency. The second-order competency *communication and inter-personal relationships* is hypothesised to have a positive impact on *inter-personal impact*.

Almost any non-managerial position would require the incumbent to pro-actively plan ahead and work in a systematic and organised way. Although these behaviours are commonly associated with managerial positions, if an employee takes initiative and responsibility, it eases the managerial burden of their superiors. This dovetails well with the leadership potential variable because by exhibiting such behaviour the employee would set a positive example, which in turn would inspire employees to reach their potential and take ownership of their tasks. This example would have a subjective influence on their peers and these employees would be singled-out for advice and direction. For this reason, the *leadership potential* and *management* first-order competencies were combined to form the *leadership and management* second-order competency, which will be included in the model. The *leadership and management* second-order competency is hypothesised to have a positive impact on the *timeliness* outcome, *need for supervision* and *interpersonal impact* latent outcome variables.

The preceding argument is summarised in the form of a reduced generic non-managerial performance structural model that is depicted as a path diagram in Figure 2. 2.

Myburgh (2013, p. 69) proposed the six performance outcomes identified by Bernardin and Beatty (1984):

> Bernardin and Beatty (1984) identify six outcome latent variables in terms of which the performance of employees should be evaluated. Whether employees are considered successful is judged according to their approach, not in terms of what the employer does but rather by what the employer achieves. The latent outcome variables they suggest are: Quality of output, quantity of output, timeliness, cost-effectiveness, need for supervision, and interpersonal impact. Specific structural relations are assumed to exist between the outcome variables. Performance of employees should individually and collectively serve organisational strategy. Organisational strategy imposes specific standards on each outcome latent variable. Strategy is served only if all outcome standards are met. Whether the

> strategically important outcome standards will be achieved depends, at least in part, on the performance level achieved in the latent behavioural performance dimensions that are instrumental in achieving the desired outcomes. The twelve latent performance dimensions discussed thus far were argued to be influential behavioural determinants driving the performance levels achieved on the outcome latent variables.

Myburgh (2013) frequently mentions the six performance outcomes of Bernardin and Beatty (1984) as the only outcomes in her model. However, in the model she proposed in her thesis, *customer satisfaction* and *capacity* are also included. The *customer satisfaction* latent outcome variable (but not the capacity latent variable) was included in the current study as well as *market reputation* and *environmental impact*. All nine of these outcome variables have been utilised in the preceding argument aimed at constructing a rationale as to why non-managerial employees should display competence on the five second-order generic non-managerial competencies.

2.9 PROPOSED REDUCED GENERIC NON-MANAGERIAL INDIVIDUAL PERFORMANCE STRUCTURAL MODEL

The argument presented in paragraph 2.8 provided a description of the structural relationships that are hypothesised to exist between the competencies and the outcomes. These structural relations are schematically depicted as a reduced generic non-managerial individual performance structural model in Figure 2.2.

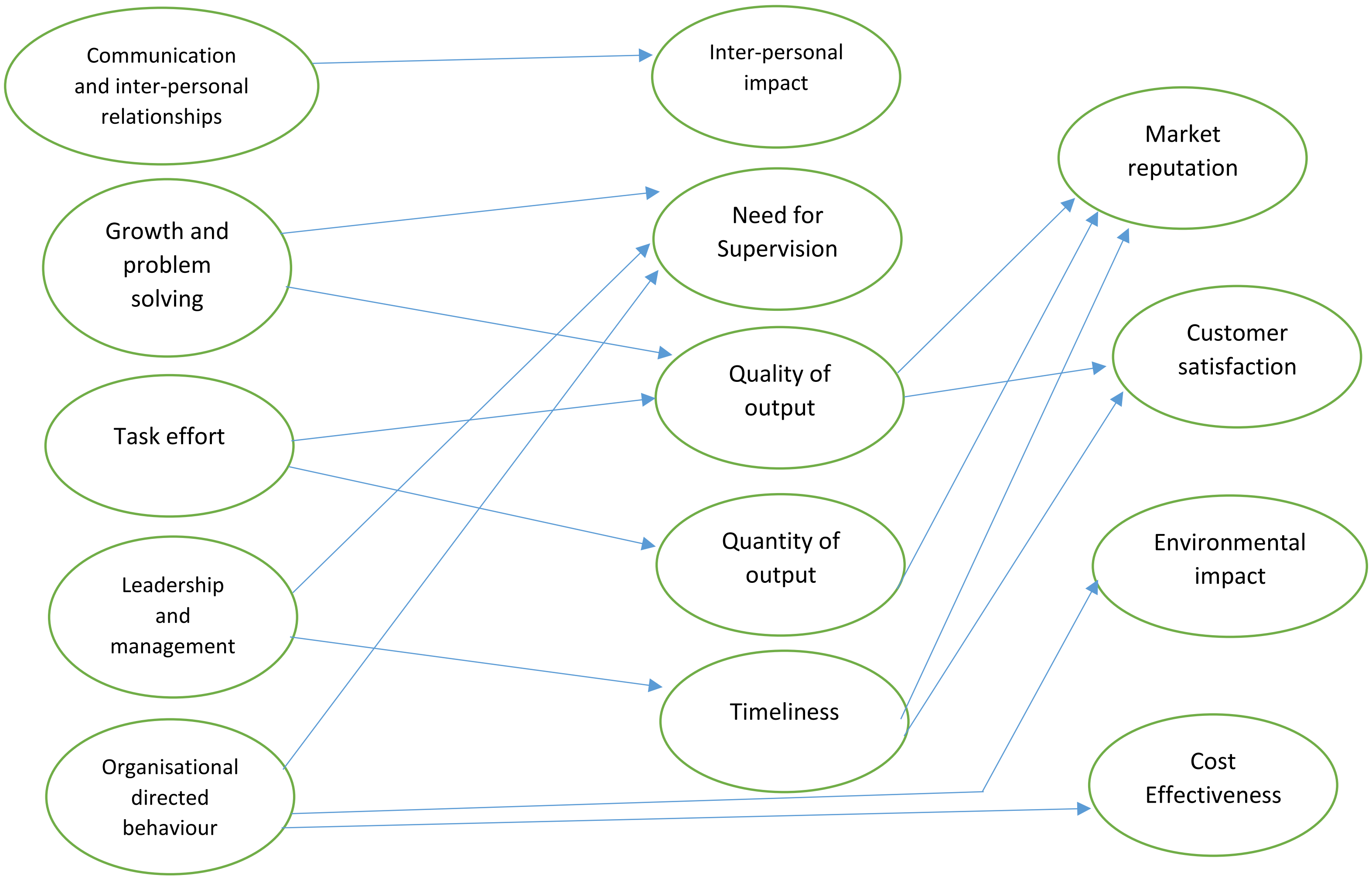

Figure 2. 2 Proposed generic non-managerial individual performance structural model

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

The need to develop and empirically test a generic non-managerial competency model has been argued in Chapter 1. The objective of the current study is to continue with the research where Myburgh (2013) left off towards the development of a valid comprehensive non-managerial individual employee competency model. Myburgh (2013) developed a structural model that structurally maps twelve competencies on nine outcome latent variables. Her model constitutes a formal conceptualisation of the non-managerial individual employee performance construct. She, however, only empirically evaluated the construct validity of the Generic Performance Questionnaire (GPQ)[7] by fitting the GPQ measurement model. The fit of the proposed performance structural model was not empirically evaluated.

With this objective in mind, Myburgh's (2013) structural model was adapted through a theorising process so that it would provide a comprehensive representation of the hypothesised non-managerial performance construct (behaviours and outcomes). However, the structural model can only be considered valid (or permissible) to the extent that the model closely fits the available empirical data (Babbie & Mouton, 2001). Research methodology serves the epistemic ideal of science through its characteristics of objectivity and rationality (Babbie & Mouton, 2001). Objectivity refers to the scientific method's conscious, explicit focus on the reduction of error. Various critical points exist in the process of testing the validity of the explanatory structural model, where the epistemic ideal could be jeopardised. Suitable, methodologically wise, steps need to be taken by the researcher at these points to increase the likelihood of valid and credible findings. Rationality refers to the scientific method's insistence that the credibility of the research findings should be analysed by knowledgeable peers through the evaluation of the methodological rigour of the processes used to arrive at the findings (Babbie & Mouton, 2001). In order to make

[7] The GPQ is essentially equivalent to what is referred to in the current study as the Generic Competency Questionnaire (GCQ).

this process possible a detailed description and motivation of the methodological choices that were made at these critical points was required.

In order to empirically test the generic non-managerial performance structural model that was developed in Chapter 2, the construct validity of Myburgh's (2013) revised Generic Performance Questionnaire (GPQ) (termed the Generic Competency Questionnaire in the current study (GCQ)) and the newly developed Generic Outcome Questionnaire (GOQ) had to be evaluated by fitting the measurement models implied by the constitutive definition of the non-managerial individual employee performance construct and the design intention of the two questionnaires. To simplify the process of developing and empirically testing the generic non-managerial performance structural model, it was decided to rather structurally map a smaller set of five second-order competencies on the latent outcome variables than the thirteen latent first-order competencies. Hypotheses on the identity of these second-order competencies were developed in Chapter 2. To allow for a credible test of the proposed generic non-managerial performance structural model, the fit of the hypothesised second-order factor structure of the GCQ had to be evaluated first. Only then was it possible to fit the hypothesised generic non-managerial performance structural model. This chapter consequently, comprehensively describes and motivates the research methodology used to test the three respective measurement models and the structural model. This chapter discusses the substantive research hypotheses, the research design, statistical hypotheses, statistical analysis techniques, measuring instruments and the sampling design.

3.2 SUBSTANTIVE RESEARCH HYPOTHESES

The GCQ and the GOQ were developed to measure generic non-managerial performance to enable the empirical testing of a comprehensive generic non-managerial performance structural model[8]. However, these instruments can only be used to operationalise the latent competencies and latent outcome variables comprising the structural model if credible evidence can be garnered on the reliability and construct validity of the instrument.

[8] The longer-term intention is to also use these instruments in conjunction with the eventual generic non-managerial competency model to assess performance and to diagnose performance problems.

The first overarching substantive hypothesis (Hypothesis 1) proposes that the GCQ provides a construct valid and reliable measure of the first-order latent competencies that constitute the non-managerial individual employee job performance construct as defined by the instrument, amongst South African non-managerial personnel. This first overarching substantive research hypothesis was divided into the following more detailed, specific operational research hypotheses:

Operational hypothesis 1: The measurement model implied by the scoring key and the design intention of the GCQ can closely reproduce the covariances observed between the items comprising each of the sub-scales;

Operational Hypothesis 2: The factor loadings of the items on their designated latent behavioural performance dimensions are statistically significant ($p<.05$) and large ($\lambda_{ij}\geq.50$);

Operational Hypothesis 3: The measurement error variance associated with each item is statistically significant ($p<.05$) but small ($\theta_{\delta}\leq.75$);

Operational Hypothesis 4: The latent performance dimensions explain large proportions of the variance in the items that represent them ($R^2\geq.25$), and;

Operational Hypothesis 5: The latent performance dimensions correlate low to moderate with each other ($\phi_{ij}<.90$; AVE>ϕ^2_{ij}; AVE$\geq.50$).

The second overarching substantive hypothesis (Hypothesis 2) proposes that the GOQ provides a construct valid and reliable measure of the latent outcomes that constitute the non-managerial individual employee job performance construct as defined by the instrument, amongst South African non-managerial personnel. This second overarching substantive research hypothesis was divided into the following more detailed, specific operational research hypotheses:

Operational hypothesis 6: The measurement model implied by the scoring key and the design intention of the GOQ can closely reproduce the covariances observed between the items comprising each of the sub-scales;

Operational hypothesis 7: The factor loadings of the items on their designated latent behavioural performance dimensions are statistically significant ($p<.05$) and large (($\lambda_{ij}\geq50$),

Operational hypothesis 8: The measurement error variance associated with each item is small ($\theta_{\delta} \leq .75$);

Operational hypothesis 9: The latent performance dimensions explain large proportions of the variance in the items that represent them ($R^2 \geq .25$), and;

Operational hypothesis 10: The latent performance dimensions correlate low to moderate with each other ($\phi_{ij} < .90$; AVE$>\phi^2_{ij}$; AVE$\geq .50$).

The third overarching substantive hypothesis (Hypothesis 3) proposes that the GCQ provides a construct valid and reliable measure of the second-order latent competencies that constitute the non-managerial individual employee job performance construct as hypothesised in Chapter 2, amongst South African non-managerial personnel. This third over-arching substantive research hypothesis was divided into the following more detailed, specific operational research hypotheses:

Operational hypothesis 11: The measurement model implied by the scoring key, the design intention of the GCQ, the hypothesised set of second-order latent competencies and the manner in which they were hypothesised to structurally express themselves in the first-order latent competencies can closely reproduce the co-variances observed between the items comprising each of the sub-scales,

Operational hypothesis 12: The factor loadings of the items on their designated first-order latent behavioural performance dimensions are statistically significant ($p < .05$) and large ($\lambda_{ij} \geq .50$);[9]

Operational hypothesis 13: The measurement error variance associated with each item is statistically significant ($p < .05$) but small ($\theta_{\delta} \leq .75$);

Operational hypothesis 14: The first-order latent performance dimensions explain large proportions of the variance in the items that represent them ($R^2 \geq .25$), and

Operational hypothesis 15: The latent second-order dimensions correlate low to moderate with each other ($\phi_{ij} < .90$; AVE$>\phi^2_{ij}$; AVE$\geq .50$).,

Operational hypothesis 19: The slope of the regression of the first-order factors on the second-order factors (γ_{ij}) are statistically significant ($p < .05$).

[9] Operational hypotheses 12, 13 and 14 is the same as operational hypothesis 2, 3 and 4.

The fourth substantive hypothesis (Hypothesis 4) proposes that generic individual non-managerial performance structural model provides a valid account of the psychological process underpinning the level of performance of non-managerial individuals in an organisation. This hypothesis was dissected into the following more detailed path-specific (direct effect) substantive research hypotheses:

Hypothesis 5: In the proposed generic individual non-managerial performance structural model it is hypothesised that *Communication and inter-personal relationships* will positively influence *Interpersonal impact.*

Hypothesis 6: In the proposed generic individual non-managerial performance structural model it is hypothesised that *Growth and problem solving* will negatively influence *Need for supervision.*

Hypothesis 7: In the proposed generic individual non-managerial performance structural model it is hypothesised that *Growth and problem solving* will positively influence *Capacity.*

Hypothesis 8: In the proposed generic individual non-managerial performance structural model it is hypothesised that *Growth and problem solving* will positively influence *Quality of outputs.*

Hypothesis 9: In the proposed generic individual non-managerial performance structural model it is hypothesised that *Task effort* will positively influence *Quality of outputs.*

Hypothesis 10: In the proposed generic individual non-managerial performance structural model it is hypothesised that *Task effort* will positively influence the *Quantity of outputs.*

Hypothesis 11: In the proposed generic individual non-managerial performance structural model it is hypothesised that *Leadership and management* will negatively influence *need for supervision.*

Hypothesis 12: In the proposed generic individual non-managerial performance structural model it is hypothesised that *Leadership and management* will positively influence *Timeliness.*

Hypothesis 13: In the proposed generic individual non-managerial performance structural model it is hypothesised that *Organisational directed behaviour* will negatively influence *Need for supervision*.

Hypothesis 14: In the proposed generic individual non-managerial performance structural model it is hypothesised that *Organisational directed behaviour* will negatively influence *Environmental impact.*

Hypothesis 15: In the proposed generic individual non-managerial performance structural model it is hypothesised that *Organisational directed behaviour* will positively influence *Cost effectiveness.*

Hypothesis 16: In the proposed generic individual non-managerial performance structural model it is hypothesised that *Quality of output* will positively influence *Market reputation.*

Hypothesis 17: In the proposed generic individual non-managerial performance structural model it is hypothesised that *Quality of output* will positively influence *Customer satisfaction.*

Hypothesis 18: In the proposed generic individual non-managerial performance structural model it is hypothesised that *Quantity of output* will positively influence *Market reputation.*

Hypothesis 19: In the proposed generic individual non-managerial performance structural model it is hypothesised that *Timeliness* will positively influence *Market reputation.*

Hypothesis 20: In the proposed generic individual non-managerial performance structural model it is hypothesised that *Timeliness* will positively influence *Customer satisfaction.*

Hypothesis 21: In the proposed generic individual non-managerial performance structural model it is hypothesised that *Customer satisfaction* will positively influence *Market reputation.*

3.3 RESEARCH DESIGN

The strategy that dictated the procedure used to test the validity of the foregoing overarching substantive research hypotheses is known as the research design. The research design can be regarded as the plan, guideline or blueprint of how the researcher aimed to conduct the research process in order to solve the research problem (Babbie & Mouton, 2001). The design that will be the most appropriate is dependent on the nature of the research hypotheses and the type of evidence that would be necessary to test the validity of the hypotheses. Burger (2012) stated that the research design is used to find an answer to the research initiating question and is used to control variance. The control of variance refers to the maximisation of systematic variance, the minimisation of error variance and the controlling of extraneous variance, which will ultimately provide unambiguous empirical evidence, which can be interpreted unambiguously in support of, or against the hypotheses being investigated (Kerlinger & Lee, 2000).

According to Kerlinger and Lee (2000) a clear distinction should be made between experimental- and *ex post facto* research designs. In an *ex post facto* research design, the researcher does not have manipulative control over the independent variables, because their manifestations have already taken place or because their level cannot be manipulated (Kerlinger & Lee, 2000). In an experimental research design, the researcher does have manipulative control over the independent variables and observes the dependent variable/s for variation that could be associated with the manipulation of the independent variable. In other words, manipulative control is the most important difference between the two broad categories of research designs (Kerlinger & Lee, 2000).

Kerlinger and Lee (2000) highlight the importance of understanding the strengths and weaknesses of the *ex post facto* and experimental research designs. According to Kerlinger (1973) *ex post facto* research has three significant limitations, the inability to manipulate independent variables (which has been discussed in the previous paragraph), the lack of power to randomise and, as a consequence of these two limitations, the risk of improper interpretation. In terms of the second limitation, both research approaches permit the selection of subjects at random. However, in *ex post facto* research it is not possible to assign treatments to groups or participants to groups at random. For this reason, the researcher using an *ex post facto* research approach should be aware of the possible influence of self-selection bias, an occurrence where subjects "select themselves" into groups on the basis of characteristics other than those in which the researcher is interested. In contrast, experimental research exercises control through randomisation, because subjects are assigned to groups at random and treatments are assigned to groups at random. The third limitation, risk of improper interpretation, stems firstly from the fact that the absence of manipulation in the *ex post facto* research design prohibits the drawing of casual inferences from significant path coefficients as correlations that do not imply causation. The risk of improper interpretation stems secondly from the absence of random assignment in the *ex post facto* research design which reduced the control over error and extraneous variance.

In spite of the limitations associated with the *ex post facto* research design, it is still an extremely valuable research approach. The reason being that most research in the social sciences does not permit experimentation because the variables normally found in social research cannot be manipulated. Since the exogenous latent variables in this particular study cannot be manipulated, and because the structural model hypothesises structural relations between the endogenous latent variables, an *ex post facto* research correlational design was used. In an *ex post facto* correlation design each latent variable is operationalised by at least two or more indicators variables (assuming in total p exogenous indicator variables and q endogenous indicator variables). The *ex post facto* correlation design used to test the overarching and specific operational hypotheses associated with the first-order and the second-order GCQ measurement models[10] are depicted in Figure 3.1 and the *ex post facto* correlation design used to test the overarching and specific operational hypotheses associated with the first-order GOQ measurement model is depicted in Figure 3.2.

X_{kp} in Figures 3.1 and 3.2 refers to the score of participant k on item parcel p. The ideal is to fit the three measurement models with individual items as indicators. Doing so would, however, have required a reasonably large sample (see paragraph 3.5). The initial intention, as reflected in the research design depicted in Figure 3.1, was that

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[10] The research design required to fit the second order factor GCQ measurement model is identical to the first-order GCQ measurement model.

each of the 13 subscales of the GCQ consisting of 8 items each would be randomly parcelled into 4 item parcels by calculating the mean.

$$
\begin{array}{cccccc}
[X_{11}] & [X_{12}] & \dots & [X_{1p}] & \dots & [X_{1.52}] \\
[X_{21}] & [X_{22}] & \dots & [X_{2p}] & \dots & [X_{2.52}] \\
\vdots & \vdots & \dots & \vdots & \dots & \vdots \\
[X_{k1}] & [X_{k2}] & \dots & [X_{kp}] & \dots & [X_{k.52}] \\
\vdots & \vdots & \dots & \vdots & \dots & \vdots \\
[X_{n1}] & [X_{n2}] & \dots & [X_{np}] & \dots & [X_{n.52}]
\end{array}
$$

Figure 3. 1 GCQ *ex post facto* correlational design

The design depicted in Figure 3.2 reflects the initial intention that each of the 9 subscales of the GOQ consisting of 8 items each would be randomly parcelled into 4 item parcels by calculating the mean.

$$
\begin{array}{cccccc}
[X_{11}] & [X_{12}] & \dots & [X_{1p}] & \dots & [X_{1.36}] \\
[X_{21}] & [X_{22}] & \dots & [X_{2p}] & \dots & [X_{2.36}] \\
\vdots & \vdots & \dots & \vdots & \dots & \vdots \\
[X_{k1}] & [X_{k2}] & \dots & [X_{kp}] & \dots & [X_{k.36}] \\
\vdots & \vdots & \dots & \vdots & \dots & \vdots \\
[X_{n1}] & [X_{n2}] & \dots & [X_{np}] & \dots & [X_{n.36}]
\end{array}
$$

Figure 3. 2 GOQ *ex post facto* correlation design

The *ex post facto* correlation design used to test the generic non-managerial individual performance structural model is depicted in Figure 3.3. X_{ip} and Y_{ik} in Figure 3.3 refer to the score of participants i on item parcels p and k that represent ξ_t η_q respectively.

The design depicted in Figure 3.3 assumes that each of the 9 subscales of the GOQ were parcelled into 2 item parcels and that the 13 first-order dimension scores of the GCQ were used as indicators of the 5 second-order latent performance dimensions.

To empirically test the claims made by all the models (first-order GCQ factor structure, first-order GOQ factor structure, second-order GCQ factor structure and the reduced generic non-managerial individual performance structural model) via the logic of the *ex post facto* correlational design, the researcher observed the observed variables and calculated the inter-indicator covariance matrix.

$[X_{11}]$	$[X_{12}]$	…	$[X_{1p}]$	…	$[X_{1.13}]$	Y_{11}	Y_{12}	…	Y_{1k}	…	$Y_{1.20}$
$[X_{21}]$	$[X_{22}]$	…	$[X_{2p}]$	…	$[X_{2.13}]$	Y_{21}	Y_{22}	…	Y_{2k}	…	$Y_{2.20}$
:	:	…	:	…	:	:	:	…	:	…	:
$[X_{i1}]$	$[X_{i2}]$	…	$[X_{ip}]$	…	$[X_{i.13}]$	Y_{i1}	Y_{i2}	…	Y_{ik}	…	Y_{i20}
:	:	…	:	…	:	:	:	…	:	…	:
$[X_{n1}]$	$[X_{n2}]$	…	$[X_{np}]$	…	$[X_{n.13}]$	Y_{n1}	Y_{n2}	…	Y_{nk}	…	Y_{n20}

Figure 3. 3 Non-managerial performance structural model *ex post facto* correlation design

Estimates for the freed measurement model (or measurement and structural model) parameters were obtained in an iterative fashion with the purpose of reproducing the observed inter-indicator covariance matrix as accurately as possible (Diamantopoulos & Siguaw, 2000). If the fitted model failed to successfully reproduce the observed covariance matrix (Byrne, 1989; Kelloway, 1998) it would unambiguously lead to the conclusion that the measurement model implied by the design intention (or the structural model) did not suffice as an acceptable explanation for the observed inter-indicator co-variance matrix. This would have meant that the instrument did not measure the construct it was intended to measure or that the structural model failed to provide a plausible description of the mechanism that regulates non-managerial individual employee performance. However, if the covariance matrix derived from the estimated model parameters closely corresponded with the observed covariance matrix, it would not imply that the processes postulated by the model produced the observed covariance matrix. If a high degree of fit is achieved between the observed and estimated co-variance matrices it only suggests that the processes portrayed in the model provide one plausible explanation for the observed covariance matrix but not necessarily that it was the process that created the observed matrix.

3.4 STATISTICAL HYPOTHESIS

The format of the statistical hypotheses that were analysed was determined by the statistical analysis technique used to analyse the data collected in accordance with the prescriptions of the research designs. The previous discussion regarding the logic underlying the proposed research designs clearly points to the use of structural equation modelling as statistical analysis technique. The proposed structural model has exogenous latent variables and exogenous observed variables with numerous paths hypothesised between the latent competencies and the indicator variables and between the latent outcomes and their designated indicator variables. Furthermore, the reduced generic non-managerial performance structural model is made-up of several exogenous and endogenous latent variables with several paths between the endogenous latent variables. Since the explanation lies spread over the whole of the model dissecting the model was an unattractive option. Structural equation modelling offered the only possibility to test the overarching hypothesis is as an integral entity.

The LISREL notational system was used to formulate the statistical hypotheses (Diamantopoulos & Siguaw, 2000). According to Diamantopoulos and Siguaw (2000) to estimate a model's fit, the extent to which the model is consistent with the empirical data is tested. In order to investigate the hypothesised models' fit an exact fit null hypothesis and a close fit null hypothesis was tested for each model (Diamantopoulos & Siguaw, 2000).

The first overarching substantive research hypothesis (Hypothesis 1) proposes that the GCQ provides a construct valid and reliable measure of the generic competencies that constitute non-managerial job performance as defined by the instrument, amongst South African non-managerial personnel. If the first substantive hypothesis is interpreted to mean that the hypothesised model provides an exact account of the measurement model in the parameter, it translates into the exact fit hypothesis below:

H_{01}: RMSEA=0
H_{a1}: RMSEA>0

The exact fit is rather idealistic in the sense that it represents the position that the measurement model is able to reproduce the observed covariance matrix to a degree of accuracy that can be explained in terms of sampling error only. This represents a somewhat unrealistic, although not altogether impossible, situation. Browne and Cudeck (1993, p. 137) consequently argue:

> In applications of the analysis of co-variance structures in the social sciences it is implausible that any model that we use is anything more than an approximation to reality. Since a null hypothesis that a model fits exactly in some population is known a priori to be false, it seems pointless even to try to test whether it is true.

Assuming that the measurement model hypothesised to underlie the GCQ only approximates the processes that operated in reality to create the observed co-variance matrix, the following close fit null hypothesis (H_{02}) was also be tested (Browne & Cudeck, 1993):

H_{02}: RMSEA ≤.05

H_{a2}: RMSEA ≥.05

If either H_{01} and/or H_{02} were not rejected, and exact and/or close fit had been achieved, or alternatively if the measurement model would at least demonstrate reasonable model fit, the following 52 null hypotheses were tested concerning the freed elements in Λ^X:

H_{0i}: $\lambda_{jk}=0$; i=3, 4, …, 54; j=1,2, …, 52; k=1, 2, …, 13

H_{ai}: $\lambda_{jk}\neq 0$; i=3, 4, …, 154; j=1,2, …, 52; k=1, 2, …, 13

If either H_{01} and/or H_{02} were not rejected, and exact and/or close fit had been achieved, or alternatively if the measurement model would at least demonstrate reasonable model fit, the following 52 null hypotheses were tested concerning the freed elements in Θ_δ:

H_{0i}: $\theta_{\delta jj}=0$; i=55, 56, …, 106; j=1, 2…; 52

H_{ai}: $\theta_{\delta jj}>0$; i=55, 56, …, 106; j=1, 2…; 52

If either H_{01} and/or H_{02} were not rejected, and exact and/or close fit had been achieved, or alternatively if the measurement model would at least demonstrate reasonable model fit, the following 78 null hypotheses[11] were tested concerning the freed elements in Φ:

H_{0i}: $\phi_{jk}=0$; i=107, 108, …, 184; j=1, 2…13; k=1, 2…13; j≠k

H_{ai}: $\phi_{jk}>0$; i=107, 108, …, 184; j=1, 2…13; k=1, 2…13; j≠k

The second overarching substantive research hypothesis (Hypothesis 2) proposes that the GOQ provides a construct valid and reliable measure of job outcomes as defined by the instrument, amongst South African non-managerial personnel. If the second substantive hypothesis is interpreted to mean that the hypothesised model provides an exact account of the measurement model in the parameter, it translates into the exact fit hypothesis below:

H_{0185}: RMSEA = 0

H_{a185}: RMSEA > 0

[11] There were (13 x 12)/2 = 78 unique inter-latent competency correlations.

Assuming that the measurement model hypothesised to underlie the GOQ only approximates the processes that operated in reality to create the observed co-variance matrix, the following close fit null hypothesis (H_{0290}) was also be tested (Browne & Cudeck, 1993):

H_{0186}: RMSEA ≤ .05

H_{0186}: RMSEA ≥ .05

If either H_{0185} and/or H_{0186} were not rejected, and exact and/or close fit had been achieved, or alternatively if the measurement model would at least demonstrate reasonable model fit, the following 36 null hypotheses were tested concerning the freed elements in Λ^X:

H_{0i}: λ_{jk}=0; i=187, 188, …, 222; j=1,2, …, 36; k=1, 2, …, 9

H_{ai}: λ_{jk}≠0; i=187, 188, …, 222; j=1,2, …, 36; k=1, 2, …, 9

If either H_{0185} and/or H_{0186} were not rejected and exact and/or close fit had been achieved, or alternatively if the measurement model would at least demonstrate reasonable model fit, the following 36 null hypotheses were tested concerning the freed elements in Θ_δ:

H_{0i}: $\Theta_{\delta jj}$ =0; i=222, 223, …, 258; j=1, 2…; 36

H_{ai}: $\Theta_{\delta jj}$ >0; i=222, 223, …, 258; j=1, 2…; 36

If either H_{0185} and/or H_{0186} were not rejected and exact and/or close fit had been achieved, or alternatively if the measurement model would at least demonstrate reasonable model fit, the following 36 null hypotheses were tested concerning the freed elements in Φ:

H_{0i}: ϕ_{jk} =0; i=259, 260, …, 294; j=1, 2…9; k=1, 2…9; j≠k

H_{ai}: ϕ_{jk} >0; i=259, 260, …, 294; j=1, 2…9; k=1, 2…9; j≠k

The third overarching substantive research hypothesis (hypothesis 3) proposes that the GCQ provides a construct valid and reliable measure of the second-order latent competencies that constitute the non-managerial individual employee job performance construct as hypothesised in Chapter 2, amongst South African non-managerial personnel. If the third substantive hypothesis is interpreted to mean that the hypothesised model provides an exact account of the measurement model in the parameter, it translates into the exact fit hypothesis below:

H_{0295}: RMSEA = 0
H_{a295}: RMSEA > 0

Assuming that the second-order measurement model underlying the GCQ only approximates the processes that operated in reality to create the observed co-variance matrix, the following close fit null hypothesis was also be tested (Browne & Cudeck, 1993):

H_{0296}: RMSEA ≤ .05
H_{a296}: RMSEA ≥ .05

If either H_{0295} and/or H_{0296} were not rejected and exact and/or close fit had been achieved, or alternatively if the measurement model would at least demonstrate reasonable model fit, the following 52 null hypotheses were tested concerning the freed elements in Λ^X:

H_{0i}: λ_{jk}=0; i=297, 298, …, 348; j=1,2, …, 52; k=1, 2, …, 13
H_{ai}: λ_{jk}≠0; i=297, 298, …, 348; j=1,2, …, 52; k=1, 2, …, 13

If either H_{0295} and/or H_{0296} were not rejected and exact or close fit had been achieved, or alternatively if the measurement model would at least demonstrate reasonable model fit, the following 52 null hypotheses were tested concerning the freed elements in Θ_δ:

H_{0i}: $\theta_{\delta jj}$ =0; i=348, 349, …, 400; j=1, 2…; 52
H_{ai}: $\theta_{\delta jj}$ >0; i=348, 3349, …, 400; j=1, 2…; 52

If either H_{0295} and/or H_{0296} were not rejected and exact or close fit had been achieved, or alternatively if the measurement model would at least demonstrate reasonable model fit, the following 10 null hypotheses were tested concerning the freed elements in Φ:

H_{0i}: ϕ_{jk} =0; i=400, 401, …, 410; j=1, 2…5; k=1, 2…5; j≠k
H_{ai}: ϕ_{jk} >0; i=400, 401, …, 410; j=1, 2…5; k=1, 2…5; j≠k

If either H_{0295} and/or H_{0296} were not rejected and exact or close fit had been achieved, or alternatively if the measurement model would at least demonstrate reasonable model fit, the following 13 null hypotheses were tested concerning the freed elements in Γ:

H_{0i}: γ_{jk} =; i=411, 412, …, 423; j=1, 2, …, 13; k=1, 2, …5

H_{ai}: γ_{jk} >; i=411, 412, …, 423; j=1, 2, …, 13; k=1, 2, …5

The fourth overarching substantive research hypothesis (Hypothesis 4) proposes that the generic individual non-managerial performance comprehensive covariance structure model[12] provides a valid account of the psychological process underpinning the level of performance of non-managerial individuals in an organisation. If the fourth substantive hypothesis is interpreted to mean that the hypothesised comprehensive covariance structure model provides an exact account of the process that determines the level of non-managerial performance, it translates into the exact fit hypothesis below:

H_{0425}: RMSEA = 0

H_{a425}: RMSEA > 0

If the overarching substantive research hypothesis is interpreted to mean that the comprehensive covariance structure model provides an approximate account of the process that determines the level of non-managerial performance, the substantive research hypothesis translates into the following close fit null hypothesis:

H_{0426}: RMSEA ≤ .05

H_{a426}: RMSEA ≥ .05

The fourth overarching substantive hypothesis was dissected into the seventeen more detailed path-specific (direct effect) substantive research hypotheses. If either H_{0425} and/or H_{0426} were not rejected and exact or close fit had been achieved, or alternatively

[12] The comprehensive covariance structure model (also referred to as the comprehensive LISREL model) comprises the measurement model that hypothesises specific structural linkages between the latent variables and the indicator variables and the structural model that hypothesises specific structural linkages between the latent variables. The structural model, on its own, cannot be fitted. Only the measurement model and the comprehensive covariance structure model. The fit of the structural model needs to be inferred from the fit of the measurement and comprehensive models.

if the measurement model would at least demonstrate reasonable model fit, the following 17 null hypotheses were tested concerning the freed elements in **B** and **Γ:**

Hypothesis 5: In the proposed reduced generic individual non-managerial performance structural model[13] it is hypothesised that *Communication and inter-personal relationships* will positively influence *Interpersonal impact.*

$$H_{0427}: \gamma_{11}=0$$

$$H_{a427}: \gamma_{11}>0$$

Hypothesis 6: In the proposed reduced generic individual non-managerial performance structural model it is hypothesised that *Growth and problem solving* will negatively influence *Need for supervision.*

$$H_{0428}: \gamma_{22}=0$$

$$H_{a428}: \gamma_{22}>0$$

Hypothesis 7: In the proposed reduced generic individual non-managerial performance structural model it is hypothesised that *Growth and problem solving* will positively influence *Capacity.*

$$H_{0429}: \gamma_{82}=0$$

$$H_{a429}: \gamma_{82}>0$$

Hypothesis 8: In the proposed reduced generic individual non-managerial performance structural model it is hypothesised that *Growth and problem solving* will positively influence *Quality of outputs.*

$$H_{0430}: \gamma_{32}=0$$

$$H_{a430}: \gamma_{32}>0$$

Hypothesis 9: In the proposed reduced generic individual non-managerial performance structural model it is hypothesised that *Task effort* will positively influence *Quality of outputs.*

$$H_{0431}: \gamma_{33}=0$$

---

[13] The path-specific hypotheses were purposefully formulated in this manner to acknowledge that the γ_{ij} and β_{ij} path coefficients are partial regression coefficients that reflect the influence of a specific ξ_j or η_j η_i when controlling for the other effects included in the structural equation for η_i. Strictly speaking therefore the statistical hypotheses should have formally reflected this by for example formulating $H_{0444}: \gamma_{22}=0|\gamma_{43}\neq0, \gamma_{25}\neq0$ and $H_{a444}: \gamma_{22}>0|\gamma_{43}\neq0, \gamma_{25}\neq0$ ($\neq$ should be read to mean when this effect is included in the 9regression) model).

H_{a431}: $\gamma_{33}>0$

Hypothesis 10: In the proposed reduced generic individual non-managerial performance structural model it is hypothesised that *Task effort* will positively influence the *Quantity of outputs.*

H_{0432}: $\gamma_{43}=0$

H_{a432}: $\gamma_{43}>0$

Hypothesis 11: In the proposed reduced generic individual non-managerial performance structural model it is hypothesised that *Leadership and management* will negatively influence *need for supervision.*

H_{0433}: $\gamma_{24}=0$

H_{a433}: $\gamma_{24}>0$

Hypothesis 12: In the proposed reduced generic individual non-managerial performance structural model it is hypothesised that *Leadership and management* will positively influence *Timeliness.*

H_{0434}: $\gamma_{54}=0$

H_{a435}: $\gamma_{54}>0$

Hypothesis 13: In the proposed reduced generic individual non-managerial performance structural model it is hypothesised that *Organisational directed behaviour* will negatively influence *Need for supervision.*

H_{0436}: $\gamma_{25}=0$

H_{a436}: $\gamma_{25}>0$

Hypothesis 14: In the proposed reduced generic individual non-managerial performance structural model it is hypothesised that *Organisational directed behaviour* will negatively influence *Environmental impact.*

H_{0437}: $\gamma_{75}=0$

H_{a437}: $\gamma_{75}>0$

Hypothesis 15: In the proposed reduced generic individual non-managerial performance structural model it is hypothesised that *Organisational directed behaviour* will positively influence *Cost effectiveness.*

H_{0438}: $\gamma_{65}=0$

H_{a438}: $\gamma_{65}>0$

Hypothesis 16: In the proposed reduced generic individual non-managerial performance structural model it is hypothesised that *Quality of output* will positively influence *Market reputation.*

H_{0439}: $\beta_{10.3}=0$

H_{a439}: $\beta_{10.3}>0$

Hypothesis 17: In the proposed reduced generic individual non-managerial performance structural model it is hypothesised that *Quality of output* will positively influence *Customer satisfaction.*

H_{0440}: $\beta_{93}=0$

H_{a440}: $\beta_{93}>0$

Hypothesis 18: In the proposed reduced generic individual non-managerial performance structural model it is hypothesised that *Quantity of output* will positively influence *Market reputation.*

H_{0441}: $\beta_{10.4}=0$

H_{a441}: $\beta_{10.4}>0$

Hypothesis 19: In the proposed reduced generic individual non-managerial performance structural model it is hypothesised that *Timeliness* will positively influence *Market reputation.*

H_{0442}: $\beta_{10.5}=0$

H_{a442}: $\beta_{10.5}>0$

Hypothesis 20: In the proposed reduced generic individual non-managerial performance structural model it is hypothesised that *Timeliness* will positively influence *Customer satisfaction.*

H_{0443}: $\beta_{95}=0$

H_{a443}: $\beta_{95}>0$

Hypothesis 21: In the proposed reduced generic individual non-managerial performance structural model it is hypothesised that *Customer satisfaction* will positively influence *Market reputation.*

H_{0444}: $\beta_{10.9}=0$

H_{a444}: $\beta_{10.9}>0$

To test H_{0425} and $H_{0426}$the latent variables comprising the generic non-managerial performance structural model needed to be operationalised via two or more indicator variables. The exact and close fit of the generic non-managerial performance covariance structure model can, however, only be evaluated with confidence if it had been shown that the operationalisation of the latent variables in the structural model had been successful. Consequently, a fifth overarching substantive hypothesis had been formulated. The fifth overarching substantive research hypothesis (Hypothesis 5) proposes that the two item parcels earmarked to reflect each of the latent variables comprising the generic non-managerial structural model provided valid measures of the latent variables they were tasked to reflect. If the fifth substantive hypothesis is interpreted to mean that the hypothesised measurement model provides an exact account of the measurement model in the parameter, it translates into the exact fit hypothesis below:

H_{0445}: RMSEA = 0

H_{a445}: RMSEA > 0

Assuming that the hypothesised measurement model only approximates the processes that operated in reality to create the observed co-variance matrix, the following close fit null hypothesis was also be tested (Browne & Cudeck, 1993):

H_{0446}: RMSEA ≤ .05

H_{a446}: RMSEA ≥ .05

If either H_{0445} and/or H_{0446} were not rejected and exact and/or close fit had been achieved, or alternatively if the measurement model would at least demonstrate reasonable model fit, the following 28 null hypotheses[14] were tested concerning the freed elements in Λ^X:

H_{0i}: $\lambda_{jk}=0$; i=447, 448, …, 474; j=1,2, …, 28; k=1, 2, …, 14

H_{ai}: $\lambda_{jk}\neq 0$; i=447, 448, …, 474; j=1,2, …, 28; k=1, 2, …, 14

If either H_{0445} and/or H_{0446} were not rejected and exact or close fit had been achieved, or alternatively if the measurement model would at least demonstrate reasonable model fit, the following 28 null hypotheses were tested concerning the freed elements in Θ_δ:

H_{0i}: $\theta_{\delta jj}=0$; i=475, 476, …, 502; j=1, 2…; 28

H_{ai}: $\theta_{\delta jj}>0$; i=475, 4476, …, 502; j=1, 2…; 28

If either H_{0445} and/or H_{0446} were not rejected and exact or close fit had been achieved, or alternatively if the measurement model would at least demonstrate reasonable model fit, the following 91 null hypotheses were tested concerning the freed elements in Φ:

H_{0i}: $\phi_{jk}=0$; i=503, 504, …, 593; j=1, 2…14; k=1, 2…14; j≠k

H_{ai}: $\phi_{jk}>0$; i=503, 504, …, 593; j=1, 2…14; k=1, 2…14; j≠k

3.5 SAMPLING

Since the purpose of both the GCQ and the GOQ are to provide measures of generic non-managerial individual job performance in South Africa the target population includes all South African employees that are permanently employed in non-managerial jobs in organisations in the public and private sector in South Africa. To be clear, a non-managerial job refers to any position that has no formal managerial responsibilities towards subordinates. It is acknowledged that all jobs are characterised by some managerial elements hence the inclusion of the management and administration dimension in the GCQ. In non-managerial jobs, the managerial tasks are focused on the job environment, colleagues and the employee him-/herself. Myburgh (2013, p. 81) made the distinction between managerial and non-managerial

[14] The were 14 latent variables in the generic non-managerial performance covariance structure model, each operationalised by two composite indicator variables.

jobs based on the question "whether the employees have subordinates reporting to them over which they have a managerial prerogative and through which they accomplish specific objectives set for an organisational unit". Therefore, a non-managerial position is defined as a position where the person independently aims to accomplish a goal for which he/she is individually accountable. Myburgh (2013) mentions that in order to acquire valid and credible results for the generic performance measure, the ideal would be to select a representative probability sample from the target population, however she conceded that it is not practically easy to achieve this ideal in a study of this nature.

The sampling population for the current study was defined as all full-time, permanent personnel employed in non-managerial positions in the organisations approached by the researcher to participate in the research. A substantial and non-ignorable sampling gap between the target and sampling populations therefore had to be acknowledged. The substantial and non-ignorable sampling gap undermined the representativeness of the study sample irrespective of the sampling method that was used to select the study sample. The ideal would have been to select a probability sample from the sampling population. This would have been possible if an organisation initiated and conducted the research as part of their internal business operations. Institutional permission to conduct the research at an organisation, did, however, not mandate the researcher to insist that selected employees should complete the questionnaire.

The researcher gained access to organisations via the South African Board for People Practices (SABPP) who invited their members' organisations to participate in the study. The best the researcher could do was to ask the representative of the organisation to invite selected employees to participate in the research. Additionally, the researcher also approached organisations to get permission to collect data from their employees. Participation remained at the discretion of each individual employee even though their organisation provided institutional permission for their participation in the research. A non-probability sample of personnel in non-managerial positions was therefore used in the current study. A non-probability sample is almost synonymous with the risk of a self-selection error. The consequence of these two methodological limitations was that it cannot be claimed that the sample is an accurate representation of the target population. For this reason, any generalisation of the findings obtained in the current study to the target population had to be treated with circumspection.

This study intended to use structural equation modelling (SEM), which is a large sample technique. According to Tabachnick and Fidell (2007) in SEM the size of the sample has a major impact on the parameter estimates and the chi-square fit statistic. It is accepted that a sample size under 200 will have parameter estimates that are unstable and will be viewed as lacking in statistical power (Ullman,2006; Myburgh, 2013). The thirteen dimensions in the GCQ is measured by 104 items and the nine dimensions in the GOQ is measured by 72 items[15].

Since the GCQ first-order measurement model contains the highest number of freed parameters discussing the sample size from the perspective of this model should be sufficient, because the other models would require smaller sample sizes. If the GCQ measurement model is fitted with individual items as indicator variables, 286 freed parameters would have to be estimated in the measurement model (assuming the latent variables are correlated but that the latent variable variances are not estimated). The degrees of freedom of the GCQ model would then be 5174. Syntax developed by Preacher and Coffman (2006) in R and available at *http://www.quantpsy.org/rmsea/rmsea.htm* indicated that a sample size of 14.21 participants would then be adequate to ensure a .80 probability that an incorrect model with 5174 degrees of freedom is correctly rejected. This is applicable when the probability of a Type 1 error in testing the null hypothesis of close fit is fixed at .05 (i.e., P(reject H_0: RMSEA = .05|RMSEA = .08)). Required sample size, viewed from the perspective of statistical power, reduces as the degrees of freedom increases.

The Bentler and Chou (1987) rule of thumb is that the ratio of the sample size to the number of freed parameters should be between 5:1 and 10:1. This would propose a sample size of between 1430 and 2860 participants. This clearly sets an almost insurmountable logistical challenge for a study of this nature.

The ideal in a construct validation study always will be to fit the measurement model with individual items as indicators. In the current study the outcome of the Bentler and Chou (1987) rule of thumb, however, left the researcher with little choice but to

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[15] Refer to discussing about variable type in paragraph 3.7.2.2

consider item parcelling. If the two items would be combined in a parcel the GCQ measurement model is fitted with 52 item parcels as indicator variables. The degrees of freedom of the GCQ model would then be 1378 – 182 = 1196. The Preacher and Coffman (2006) software then returns a required sample size of 30.08. Assuming 52 item parcels the Bentler and Chou (1987) rule of thumb returns a required sample size between 910 and 1820. This still presented a formidable challenge.

Lastly, time, financial and logistical considerations needed to be taken into account. In other words, considerations regarding the cost involved, availability of suitable respondents and the willingness of the employer to commit a large number of employees to this study. After taking into account all of the abovementioned arguments a sample size target of 400 was considered adequate for this study[16].

3.6 DEVELOPMENT OF THE GENERIC COMPETENCY QUESTIONAIRE (GCQ) AND GENERIC OUTCOME QUESTIONAIRE (GOQ)

The GCQ is a measure of the level of competence that employees achieve on the latent competencies that constitute non-managerial performance in the workplace and the GOQ is a measure of the level of outcomes that employees achieve on the latent job outcomes that constitute non-managerial performance. Since these instruments are generic (i.e. they are not job specific) they are intended to be used to measure competence (GCQ) and outcomes (GOQ) for all non-managerial positions in private and public-sector organisations in South Africa (Myburgh, 2013). Together the two scales form the Generic Non-managerial Performance Questionnaire (GPQ).

[16] The actual size of the sample that was eventually attained will be discussed in Chapter 4.

Both the GCQ and the GOQ were developed to acquire self-rater assessments of job performance. The instruments are available in a self-assessment form. It is assumed that each latent performance/outcome dimension is measured by a unidimensional set of items (Myburgh, 2013). In terms of the self-assessment form, the description of the behaviours/outcomes are provided in the first person and the instruments make use of a 5-point Likert type scale to obtain responses from the respondent. The scales are anchored with specific observable manifestations of below standard, on par and above standard performance on each latent competency or latent outcome (Myburgh, 2013). Figure 3.4 illustrates an excerpt from the self-rater version of the GPQ.

	Definitions	**Well below standard** 1	**Below required standard** 2	**Satisfactory** 3	**Above required standard** 4	**Well above standard** 5	**Cannot rate**
A	**TASK PERFORMANCE: The extent to which the employee effectively performs activities that contribute to the organization's technical core, performs the foundational, substantive or technical tasks that are essential for a specific job effectively, successfully completes role activities prescribed in the job description and achieves personal work objectives. Core task productivity is defined as the quantity or volume of work produced and describes the ratio inputs in relation to the outcomes achieved.**						
A1	Production or service goals	I seldom meet production or service goals; I find excuses for not meeting goals		I normally meet production or service goals, but do not exceed goals		I exceed production or service goals every time	6
		1	2	3	4	5	
A2	Quantity of work output	The amount of work I deliver is significantly below the required output		Normally I deliver the amount of work required, but no more		I consistently exceed the amount of work required; I always do more than is expected	6
		1	2	3	4	5	
A3	Quality of work output	The quality of work I deliver is substantially below the required standards		Normally I deliver products or services of the required quality		I consistently exceed the quality of work required; consistently exceed quality standards	6
		1	2	3	4	5	
A4	Core task productivity	I achieve significantly less output than most employees with the same resources		I achieve basically the same output than most employees with the same resources		I achieve significantly more output than most employees with the same resources	6
		1	2	3	4	5	

Figure 3. 4 Illustrative excerpt from the self-rater version of the GPQ (Myburgh, 2013, p. 199)

Furthermore, the GCQ has thirteen subscales, each of which are made up of eight items, whilst the GOQ has nine subscales each of which are made up of eight items. The subscales of the GCQ are made up of items that describe the observable behaviours that denote the latent behavioural performance dimensions (or competencies). On the other hand, the subscales of the GOQ are made up of items that describe the observable manifestations that denote the latent outcomes. The goal was to acquire a set of items for each subscale that will reflect an uncontaminated expression of the latent performance dimension it was intended to reflect (Myburgh, 2013). At the same time, it must be understood that it is unrealistic to expect any behaviour to only reflect one underlying latent variable. The nature of human behaviour is too complex. With this in mind, the goal had been to formulate a set of items for each subscale that, to a degree, purely reflect the common dimension of interest but where the systematic measurement error influences would share very little common variance (Myburgh, 2013). For this reason, the item sets created to serve as subscales for each latent performance/outcome dimension were regarded as essentially unidimensional if the inter-item partial correlations between items; controlling for the common underlying factor, approach zero (Myburgh, 2013).

The GCQ and the GOQ were administered via a single questionnaire. Appendix A displays the GCQ and the GOQ.

3.7 STATISTICAL ANALYSIS

3.7.1 ITEM AND DIMENSIONALITY ANALYSIS

The following discussion applies to both instruments (GCQ and GOQ). Before the fitting of the measurement models item analysis was performed in order to examine the assumption that items comprising the subscales of the GCQ and the GOQ successfully reflect a common underlying latent variable. In the design of the both the GCQ and the GOQ the objective was to construct essentially one-dimensional sets of items to reflect variance in each of the latent dimensions collectively comprising the generic performance construct. The items were designed to function as relatively homogeneous stimulus sets to which respondents exhibit behaviour that is a relatively uncontaminated expression of the performance construct as it applies to the non-managerial employee. Item analysis was used to distinguish items that were not reflective of the latent dimension that the subscale in question was designed to reflect. Items were considered to be poor items if (a) they failed to discriminate between relatively small differences in the latent performance dimension, and/or (b) failed to reflect the latent performance dimension it was designated to reflect and consequently did not respond in unison with its item colleagues in the subscale that did reflect the target latent performance dimension. According to Anastasi and Urbina (1997) item analysis can be utilised to create high validity and reliability in tests i.e. tests can be improved via the selection, substitution and the revision of items.

High internal consistency reliability for each subscale (i.e., high Cronbach alpha's), high item standard deviations, the absence of extreme item means, high item-subscale total correlations, high squared multiple correlations when regressing items on linear composites of the remaining items comprising the subscale and other favourable item statistics meant that it was permissible to claim that the items comprising a subscale validly and reliably measured the target latent performance dimension. It cannot, however, be unequivocally claimed that the target latent performance dimension was successfully measured. A finding of low internal consistency reliability and other unfavourable item statistics, in contrast, meant that it could be unequivocally claimed that the target latent performance dimension was not successfully measured. High internal consistency reliability for each subscale (i.e., high Cronbach alpha's), high item standard deviations, the absence of extreme item means, high item-subscale total correlations, high squared multiple correlations when regressing items on linear composites of the remaining items comprising the subscale and other favourable item statistics will, however, not provide sufficient evidence that the common underlying latent variable is in fact a unidimensional latent variable. In the conceptualisation of the performance construct and in the design of the GCQ and the GOQ the fundamental assumption was that each of the performance dimensions are unidimensional latent variables. It is thereby, however not implied that each of the performance dimensions are narrow and specific constructs. Instead each performance dimension should be viewed as a broad facet of non-managerial performance that manifests itself in various specific behaviours. However, each of the items comprising each of the subscales for both models were expected to load (albeit rather modestly) on a single factor. These items in the measurement model idealistically should function as homogenous stimuli to which respondents respond in a manner that is a true expression of their standing on that specific single underlying performance latent variable. The dimensionality analysis was used to verify the unidimensionality of each subscale. Dimensionality analysis allowed the researcher to remove items with insufficient factor loadings. In addition, if needed, heterogeneous subscales could be divided into two or more homogeneous subscales.

3.7.2 EVALUTATION OF STATISTICAL ASSUMPTIONS

Before any analysis could be performed the problem of missing values needed to be addressed. The typical treatment of missing values through list-wise deletion of cases tends to reduce the sample size as a function of the extent of the problem and the length of the questionnaire (Theron, 2016). Replacing missing values with the mean of the items would wash out most of the structure that exist in the data (Theron, 2016). The pair-wise deletion of cases could offer a possible solution if it does not result in a correlation matrix with extreme variation in N-values, because correlation/covariance matrices with excessive variation in N-values tend to fail to be positive-definite (Jöreskog & Sörbom, 1996).

Normally the best solution would be to use a multiple imputation procedure. The big advantage of multiple imputation procedures available in LISREL is that no cases with missing values are deleted. Instead estimates of missing values are derived for all the cases in the original sample (Theron, 2016). The multiple imputation procedures that is available in LISREL makes the assumption that the values are missing at random, that the observed variables are continuous and follow a multivariate normal distribution (Theron, 2016). Alternatively, imputation by matching could be used if the data set meets the requirements of multivariate normality. This involves the process of substituting real values for missing values (Theron, 2016). The missing values are substituted by values derived from cases with similar response patterns (Jöreskog & Sörbom, 2003; Myburgh, 2013). The decision on the specific imputation method to use was post-phoned until that data become available and the skewness/symmetry and the extent of the missingness was apparent.

3.7.2.1 VARIABLE TYPE

The observed variables of all the measurement models as well as the structural model were treated as continuous. However, the motivation for this decision was different for the measurement models and the structural model. In terms of the measurement models the individual items comprising the scales (measured on a 5-point Likert scale) measuring the latent variables, in the GCQ and the GOQ, contain five or more scale points (Methuen & Kaplan, 1985). The complexity of comprehensive LISREL models if individual items were treated as indicator variables normally results in a decision for item parcelling (Theron, 2016). In terms of the structural model the calculating of item parcels creates continues variables that may be analysed via maximum likelihood estimation if the normality assumption has been met).

The original intention was to create item parcels from the items of each subscale by calculating the unweighted average of the odd numbered items and the even numbered items of each scale (Theron, 2016). The calculation of item parcels had the added advantage of simplifying the structural equation modelling, because if each individual item would have served as an indicator variable it would most certainly have resulted in an extensive exercise due to the sheer number of items. Besides simplifying the process of fitting a model, the creation of item parcels also leads to more reliable indicator variables (Nunnally, 1978). The intention was to create between three and five item parcels for the GCQ to reflect the five second-order latent performance dimensions and two item parcels for each latent outcome dimension.

3.7.3 CONFIRMATORY FACTOR ANALYSIS

The fitting of the competency measurement model, the outcome measurement model and the second-order factor measurement model are discussed in the ensuing paragraph. Fit indices, residual covariances, modification indices and measurement model parameter estimates pertaining to all three models will be discussed.

An *ex post facto* correlation design with structural equation modelling (SEM) via LISREL 8.8 was used as the statistical analysis technique to test the overarching substantive research hypotheses.

Davidson (2000, p. 709) explains structural equation modelling as “a collection of statistical techniques that allow for the examination of a set of relationships between one or more independent variables, either continuously or discretely, and one or more dependent variables, either continuously or discretely”. Similarly, Hair, Anderson, Tatham and Black (1995) describes structural equation modelling as a multivariate statistical analysis tool that allows researchers to (1) scrutinize measurement and structural hypotheses as explanations for correlations and (2) test both direct and indirect influences among constructs.

In structural modelling a distinction is made between a measurement model, a structural model and a comprehensive covariance structure model (Diamantopoulos & Siguaw, 2000). A measurement model represents an overarching hypothesis on the nature of the relationships between indicator variables and the latent variables they were designated to reflect and the correlational relationships that exist between latent variables. A structural model represents an overarching hypothesis on the nature of the relationships between the latent variables and the correlational relationships that exist between exogenous latent variables. A comprehensive covariance structure model represents the combination of the measurement and structural models. The current study has as its primary objective the construct validation of the GCQ by evaluating (1) the fit of the first-order GCQ measurement model[17], and (2) the fit of the generic non-managerial performance structural model. The fit of the first-order GCQ measurement model was examined through confirmatory factor analysis (Myburgh, 2013). Confirmatory factor analysis revolves around the testing of specific hypotheses on the number of factors/latent variables underlying the observed inter-item covariance matrix, the nature if the relationship between the factors and the nature of the loading pattern of the items on the factors. According to Kelloway (1998; Myburgh, 2013) SEM is used to test the ability of the factor structure hypothesised in the model to reproduce the observed inter-item covariance matrix, to test the strength and significance of the correlations between factors and the examine the strength and significance of the factor loadings. The confirmatory factor analysis on the first-order GCQ measurement model, the first-order GOQ measurement model and the second-order GCQ measurement model unfolded through five distinct, but interrelated steps, which characterise most applications of SEM (Bolllen & Long, 1993; Diamantopoulos & Siguaw, 2000):

- Measurement model specification
- Evaluation of measurement model identification
- Estimation of measurement model parameters
- Testing of measurement model fit, and
- Interpretation of measurement model parameter estimates and possible measurement model re-specification/modification

3.7.3.1 MEASUREMENT MODEL SPECIFICATION

The conceptualisation on the generic non-managerial performance construct and architecture of the GCQ and the GOQ implied hypotheses on the manner in which the individual test item scores are expected to be influenced by the dimensions of the generic performance construct as defined by the GCQ and the GOQ. The manner in which the responses of the respondents to the GCQ and GOQ item parcels are hypothesised to be related to the underlying first-order dimensions is depicted as

[17] The study will also evaluate the fit of the GOQ and the second-order GPQ measurement model. The former analysis was necessary to allow the confident formation of item parcels for the outcome latent variables in the generic non-managerial performance structural model. The latter analysis was necessary to allow the reduction of the non-managerial competencies from 13 to 10 in the non-managerial performance structural model. The fitting of the generic non-managerial performance structural model forms an integral part of the evaluation of the construct validity of the GPQ.

matrix equations (equation 1 and 2). Whether it is justified to make inferences about the dimensions in the manner dictated by the scoring keys of the two instruments depend on the fit of the measurement models, the statistical significance and strength of the loading of the item parcels on the underlying latent variables, and the extent to which the item parcels are plagued by measurement error[18]. The overarching substantive research hypotheses that the GCQ and the GOQ provide construct valid measure of non-managerial performance as defined by the instruments, amongst South African non-managerial personnel were tested by testing the fit of the measurement models defined by the matrix equations, the significance of the factor loadings and the significance of the measurement error variances via the testing of the statistical hypotheses described in paragraph 3.4.

Equation 1 depicts the first-order GCQ measurement model implied by the conceptualisation of the generic non-managerial performance construct and the architecture of the GCQ when four items parcels are calculated from the items comprising each of the thirteen subscales and the parcels are used to represent the latent performance dimensions.

$$\mathbf{X} = \Lambda^x\xi + \delta \text{ --- } [1]$$

Where:

- $\mathbf{X}$ is 52x1 column vector of observed item parcel scores;
- Λ^x is a 52x13 matrix of factor loadings;
- ξ is a 1x13 column vector of latent behavioural performance dimensions; and
- δ is a 52x1 column vector of unique or measurement error components consisting of the combined effect on X of systematic non-relevant influences and random measurement error (Jöreskog & Sörbom, 1993).

The 52x52 Θ_δ variance-covariance matrix was assumed to be a diagonal matrix. All off-diagonal elements in the 13x13 Φ matrix were freed to be estimated.

[18] Again it is acknowledged that the question whether it is justified to make inferences about the dimensions in the manner dictated by the scoring keys of the two instruments really depend on the fit of the measurement models when operationalising the latent dimensions via the individual items, the statistical significance and strength of the loading of the items on the underlying latent variables, and the extent to which the items are plagued by measurement error

Equation 2 depicts the first-order GOQ measurement model implied by the conceptualisation of the generic non-managerial performance construct and the architecture of the GOQ when four items parcels are calculated from the items comprising each of the nine subscales and the parcels are used to represent the latent performance dimensions.

$$\mathbf{X} = \Lambda^{X}\xi + \delta \text{ -- [2]}$$

Where:

- **X** is 36x1 column vector of observed item parcel scores;
- Λ^{x} is a 36x10 matrix of factor loadings;
- ξ is a 1x9 column vector of latent behavioural performance dimensions; and
- δ is a 36x1 column vector of unique or measurement error components consisting of the combined effect on X of systematic non-relevant influences and random measurement error (Jöreskog & Sörbom, 1993).

The 36x36 Θ_δ variance-covariance matrix was assumed to be a diagonal matrix. All off-diagonal elements in the 10x10 Φ matrix were freed to be estimated.

Equation 3 depicts the second-order GCQ measurement model implied by the conceptualisation of the generic non-managerial performance construct and the architecture of the GCQ when four items parcels are calculated from the items comprising each of the thirteen subscales, the parcels are used to represent the latent performance dimensions and the thirteen first-order competency latent variables load on five second-order factors.

$$\mathbf{Y} = \Lambda^{Y}\eta + \Gamma\xi + \delta \text{ -- [3]}$$

Where:

- **X** is 52x1 column vector of observed item parcel scores;
- Λ^{x} is a 52x13 matrix of factor loadings;
- η is a 13x1 column vector of first-order latent behavioural performance dimensions;

- Γ is a 13x5 matrix of regression coefficients describing the slope of the regression of the j[th] first-order competency η_j on the i[th] second-order competency ξ_i;
- ξ is a 5x1 column vector of second-order latent behavioural performance dimensions; and
- δ is a 52x1 column vector of unique or measurement error components consisting of the combined effect on X of systematic non-relevant influences and random measurement error (Jöreskog & Sörbom, 1993).

The 52x52 Θ_δ variance-covariance matrix was assumed to be a diagonal matrix. All off-diagonal elements in the 5x5 Φ matrix were freed to be estimated.

Equation 4 depicts the generic non-managerial performance measurement model implied by the operationalisation of the generic non-managerial performance construct when 23 items parcels are calculated in total to represent the latent variables comprising the generic non-managerial structural model.

$$\mathbf{X} = \Lambda^X\xi + \delta \text{ --- [4]}$$

Where:

- $\mathbf{X}$ is 23x1 column vector of observed item parcel scores;
- Λ^x is a 23x14 matrix of factor loadings;
- ξ is a 14x1 column vector of latent behavioural performance dimensions; and
- δ is a 23x1 column vector of unique or measurement error components consisting of the combined effect on X of systematic non-relevant influences and random measurement error (Jöreskog & Sörbom, 1993).

The 23x23 Θ_δ variance-covariance matrix was assumed to be a diagonal matrix. All off-diagonal elements in the 14x14 Φ matrix were freed to be estimated.

3.7.3.2 EVALUATION OF THE MEASUREMENT MODEL IDENTIFICATION

"The problem of identification revolves around the question of whether one has sufficient information to obtain a unique solution for the parameters to be estimated in the model. If a model is not identified, it is not possible to determine unique values for the model coefficients” (Diamantopoulos & Siguaw., 2000, p. 48). According to MacCallum (1995) the key issue is whether the nature of the model and the data would allow a unique solution for the freed parameters in the model. This is only possible if for each free parameter there would have been at least one algebraic function that expresses that parameter as a function of sample variance or co-variance terms.

On the other hand, Diamantopoulos and Siguaw (2000) and MacCallum (1995) mention two important conditions regarding model identification. The first of which is that a definite scale should be established for each latent variable and the second is that the model parameters to be estimated should not exceed the number of unique variance or covariance terms in the observed sample covariance matrix (Diamantopoulos and Siguaw, 2000; MacCallum, 1995). The first requirement is met when the latent variables comprising the model are standardised so that the standard deviation becomes the unit of measurement. The following formula expressed as equation 5 can be used to determine whether a specified model meets the latter minimum requirement for identification:

$t \leq s/2$ -- [5]

where:

t = the number of parameters to be estimated

s = the number of variances and co-variances amongst the manifest (observable) variables, calculated as $(p)(p+1)$

p = the number of observed variables (i.e., item parcels in this case).

If $t > s/2$ the model is unidentified (or under-identified). If a model is unidentified “it is the failure of the combined model and data constraints to identify (locate or determine) unique estimates that results in the identification problem” (Diamantopoulos et al., 2000 p. 48). If $t = s/2$ the model is just-identified. This means that a single unique solution can be obtained for the parameter estimates. A just-identified model, however, has zero degrees of freedom and therefore no variance-covariance information remains to test the derived model solution (Diamantopoulos et al., 2000). If $t < s/2$ the model is over-identified. In this regard, it means that more than one estimate of each parameter can be obtained. In a model that is over-identified, the equations available outnumber the number of parameters to be estimated (Diamantopoulos et al., 2000). An over-identified model has positive degrees of freedom and therefore variance-covariance information remains to test the derived model solution (Diamantopoulos et al., 2000).

The first-order GCQ measurement model has 182 freed model parameters[19] that had to be estimated. There are 1378 unique variance and covariance terms in the observed covariance matrix. The degrees of freedom of the model is therefore 1196. The model is therefore over-identified with positive degrees of freedom.

The GOQ measurement model has 125 freed model parameters[20] that have to be estimated. There are 820 unique variance and covariance terms in the observed covariance matrix. The degree of freedom of the model is therefore 695. The model is therefore over-identified with positive degrees of freedom.

The second-order GCQ measurement model has 140 freed model parameters[21] that have to be estimated. There are 1378 unique variance and covariance terms in the observed covariance matrix. The degree of freedom of the model is therefore 1238. The model is therefore over-identified with positive degrees of freedom.

3.7.3.3 ESTIMATION OF MEASUREMENT MODEL PARAMETERS

3.7.3.3.1 UNIVARIATE AND MULTIVARIATE NORMALITY

When fitting measurement models to continuous data, the method of maximum likelihood estimation is used to derive estimates for the freed measurement model parameters. The use of this method assumes multivariate normality (Kaplan, 2000). Alternative estimation methods that can be used in structural equation modelling are true generalised least squares (GLS), weighted least squares (WLS), diagonally weighted least squares (DWLS), robust maximum likelihood (RML) and full information maximum likelihood (FIML) (Mels, 2003). If the data used to fit a structural equation models does not follow a multivariate normal distribution the methods that can be used are robust maximum likelihood (RML), weighted least squares (WLS) and diagonally weighted least squares (DWLS) (Mels, 2003). Robust maximum likelihood is recommended in cases where the assumption of a multivariate normal distribution

[19] The GPQ comprises 13 subscales each containing 8 items that have been randomly parcelled into 4 item parcels containing two items each.
[20] The GOQ comprises 10 subscales each containing 8 items that have been randomly parcelled into 4 item parcels containing two items each.
[21] The GPQ comprises 13 subscales each containing 8 items that have been randomly parcelled into 4 item parcels containing two items each. The GPQ measures 5 second-order competencies.

does not hold (Mels; 2003). In the case of the current study, if the null hypothesis of multivariate normality was rejected, normalisation was attempted. The success of this attempt was analysed by testing the null hypothesis that the normalised indicator variable distribution follows a multivariate normal distribution (Chikampa, 2013; Burger, 2012). The outcome then determined whether Ml estimation or RML estimation was used.

3.7.3.4 TESTING MODEL FIT

Model fit explains how well the proposed model that reflects an underlying theory or hypothesis is able to account for the covariance between the observations made on the latent variables comprising the model (Hooper, Coughlan & Mullen, 2008). The objective of structural equation modelling is to determine how well the model "fits" the data of the underlying theory or hypothesis, or to be more precise, how well the model can account for the observed co-variance matrix. The model fits the data well when the estimated model parameters can mathematically closely reproduce the observed co-variance matrix. The model can then be deemed as providing a plausible account of the process that generated the observed covariance matrix. It is important to mention that even if the model fits the data well it can never be concluded that the process depicted in the model is necessarily the process that underpins the phenomenon of interest.

LISREL 8.8 provides numerous fit indices to guide the researcher in assessing both the absolute and comparative fit of the measurement model and the structural model. More than one cut-off value has been suggested for some of these indices, combined with the lack of agreement between different indices on the quality of the model fit, often leads to conflicting verdicts on model fit. This necessitates caution when interpreting the fit statistics, because model fit is one of the most important steps in the process of structural equation modelling (Diamantopoulos et al., 2000; Hooper et al., 2008).

Therefore, rather than basing the decision on model fit on one or two favourable fit indices, the full spectrum of fit indices available in LISREL 8.8 was considered to come to an integrated verdict on the fit of the measurement and structural models. The full spectrum of indices produced by LISREL 8.8 that were considered are discussed in paragraph 3.7.3.4.1.

In addition to the spectrum of fit statistics produced by LISREL 8.8, the magnitude and distribution of the standardised residuals as well as the magnitude of the model identification indices calculated for Λ^x and Θ_δ were considered in the evaluation of the measurement model fit. Large modification index values indicate the existence of measurement model parameters, that if set free, would improve the fit of the model. If a high percentage of the fixed parameters in the model would improve the model fit if they were freed, it would reflect negatively on the fit of the measurement model, because it would suggest that there are a number of ways in which to improve the fit of the current models (Van Heerden, 2012). In the case of the structural model the modification indices calculated for Γ and **B** were evaluated as comments on the fit of the model.

3.7.3.4.1 LISREL FIT INDICES

ABSOLUTE FIT INDICES

MODEL CHI-SQUARE

Traditionally the normal theory chi-square is used to evaluate overall model fit when the multivariate normality assumption is met and the Satorra-Bentler chi-square is made use of when the assumption of multivariate normality does not hold (Mels, 2013; Wilbers, 2014). The Satorra-Bentler chi-square statistic is obtained from using the robust maximum likelihood parameter estimation method and is better suited to multivariate non-normal data (Mels, 2013; Wilbers, 2014). The normal theory and Satorra-Bentler chi-square statistics determine the incongruity between the observed and reproduced covariance matrices. The chi-square statistic is used to test the exact fit null hypothesis (H_0: RMSEA = 0)[22]. In other words, the chi-square statistic tests the hypothesis that the measurement model fits the data in the population perfectly and can reproduce the observed co-variance matrix in the sample to a degree of accuracy that can be explained in terms of sampling error only. Therefore, an insignificant chi-square ($p>.05$) will indicate a good model fit. Both chi-square statistics are sensitive to sample size. Large sample sizes have a big probability to lead to model rejections on the other hand, small sample sizes more often than not lead to the chi-square having

[22] In the current study H_{01}, H_{0185} and H_{0312} will be tested to evaluate the exact fit of the first-order GPQ, the GOQ and the second-order GPQ. H_{0461} will be tested to evaluate the success of the operationalisation of the latent variables comprising the generic non-managerial performance model.

a lack of power to distinguish between a good model fit and a poor model fit (Hooper, Coughlan & Mullen, 2008).

ROOT MEAN SQUARE ERROR OF APPORXIMATION (RMSEA)

The RMSEA ascertains how well the model, with undetermined but optimally selected parameter estimates would fit the population co-variance matrix. The RMSEA statistic has become one of the most important fit indices, because of its sensitivity to the number of model parameters (Hooper et al., 2008). The RMSEA also focuses on the correspondence between the observed and reproduced covariance matrices in the population but indicate the inconsistency function value in terms of the degrees of freedom of the model (Diamantopoulos & Siguaw, 2000). A value of .05 or lower indicates a good model fit and a value below .08 indicates reasonable model fit (Browne & Cudeck, 1993). Moreover, LISREL provides a test for the closeness of model fit by formally calculating the probability of the sample RMSEA value being observed in the sample under the null hypothesis H_0: RMSEA ≤ .05[23] (Du Toit & Du Toit, 2001).

GOODNESS-OF-FIT STATISTIC (GFI) AND THE ADJUSTED GOODNESS-OF-FIT STATISTIC (AGFI)

The Goodness-of Fit statistic was introduced to serve as an alternative to the Chi-square test (Jöreskog and Sorböm, 2003). In terms of the GFI a cut-off value of .90 is advised for good model fit, however in cases where sample sizes are small and factor loading are low a cut-off value of .95 is advised. The adjusted goodness-of fit statistic (AGFI) adjusts the GFI based on the degrees of freedom. The same cut-off values apply to the AGFI (Hooper et al., 2008).

ROOT MEAN SQUARE RESIDUAL (RMR) AND STANDARDISED ROOT MEAN SQUARE RESIDUAL (SRMR)

“The root mean square residual (RMR) and standardized root mean square residual (SRMR) are the square root of the discrepancy between the sample covariance matrix and the model covariance matrix” (Hooper et al., 2008; p. 54). The scale of each indicator is used to compute the range of the RMR. However, complications arise

[23] In the current study H_{02}, H_{0186} and H_{0313} will be tested to evaluate the close fit of the first-order GPQ, the GOQ and the second-order GPQ. H_{0462} will be tested to evaluate the success of the operationalisation of the latent variables comprising the generic non-managerial performance model.

when interpreting the RMR when questionnaires include items with varying scales. This is to say some items may be measured on a scale ranging from 1-5 whilst other items are measured on a scale ranging from 1-7. The standardised RMR (SRMR) provides a solution to the problem and is regarded as much more useful in interpretation. Models indicating good fit have SRMR values less than .05 while models reflecting SRMR values of .08 border on acceptable. It is important to mention that if the SRMR indicates exact model fit (SRMR = 0) the role of the number of freed parameters and the sample size should be considered because a large number of parameters and large sample sizes, tends to lead to a lower SRMR value (Hooper et al., 2008).

INCREMENTAL FIT INDICES

Incremental fit indices do not use the chi-square on its own to evaluate the model fit. Instead these indices compare the model chi-square value to that of a baseline model (Hooper et al., 2008).

NORMED-FIT INDEX (NFI) and NON-NORMED FIT INDEX (NNFI)

The NFI assesses the model fit by comparing the X^2 value of the model to the X^2 of the null model. The worst-case scenario is represented by the null/independence model, because it describes all variables as structurally unrelated. The values for the NFI can range from 0 to 1. Values greater than .90 reflect good fit, however when interpreting this index an acceptable cut-off of NFI value equal to or larger than .95 is suggested. A limitation of the NFI is that it is sensitive to sample size, to be more specific it underestimates fit for samples less than 200 (Hooper et al., 2008). This limitation of the NFI was ameliorated by the NNFI, which is an index that prefers simpler models. In other words, the NNFI index (along with RMSEA and CFI), is less sensitive to and less affected by sample size (Bollen & Long, 1993; Hooper et al., 2008). A cut-off of NNFI ≥ 0.95 is suggested (Hooper et al., 2008).

COMPARATIVE FIT INDEX (CFI)

The CFI is a modified form of the NFI that makes use of sample size. Just as the NFI the index assumes a model where all the latent variables are structurally unrelated. The values for the CFI can range from 0 to 1. When interpreting this index an acceptable cut-off value on the CFI index is .95 is suggested with values equal to or larger than .95 indicating good model fit (Hooper et al., 2008).

PARSIMONY FIT INDICES

Parsimony fit indices address the problem of model complexity. The parsimony fit indices include the Parsimony Goodness-of-Fit index (PGFI) and the Parsimonious Normed Fit Index (PNFI). The PGFI is derived from the GFI by adjusting for loss of degrees of freedom. Similarly, the PNFI also adjusts for degrees of freedom, however it is derived from the NFI. The values of the parsimony fit indices are markedly lower when compared to other goodness of fit indices, because of the way parsimony indices are penalised for model complexity. Therefore, values of .50 or larger can be interpreted as indicating good model fit (Hooper et al., 2008).

Information criteria indices are a second form of parsimony fit indices. They are the Akaike Information Criterion (AIC) and the Consistent Version of AIC (CAIC). These indices are used to compare non-nested or non-hierarchical models. Small values indicate a good fit; however, the absence of a 0-1 scale make it difficult to determine a cut-off value (Hooper et al., 2008). Smaller AIC and CAIC values indicate better fit. It is therefore expected that the AIC and CAIC values calculated for the fitted model should be smaller than those calculated for the independence model as well as the saturated model.

3.7.3.5 INTERPRETATION OF MEASUREMENT MODEL PARAMETER ESTIMATES

If at least close fit is achieved by the measurement models the measurement model parameter estimates were interpreted. This refers to the statistical significance and magnitude of the freed factor loadings in in the unstandardised and completely standardised Λ^x, the statistical significance and magnitude of the measurement error variances in the main diagonal in the unstandardised and completely standardised Θ_δ and the statistical significance and magnitude of the covariances between the latent variables in Φ (Van Heerden, 2012). The statistical significance of the estimates in Λ^x were tested by testing:

- H_{0i}: $\lambda_{jk}=0$; i=3, 4, …, 54; j=1,2, …, 52; k=1, 2, …, 13;
- H_{0i}: $\lambda_{jk}=0$; i=187, 188, …, 226; j=1,2, …, 40; k=1, 2, …, 10;

- H_{0i}: λ_{jk}=0; i=314, 315, …, 365; j=1,2, …, 104; k=1, 2, …, 1; and
- H_{0i}: λ_{jk}=0; i=463, 464, …, 492; j=1,2, …, 30; k=1, 2, …, 15.

The statistical significance of the estimates in Θ_δ were tested by testing:

- H_{0i}: $\theta_{\delta jj}$ =0; i=55, 56, …, 106; j=1, 2…; 52;
- H_{0i}: $\Theta_{\delta jj}$ =0; i=227, 228, …, 266; j=1, 2…; 40;
- H_{0i}: $\theta_{\delta jj}$ =0; i=366, 367, …, 417; j=1, 2…; 10; and
- H_{0i}: $\theta_{\delta jj}$ =0; i=493, 494, …, 522; j=1, 2…; 30

The statistical significance of the estimates in Φ were tested by testing:

- H_{0i}: ϕ_{jk} =0; i=107, 108, …, 184; j=1, 2…13; k=1, 2…13; j≠k;
- H_{0i}: Φ_{jk} =0; i=267, 268, …, 311; j=1, 2…10; k=1, 2…10; j≠k;
- H_{0i}: $\theta_{\delta jj}$ =0; i=366, 367, …, 417; j=1, 2…; 10; and
- H_{0i}: ϕ_{jk} =0; i=523, 524, …, 627; j=1, 2…15; k=1, 2…15; j≠k

3.7.3.6 DISCRIMINANT VALIDITY

The latent variables in the measurement models are regarded as qualitatively distinct, separate constructs. If latent variables should correlate excessively strongly in Φ the question arises whether the instrument has succeeded in measuring the latent variables as distinct, separate constructs (Van Heerden, 2012). In order to analyse the discriminant validity of the measurement model, confidence intervals were calculated for the ϕ_{ij} estimates. When the 95% confidence intervals for the phi-estimates ϕ_{ij} do not contain unity, discriminant validity has been achieved.

3.7.4 FITTING OF THE STRUCTURAL MODEL

Provided at least close measurement model fit had been achieved for the measurement model reflecting the operationalising of the latent variables comprising the reduced generic non-managerial performance model, the comprehensive LISREL model was fitted by analysing the covariance matrix. If the multivariate normality assumption was satisfied maximum likelihood estimation was be used (before or after normalisation). Where normalisation was unsuccessful in achieving multivariate normality in the observed data, robust maximum likelihood estimation served as an alternative (Van Heerden, 2012).

The structural equation modelling analysis on the generic non-managerial structural model unfolded through same five distinct, but interrelated steps that applied to the CFA (Bolllen & Long, 1993; Diamantopoulos & Siguaw, 2000).

3.7.4.1 STRUCTURAL MODEL SPECIFICATION

Equation 6 depicts the reduced generic non-managerial structural model.

$$\eta = \mathbf{B}\eta + \Gamma\xi + \zeta \text{--} [6]$$

Where:

- η is 9x1 column vector of endogenous latent variables;
- **B** is a 9x9 square matrix of partial regression coefficients describing the slope of the regression of η_i on η_j;
- ξ is a 5 x1 column vector of latent behavioural performance dimensions;
- Γ is a 9x5 matrix of partial regression coefficients describing the slope of the regression of η_j on ξ_j; and
- ζ is a 9x1 column vector of unique or structural error components (Jöreskog & Sörbom, 1993).

The 9x9 Ψ structural error variance-covariance matrix was assumed to be a diagonal matrix. The 9 structural error terms ζ_j were therefore assumed to be uncorrelated. All off-diagonal elements in the 5x5 Φ matrix were freed to be estimated.

3.7.4.2 EVALUATION OF COMPREHENSIVE COVARIANCE STRUCTURAL MODEL IDENTIFICATION

The generic non-managerial comprehensive covariance structure model has 88 freed model parameters[24] that had to be estimated. There are 496 unique variance and covariance terms in the observed covariance matrix. The degrees of freedom of the model is therefore 408 The model is therefore over-identified with positive degrees of freedom.

[24] The generic non-managerial performance structural model comprises ?? endogenous latent variables and ?? exogenous latent variables that have been operationalised by two sets of item parcels each.

3.7.4.3 TESTING OF COMPREHENSIVE COVARIANCE STRUCTURE MODEL FIT

The fit of the generic non-managerial performance comprehensive covariance structure model was evaluated by testing H_{0441} and H_{0442}. The same basket of fit statistics that was discussed in paragraph 3.7.3.4.1 and that was used to evaluate the fit of the measurement models was also used to evaluate the fit of the comprehensive covariance structure model. Further thought was also given in terms of the magnitude and distribution of the standardised residuals and the magnitude of model modification indices calculated for Γ and **B**. Large modification index values indicate the existence of structural model parameters, that if set free, would improve the fit of the model. If a high percentage of the fixed parameters in the model would improve the model fit if they were freed, it would reflect negatively on the fit of the structural model, because it would suggest that there are a number of ways in which to improve the fit of the current model (Van Heerden, 2012).

If H_{0441} and/or H_{0442} were not rejected or if at least reasonable comprehensive covariance structure model fit was obtained the path-specific substantive hypotheses were tested by testing H_{0443} – H_{0459}.

CHAPTER 4

AN EVALUATION OF RESEARCH ETHICS

4.1 INTRODUCTION

The protection of the dignity, rights, safety and well-being of the research participants involved in this study is paramount. Consequently, it was necessary to reflect on the potential ethical risks associated with the proposed research as outlined in this proposal. Empirical behavioural research necessitates either passive or active participation of individuals which exposes them to situations where their dignity, rights, safety and well-being might be compromised to some degree. The all-important question to consider was whether this compromise can be justified in term of the purpose of the current research. The proposed research in this study had a benevolent purpose, therefore the all-important question was whether the costs that research participants had to incur justified the benefits that accrue to society (Standard Operating Procedure, 2012).

4.2 INFORMED CONSENT AND INFORMED INSTITUTIONAL PERMISSION

The research participant reserved the right to voluntarily decide whether he/she wished to take part in research. In order for the participant to make an informed decision as to whether they want to participate in the research, they were informed regarding the following: (1) The objective and purpose of the research (2) What participation in the research will demand (3) How the research results will be distributed and used (4) Who researchers are and what their affiliation is (5) How they can make further inquiries about the research (6) What their rights as research participants are and where they can find more information regarding their research rights (Standard Operating Procedure, 2012).

Annexure 12 of the Ethical Rules of Conduct for Practitioners Registered under the Health Professions Act (Act no. 56 of 1974) (Republic of South Africa, 2006) stipulates that a psychologist that undertakes research is morally and legally bound to enter into an agreement with participants on the nature of the research as well as the responsibilities of both parties. The agreement according to which the research participant provides informed consent should meet the following requirements according to Annexure 12 (Republic of South Africa, 2006, p. 42):

1) A psychologist shall use language that is reasonably understandable to the research participant concerned in obtaining his or her informed consent.
2) Informed consent referred to in sub rule (1) shall be appropriately documented, and in obtaining such consent the psychologist shall –

a) inform the participant of the nature of the research;
b) inform the participant that he or she is free to participate or decline to participate in or to withdraw from the research;
c) explain the foreseeable consequences of declining or withdrawing;
d) inform the participant of the significant factors that may be expected to influence his or her willingness to participate (such as risks, discomfort, adverse effects or exceptions to the requirement of confidentiality);
e) explain any other matter about which the participant enquires;
f) when conducting research with a research participant such as a student or subordinate, take special care to protect such participant from the adverse consequences of declining or withdrawing from participation;
g) when research participation is a course requirement or opportunity for extra credit, give a participant the choice of equitable alternative activities; and
h) in the case of a person who is legally incapable of giving informed consent, nevertheless -
   i. provide an appropriate explanation;
   ii. obtain the participants assent; and
   iii. obtain appropriate permission form a person legally authorized to give such permission.

Informed consent was acquired from all research participant before the assessments commenced (see Appendix A). Annexure 12 of the Ethical Rules of Conduct for Practitioners Registered under the Health Professions Act (Act no. 56 of 1974) (Republic of South Africa, 2006, p. 41) requires psychological researchers to obtain institutional permission from the organisation from which research participants will be solicited:

A psychologist shall –

a) obtain written approval from the host institution or organisation concerned prior to conducting research;
b) provide the host institution or organisation with accurate information about his or her research proposals; and

c) conduct the research in accordance with the research protocol approved by the institution or organisation concerned

Informed institutional permission was obtained from all participating organisations (see Appendix B).

Annexure 12 of the Ethical Rules of Conduct for Practitioners Registered under the Health Professions Act (Act no. 56 of 1974) (Republic of South Africa, 2006, p. 41) requires psychological researchers to disclose confidential information under the following circumstances:

A psychologist may disclose confidential information –

a) only with the permission of the client concerned;
b) when permitted by law to do so for a legitimate purpose, such as providing a client with the professional services required;
c) to appropriate professionals and then for strictly professional purposes only;
d) to protect a client or other persons from harm; or
e) to obtain payment for a psychological service, in which instance disclosure is limited to the minimum necessary to achieve that purpose.

The likelihood that any of the grounds for disclosure would arise was very small in the current study. Moreover, the current study collected data anonymously which effectively prevented any disclosure under any of the grounds listed in Annexure 12 of the Ethical Rules of Conduct for Practitioners Registered under the Health Professions Act (Act no. 56 of 1974) (Republic of South Africa, 2006, p. 41).

The individual participants had no direct benefit by participating in this study. However, this study was a step towards the development of a generic non-managerial individual performance model, which constituted a major progress in the fields of recruitment and selection, development and performance management. In the broader context, the development of successful generic performance measures by industrial psychologists could increase the willingness of organisations to make use of assessments on a much bigger scale.

Approval for ethical clearance of the proposed research study had been received from the Research Ethics Committee Human Research (Humanities) of Stellenbosch University.

CHAPTER 5

RESEARCH RESULTS

5.1 INTRODUCTION

The aim of Chapter 4 is to present the results of the statistical analysis that were envisaged in Chapter 3. Before we continue the researcher feels that it would be disingenuous if the elephant in the room is not acknowledged. The study presented an enormous challenge in terms of data collection and the final sample fell remarkedly short of the initial expectations. The GCQ and the GOQ were developed to assess non-managerial performance. Many employees seemingly feel threatened and insecure when they have to rate their own performance (or have their performance rated by somebody else). Reassurance that individual results will not be shared with management very often was seemingly not trusted. The fact that the data was collected anonymously seemingly had little effect in allaying such fears. In unionised work environments the problem was further aggravated in that Consequently, it was not possible to perform all the statistical analysis set out in Chapter 3.

Chapter 4 starts by describing the sample and the nature and extent to which the sample was plagued by missing values. Subsequently the results of the item analysis performed on each subscale to ascertain the psychometric integrity of the item indicator variables meant to represent the various latent non-managerial performance dimensions are presented. This is followed by a discussion of the results of the dimensionality analysis performed on each subscale via exploratory factor analysis, and in the case of factor fission, with second-order confirmatory factor analysis or bi-factor confirmatory factor analysis. Next an evaluation of the degree to which the data satisfied the statistical data assumptions relevant to the confirmatory factor analysis is presented. Thereafter, the fit of the GOQ measurement model is scrutinised and the measurement model parameter estimates discussed.

5.2 SAMPLE

A non-probability sample of non-managerial employees from an organisation in the mining sector as well as a small sample of non-managerial employees from other organisations, reached through the SABPP (South African Board for People

Practices), participated in the study. The final sample size that was used was 97 respondents.

As mentioned above, significant challenges were experienced during the data collection phase of the study and the final sample consisted of only 97 respondents. Some of the factors identified as obstacles in the data collections phase were:

- The complexity of the proposed model and its dimensions meant the GCQ and the GOQ had a large number of items (176) which required a substantial time sacrifice (40 min) to complete.
- Organisations were generally unwilling to “donate” so much of their employees’ time if they did not receive some tangible benefit from the study.
- There also seemed to be some misconceptions regarding the nature of the study and organisations misinterpreted the survey as a performance management tool. This led to a reluctance to expose their employees to the survey for the fear of the internal consequences.
- Furthermore, a substantial sample was negotiated with a municipality in the Western Cape, but internal problems relating to their performance management system led to their union boycotting the study.

5.3 MISSING VALUES

In the event of dealing with data sets with incomplete responses, the missing values problem needs to be addressed before the researcher can turn his hand to analysis. A limited number of missing values arose from the items comprising the subscales of the Generic Performance Questionnaire (GCQ) and the Generic Outcome Questionnaire (GOQ). Both questionnaires were administered electronically and were set up to prompt respondents for a response if any item had not been responded to. Both questionnaires, however, made provision for a “cannot rate” response option that was coded 6 and defined as a user defined missing value. The maximum number of missing values for any individual item was 6. Only .80 percent of the 97 x 176 data set were missing values. Table 5.1 indicates the distribution of missing values across the items of the GCQ and the GOQ.

Table 5. 1

Distribution of missing values per subscale item

		Item number							
		1	2	3	4	5	6	7	8
	A	0	0	0	0	0	0	0	0
	B	0	0	0	0	0	0	0	0
	C	1	0	0	1	0	1	0	1
	D	0	0	1	0	0	1	4	0
	E	1	1	1	4	2	0	4	1
GCQ dimensions	F	1	1	1	0	2	2	0	0
	G	1	1	1	1	0	0	0	0
	H	1	1	1	1	0	0	1	0
	I	1	0	0	0	0	0	0	2
	J	0	0	0	0	0	0	2	0
	K	0	0	0	0	0	0	1	0
	L	1	1	1	2	1	1	1	0
	M	0	0	0	0	1	0	1	0
	N	0	1	1	1	2	1	0	1
	O	0	0	0	0	3	0	1	0
GOQ dimensions	P	1	2	1	3	0	0	0	0
	Q	1	1	1	1	0	1	1	1
	R	0	0	0	1	0	0	1	0
	S	0	1	1	3	0	0	0	0
	T	2	3	5	4	5	5	6	6
	U	0	1	1	0	1	1	0	0
	V	0	2	4	1	0	0	2	0

There are different options that were considered to solve the missing value problem. The treatment of the missing value problem through list-wise deletion of cases is normally the seen as the default method, however in this situation the consequence of the method would have been an effective sample size of only 66 cases (Smuts, 2011) which was not regarded as acceptable. Pair-wise deletion would not be a sensible solution when item-parcels are calculated, due to the fact that the problem would simply be perpetuated on the item-parcel level (Burger, 2012).

Imputation by matching is a process were missing values are substituted by real values. The values used to substitute the missing values are derived from one or more complete cases with a similar response pattern (Jöreskog & Sörbom. 1996). If there are still cases with missing values after imputation, they are removed from the data set. The small sample size meant, the imputation by matching was not a viable solution in this study.

A multiple imputation procedure would present a superior solution for the missing values problem (Du Toit & Du Toit, 2001; Mels, 2003). A strength of the two multiple imputation procedures is that they derive missing values for all the cases in the presented sample. In other words, no cases are deleted, and the data set is available for item analysis, exploratory factor analysis prior to the calculation of parcels, the calculation of item parcels and subsequent analyses (Du Toit & Du Toit, 2001; Mels, 2003). It is acknowledged that the Full Information Maximum Likelihood (FIML) estimation is generally seen as superior when compared to the multiple imputation procedures, however it does not allow the creation of a separate imputed data set which hinders item analysis, exploratory factor analysis prior to the calculation of parcels, the calculation of item parcels and subsequent analyses.

It was decided to use multiple imputation to address the missing values conundrum in this study. Despite the strict assumptions, the data satisfied the requirements set out by the procedure (Prinsloo, 2013):

- Missing data only represented .80% of the data which is well below the proposed cut-off value of 30%.
- A five-point Likert scale was used to measure the responses to the items, which means that the items could be treated as continues variables (Muthén & Kaplan, 1985).
- Despite failing to satisfy the multivariate normality assumption, the observed item variables were not excessively skewed.

Lastly, the fact that the solution prevented the diminishing of an already small sample size proved to be a vital consideration for the use of the multiple imputation procedure

5.4 ITEM ANALYSIS

The scales used to measure the various latent variables comprising the GCQ and the GOQ were adapted and where necessary created with the aim to measure a clearly defined dimension of a latent variables. The observable behaviour which the respondents displayed in their reaction to items was meant to be relatively uncontaminated behavioural expressions of the applicable latent variable (Burger, 2012).

Item analysis via the SPSS 25 Reliability procedure was used to establish the internal consistency of the various subscales of the GCQ and the GOQ. The objective of the item analysis via the SPSS reliability procedure was to identify and eliminate poor items not contributing to an internally consistent description of the various latent dimensions comprising the construct in question. Poor items are items that fail to discriminate between different states of the latent variable they are meant to reflect and items that do not, in conjunction with their subscale colleagues, reflect a common latent variable. Items that do not contribute to an internally consistent description of the sub-scales of the measuring instruments were identified and their deletion considered (Henning, Theron & Spangenberg, 2004).

Item analysis was performed on the data after imputation.

5.4.1 ITEM ANALYSIS: TASK PERFORMANCE

The *Task Performance* subscale comprised 8 items. Table 5.2 depicts the results of the item analysis for the *Task Performance* subscale. The *Task Performance* subscale obtained a satisfactory Cronbach's Alpha of .859. Approximately 86% of the variance in the *Task Performance* subscale item responses was therefore systematic variance and only 14% random error variance. The item means ranged from 3.887 to 4.258 and the item's standard deviation ranged from .740 to 1.001. None of the items returned extreme means that resulted in a truncation of the item distribution. None of the item standard deviations therefore showed themselves as outliers in the item standard deviation distribution. The inter-item correlation matrix revealed correlations ranging from .276 to .587. None of the items consistently correlated lower than the mean inter-item correlation (.436) with the remaining items of the subscale[25].

Table 5. 2

Item statistics for the Task Performance scale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.859	.861	8

	Mean	Std. Deviation	N
A1	4.05155	.808434	97
A2	4.25773	.739909	97
A3	4.01031	.822785	97
A4	3.98969	.847728	97
A5	3.81443	.845699	97

[25] Isolated low correlations should not be seen as an indication of a problematic item. Rather it suggests potential factor fission.

Table 5. 3

Item statistics for the Task Performance scale (continued)

	Mean	Std. Deviation	N
A6	4.00000	.829156	97
A7	4.08247	.849879	97
A8	3.88660	1.009087	97

	A1	A2	A3	A4	A5	A6	A7	A8
A1	1.000	.413	.438	.472	.502	.373	.342	.505
A2	.413	1.000	.492	.536	.394	.492	.413	.333
A3	.438	.492	1.000	.538	.587	.412	.386	.441
A4	.472	.536	.538	1.000	.491	.445	.276	.413
A5	.502	.394	.587	.491	1.000	.490	.413	.463
A6	.373	.492	.412	.445	.490	1.000	.281	.349
A7	.342	.413	.386	.276	.413	.281	1.000	.521
A8	.505	.333	.441	.413	.463	.349	.521	1.000

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
A1	28.04124	18.248	.609	.397	.841
A2	27.83505	18.681	.606	.449	.842
A3	28.08247	17.847	.659	.473	.836
A4	28.10309	17.885	.628	.456	.839
A5	28.27835	17.620	.672	.495	.834
A6	28.09278	18.460	.556	.363	.847
A7	28.01031	18.573	.520	.365	.851
A8	28.20619	17.061	.603	.435	.844

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.012	3.814	4.258	.443	1.116	.017	8
Item Variances	.717	.547	1.018	.471	1.860	.018	8
Inter-Item Correlations	.436	.276	.587	.311	2.126	.006	8

Mean	Variance	Std. Deviation	N of Items
34.60825	15.699	3.962209	8

None of the items showed themselves as outliers in the corrected item-total and squared multiple correlation distributions. All the items therefore responded to the same source of systematic variance. It can, however, not be inferred from the item statistics that the source of systematic variance is necessarily the intended latent performance dimension (although the results are compatible with such a position) nor that the source of systematic variance is necessarily unidimensional. Because all the items responded to a common source of systematic variance the Cronbach's Alpha of the subscale was not positively affected when any of the items were deleted. Based on the basket of evidence it was decided to retain all the items in the *Task Performance* subscale.

5.4.2 ITEM ANALYSIS: EFFORT

The *Effort* scale comprised 8 items. Table 5.3 depicts the results of the item analysis for the *Effort* subscale. The *Effort* subscale obtained a satisfactory Cronbach's Alpha of .800. The item means ranged from 4.000 to 4.557 and the item's standard deviation ranged from .661 to .894. none of the items returned extreme means that truncated the item distributions. None of the items therefore showed themselves as outliers in the item standard deviation distribution. The inter-item correlation matrix revealed correlations ranging from 0.113 to 0.611. Although some of the item pairs returned correlations substantially below the mean inter-item correlation (.340) none of the items consistently correlated lower than the mean inter-item correlation with the remaining items of the subscale. None of the items therefore responded substantially out of step with all its colleagues. None of the items therefore responded to a different source of systematic variance than the remaining items of the subscale. The pattern of inter-item correlations does, however indicate potential factor fission.

Table 5. 4

Item statistics for the Effort scale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.800	.804	8

	Mean	Std. Deviation	N
B1	4.00000	.877971	97
B2	4.20619	.840859	97
B3	4.30928	.893971	97
B4	4.36082	.766289	97
B5	4.50515	.663383	97
B6	4.27835	.717958	97
B7	4.39175	.670148	97
B8	4.55670	.660951	97

	B1	B2	B3	B4	B5	B6	B7	B8
B1	1.000	.113	.491	.325	.286	.314	.319	.233
B2	.113	1.000	.441	.417	.260	.215	.243	.129
B3	.491	.441	1.000	.611	.208	.303	.352	.340
B4	.325	.417	.611	1.000	.252	.478	.412	.319
B5	.286	.260	.208	.252	1.000	.577	.464	.445
B6	.314	.215	.303	.478	.577	1.000	.485	.175
B7	.319	.243	.352	.412	.464	.485	1.000	.302
B8	.233	.129	.340	.319	.445	.175	.302	1.000

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
B1	30.60825	12.178	.449	.312	.790
B2	30.40206	12.660	.390	.298	.798
B3	30.29897	11.170	.624	.539	.759
B4	30.24742	11.771	.635	.521	.758
B5	30.10309	12.781	.522	.528	.777

Table 5. 5

Item statistics for the Effort scale (continued)

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
B6	30.32990	12.432	.544	.513	.773
B7	30.21649	12.609	.555	.350	.773
B8	30.05155	13.299	.407	.332	.792

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.326	4.000	4.557	.557	1.139	.031	8
Item Variances	.588	.437	.799	.362	1.829	.023	8
Inter-Item Correlations	.340	.113	.611	.498	5.412	.016	8

Mean	Variance	Std. Deviation	N of Items
34.60825	15.699	3.962209	8

None of the items showed themselves as outliers in the corrected item-total correlation distribution or the squared multiple correlation distribution. All the items therefore responded to the same systematic source of variance (although not necessarily unidimensional nor necessarily the latent performance dimension of interest). Hence the Cronbach's Alpha was not positively affected when any of the items were deleted from the sub-scale. Based on the evidence above it was decided to retain all the items in the *Effort* subscale.

5.4.3 ITEM ANALYSIS: ADAPTABILITY

The *Adaptability* scale comprised 8 items. Table 5.4 depicts the item analysis results for the *Adaptability* subscale. The *Adaptability* subscale obtained a marginally unsatisfactorily Cronbach's Alpha of .758 which falls below the critical cut-off value of .80. The item means ranged from 3.052 to 4.155 and the item's standard deviation ranged from .801 to 1.245. None of the items returned an extreme high or low mean. None of the item standard deviations presented themselves as outliers in the item standard deviation distribution. None of the items therefore normatively failed to discriminate less well between relatively small differences in standing on the latent performance dimension that their subscale colleagues. The inter-item correlation matrix revealed correlations ranging from 0.133 to 0.456. None of the items consistently correlated lower than the mean inter-item correlation with the remaining items of the subscale. None of the items therefore responded altogether out of step with its colleagues. Nonetheless the pattern of lower and higher inter-item correlations indicates potential factor fission.

Table 5. 6

Item statistics for the Adaptability scale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.758	.773	8

	Mean	Std. Deviation	N
C1	4.15464	.916745	97
C2	3.86598	.824480	97
C3	4.06186	.801229	97
C4	4.05155	.961457	97
C5	3.90722	.913812	97
C6	3.94845	.882363	97
C7	3.05155	1.244748	97
C8	4.06186	1.048952	97

	C1	C2	C3	C4	C5	C6	C7	C8
C1	1.000	.455	.327	.416	.403	.190	.185	.293
C2	.455	1.000	.375	.456	.301	.277	.179	.323
C3	.327	.375	1.000	.456	.307	.432	.133	.280
C4	.416	.456	.456	1.000	.207	.310	.172	.296
C5	.403	.301	.307	.207	1.000	.446	.334	.180
C6	.190	.277	.432	.310	.446	1.000	.325	.139
C7	.185	.179	.133	.172	.334	.325	1.000	.149
C8	.293	.323	.280	.296	.180	.139	.149	1.000

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
C1	26.94845	17.091	.511	.351	.722
C2	27.23711	17.433	.536	.338	.720
C3	27.04124	17.686	.516	.345	.724
C4	27.05155	16.820	.514	.356	.721
C5	27.19588	17.201	.497	.341	.725
C6	27.15464	17.486	.479	.347	.728
C7	28.05155	16.924	.325	.165	.767
C8	27.04124	17.519	.362	.165	.750

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.885	3.052	4.124	1.072	1.351	.122	8
Item Variances	.917	.642	1.549	.907	2.414	.081	8
Inter-Item Correlations	.298	.105	.447	.342	4.263	.010	8

Mean	Variance	Std. Deviation	N of Items
31.10309	21.802	4.669236	8

Item C7 and C8 did have somewhat lower item-total and squared multiple correlations, however, whether they truly deserve to be flagged as outliers in the two correlation distributions seemed somewhat of a moot question. Cronbach's Alpha is only positively affected (0.758 to 0.767) when C7 is deleted from the sub-scale. Despite evidence supporting the deletion of item C7, it was decided to postpone the deletion of the item until the inspection of the exploratory factor analysis results, as factor fission is suspected. Based on the evidence above it was decided to retain item C7 from the *Adaptability* scale as well as all other items in the subscale.

5.4.4 ITEM ANALYSIS: INNOVATING

The *Innovating* scale comprised 8 items. Table 5.5 depicts the item analysis results for the *Innovating* subscale. The *Innovating* subscale obtained a satisfactory Cronbach's Alpha of .850. The item means ranged from 3.526 to 3.990 and the item's standard deviation ranged from .810 to 1.052. No of the items returned extreme means that caused the truncation of the item distributions. None of the items therefore showed themselves as outliers (towards the lower end of the distribution) in the item standard deviation distribution. The inter-item correlation matrix revealed correlations ranging from 0.190 to 0.627. None of the items, however, consistently correlated lower than the mean inter-item correlation with the remaining items of the subscale. All the items therefore responded in relative unison in response to a single (though not necessarily unidimensional) source of systematic variance and not necessarily the intended latent performance dimension.

Table 5. 7

Item statistics for the Innovating scale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.850	.853	8

	Mean	Std. Deviation	N
D1	3.91753	.837532	97
D2	3.86598	.811748	97
D3	3.83505	.909217	97
D4	3.65979	.934151	97
D5	3.86598	.837019	97
D6	3.57732	.944668	97
D7	3.52577	1.051713	97
D8	3.98969	.810026	97

	D1	D2	D3	D4	D5	D6	D7	D8
D1	1.000	.627	.502	.496	.430	.522	.381	.244
D2	.627	1.000	.435	.489	.387	.455	.303	.362
D3	.502	.435	1.000	.559	.463	.439	.190	.337
D4	.496	.489	.559	1.000	.421	.567	.354	.408
D5	.430	.387	.463	.421	1.000	.441	.341	.413
D6	.522	.455	.439	.567	.441	1.000	.478	.362
D7	.381	.303	.190	.354	.341	.478	1.000	.349
D8	.244	.362	.337	.408	.413	.362	.349	1.000

Table 5. 8

Item statistics for the Innovating scale (continued)

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
D1	26.25773	19.735	.658	.541	.831
D2	26.30928	20.174	.617	.462	.836
D3	26.35052	19.772	.563	.425	.842
D4	26.51546	18.898	.685	.500	.827
D5	26.30928	20.278	.578	.351	.840
D6	26.60825	19.157	.659	.462	.830
D7	26.69072	19.403	.535	.374	.847
D8	26.18557	20.965	.500	.316	.848

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.772	3.485	3.990	.505	1.145	.032	8
Item Variances	.798	.656	1.065	.409	1.623	.021	8
Inter-Item Correlations	.428	.218	.627	.409	2.872	.008	8

Mean	Variance	Std. Deviation	N of Items
30.23711	25.037	5.003693	8

None of the items showed themselves as outliers in either the corrected item-total correlation distribution nor in the and squared multiple correlation distribution thereby echoing the inferences derived from the inter-item correlation matrix. Cronbach's Alpha was therefore not positively affected when any of the subscale items were deleted from the sub-scale. Based on the evidence above it was decided to retain all the items in the *Innovating* scale.

5.4.5 ITEM ANALYSIS: LEADERSHIP POTENTIAL

The *Leadership Potential* scale comprised 8 items. Table 5.6 depicts the item the results of the analysis for the *Leadership Potential* subscale. The *Leadership Potential* subscale obtained a satisfactory Cronbach's Alpha of .883. The item means ranged from 3.474 to 4.031 and the item's standard deviation ranged from .838 to 1.086. None of the items returned an extreme mean that truncated the item response distribution. None of the items showed themselves as outliers in the item standard deviation distribution. None of the items therefore discriminated substantially less well between relatively small differences in standing on the latent performance dimension then its colleague items in the subscale. The inter-item correlation matrix revealed correlations ranging from .190 to .627. none of the items consistently correlated lower than the mean inter-item correlation with the remaining items of the subscale. All items therefore responded in relative unison to a common source of systematic variance, although not necessarily unidimensional nor necessarily the intended latent performance dimension. The results are nonetheless consistent with the position that all the items to some degree measure the *Leadership Potential* latent performance dimension.

Table 5. 9

Item statistics for the Leadership Potential scale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.883	.884	8

	Mean	Std. Deviation	N
E1	3.83505	.837661	97
E2	4.03093	.871464	97
E3	3.86598	.942391	97
E4	3.61856	1.025135	97
E5	3.77320	1.005248	97
E6	3.58763	1.018092	97
E7	3.47423	.925257	97
E8	3.59794	1.086468	97

	E1	E2	E3	E4	E5	E6	E7	E8
E1	1.000	.649	.697	.472	.487	.384	.411	.453
E2	.649	1.000	.601	.398	.353	.332	.343	.376
E3	.697	.601	1.000	.550	.583	.496	.372	.374
E4	.472	.398	.550	1.000	.491	.506	.401	.422
E5	.487	.353	.583	.491	1.000	.651	.486	.478
E6	.384	.332	.496	.506	.651	1.000	.442	.574
E7	.411	.343	.372	.401	.486	.442	1.000	.616
E8	.453	.376	.374	.422	.478	.574	.616	1.000

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
E1	25.94845	25.883	.680	.603	.861
E2	25.75258	26.501	.571	.477	.871
E3	25.91753	24.868	.705	.630	.857
E4	26.16495	24.973	.620	.404	.866
E5	26.01031	24.531	.687	.550	.859
E6	26.19588	24.659	.661	.546	.862
E7	26.30928	25.945	.592	.440	.869
E8	26.18557	24.403	.633	.523	.865

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.710	3.423	4.031	.608	1.178	.039	8
Item Variances	.924	.702	1.162	.460	1.655	.025	8
Inter-Item Correlations	.488	.332	.687	.356	2.073	.010	8

Mean	Variance	Std. Deviation	N of Items
29.78351	32.380	5.690319	8

The moderate-high corrected item-total correlations and the moderate squared multiple correlations also confirmed to the absence of problem items in this subscale. More importantly none of the items showed themselves as outliers in either the corrected item-total correlation distribution or the squared multiple correlation distribution. The Cronbach alpha decreased when each item was deleted from the scale, indicating that the items tend to respond in unison to changes in the level of the latent variable being measured and the deletion of any item will negatively affect the internal consistency of this subscale. Based on the evidence above it was decided to retain all the items in the *Leadership Potential* subscale.

5.4.4 ITEM ANALYSIS: COMMUNICATION

The *Communication* scale comprised 8 items. Table 5.7 depicts the results of the item analysis for the *Communication* subscale. The *Communication* subscale obtained a satisfactory Cronbach's Alpha of .870. The item means ranged from 3.557 to 3.928 and the item's standard deviation ranged from 0.824 to 1.050. None of the items returned extreme means that resulted in a truncation of the item response distribution. Noe of the items showed themselves as outliers in the item standard deviation distribution. None of the items therefore showed themselves as insensitive items. The inter-item correlation matrix revealed correlations ranging from .188 to .750. None of the items consistently correlated lower than the mean inter-item correlation (.488) with the remaining items of the subscale. Item F1 almost qualified to be flagged but for its pronounced correlation with item F2.

Table 5. 10

Item statistics for the Communication scale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.870	.870	8

	Mean	Std. Deviation	N
F1	3.60825	.823568	97
F2	3.82474	.866149	97
F3	3.67010	.921069	97
F4	3.73196	.872203	97
F5	3.58763	1.007809	97
F6	3.55670	1.050487	97
F7	3.62887	1.003324	97
F8	3.92784	.970904	97

Table 5. 11

Item statistics for the Communication scale (continued)

	F1	F2	F3	F4	F5	F6	F7	F8
F1	1.000	.618	.418	.418	.192	.231	.188	.264
F2	.618	1.000	.554	.475	.215	.246	.332	.319
F3	.418	.554	1.000	.680	.447	.547	.610	.521
F4	.418	.475	.680	1.000	.501	.528	.564	.469
F5	.192	.215	.447	.501	1.000	.750	.651	.406
F6	.231	.246	.547	.528	.750	1.000	.593	.428
F7	.188	.332	.610	.564	.651	.593	1.000	.571
F8	.264	.319	.521	.469	.406	.428	.571	1.000

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
F1	25.92784	25.568	.428	.422	.873
F2	25.71134	24.645	.514	.501	.866
F3	25.86598	22.409	.752	.628	.841
F4	25.80412	23.013	.722	.550	.845
F5	25.94845	22.695	.636	.640	.854
F6	25.97938	22.125	.666	.626	.850
F7	25.90722	22.127	.708	.609	.845
F8	25.60825	23.407	.582	.385	.859

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.653	3.474	3.895	.421	1.121	.016	8
Item Variances	.885	.668	1.146	.477	1.715	.026	8
Inter-Item Correlations	.457	.156	.686	.530	4.393	.023	8

Mean	Variance	Std. Deviation	N of Items
29.53608	29.814	5.460200	8

The suspicion surrounding item F1 was confirmed when inspecting the corrected item-total and squared multiple correlations. Furthermore, the Cronbach's Alpha of the sub-scale is positively affected (.870 to .873) when the item is deleted. Due to the small increase in the Cronbach's Alpha it was decided not to delete item F1. Based on the evidence above it was decided to retain all the items in the *Communication* scale. The results in the inter-correlation matrix point towards possible factor fission.

5.4.7 ITEM ANALYSIS: INTERPERSONAL RELATIONS

The *Interpersonal Relations* scale comprised 8 items. Table 5.8 depicts the results of the item analysis for the *Interpersonal Relations* subscale. The *Interpersonal Relations* subscale obtained a highly satisfactory Cronbach's Alpha of .893. Approximately 89% of the variance in the item responses was due to systematic sources of variance and approximately 11% was random error variance. The item means ranged from 3.845 to 4.227 and the item's standard deviation ranged from 0.777 to 0.882. None of the items returned extreme means that truncated the item response distribution. None of the items showed themselves as outliers in the item standard deviation distribution. None of the items therefore discriminated substantially less well between relatively small differences in standing on the latent performance dimension then its colleague items in the subscale. The inter-item correlation matrix revealed correlations ranging from .192 to .687.

Table 5. 12

Item statistics for the Interpersonal Relations scale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.893	.894	8

	Mean	Std. Deviation	N
G1	4.17526	.777420	97
G2	3.84536	.881998	97
G3	3.89691	.835221	97
G4	4.00000	.841625	97
G5	4.14433	.816365	97
G6	4.12371	.844809	97
G7	4.20619	.853158	97
G8	4.22680	.822916	97

	G1	G2	G3	G4	G5	G6	G7	G8
G1	1.000	.526	.622	.557	.551	.553	.542	.475
G2	.526	1.000	.643	.463	.364	.417	.320	.192
G3	.622	.643	1.000	.667	.465	.491	.439	.413
G4	.557	.463	.667	1.000	.515	.469	.479	.541
G5	.551	.364	.465	.515	1.000	.684	.675	.493
G6	.553	.417	.491	.469	.684	1.000	.687	.514
G7	.542	.320	.439	.479	.675	.687	1.000	.615
G8	.475	.192	.413	.541	.493	.514	.615	1.000

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
G1	28.44330	19.895	.722	.534	.875
G2	28.77320	20.469	.534	.473	.893
G3	28.72165	19.599	.705	.621	.876
G4	28.61856	19.634	.693	.554	.878
G5	28.47423	19.731	.705	.579	.877
G6	28.49485	19.440	.719	.596	.875
G7	28.41237	19.474	.705	.617	.876
G8	28.39175	20.387	.598	.490	.886

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.081	3.856	4.227	.371	1.096	.020	8
Item Variances	.698	.604	.791	.187	1.310	.003	8
Inter-Item Correlations	.517	.202	.687	.485	3.405	.013	8

Mean	Variance	Std. Deviation	N of Items
32.61856	25.509	5.050667	8

No items showed themselves as questionable items in the inter-item correlation matrix in that none of them consistently correlated below the mean inter-item correlation

(.517) with the remaining items of the subscale. The moderate-high corrected item-total correlation and the moderate squared multiple correlations also confirmed to the absence of problem items in this subscale. None of the items showed themselves as outliers in either the corrected item-total correlation distribution or the squared multiple correlation distribution. The Cronbach alpha decreases when each item was deleted from the scale, indicating that the items tend to respond in unison to changes in the level of the latent variable being measured and the deletion of any item will negatively affect the internal consistency of this subscale. Based on the evidence above it was decided to retain all the items in the *Interpersonal Relations sub*scale.

5.4.8 ITEM ANALYSIS: MANAGEMENT

The *Management* scale comprised 8 items. Table 5.9 depicts the item analysis results for the *Management* subscale. The *Management* subscale obtained a highly satisfactory Cronbach's Alpha of .895. The item means ranged from 3.794 to 3.979 and the item's standard deviation ranged from 0.852 to 0.946. None of the items returned extreme high or low means. None of the item response distributions were truncated. No item showed itself as an outlier in the item standard deviation distribution. No concern therefore arose about the sensitivity of any item. The inter-item correlation matrix revealed correlations ranging from .346 to .796.

Table 5. 13

Item statistics for the Management scale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.895	.895	8

	Mean	Std. Deviation	N
H1	3.80412	.861674	97
H2	3.83505	.862173	97
H3	3.83505	.931849	97
H4	3.93814	.851646	97
H5	3.96907	.895051	97
H6	3.97938	.889515	97
H7	3.79381	.945804	97
H8	3.91753	.920486	97

	H1	H2	H3	H4	H5	H6	H7	H8
H1	1.000	.559	.478	.438	.397	.389	.346	.544
H2	.559	1.000	.796	.511	.452	.580	.494	.665
H3	.478	.796	1.000	.525	.518	.599	.434	.567
H4	.438	.511	.525	1.000	.435	.397	.359	.392
H5	.397	.452	.518	.435	1.000	.706	.546	.566
H6	.389	.580	.599	.397	.706	1.000	.465	.634

Table 5. 14

Item statistics for the Management scale (continued)

	H1	H2	H3	H4	H5	H6	H7	H8
H7	.346	.494	.434	.359	.546	.465	1.000	.626
H8	.544	.665	.567	.392	.566	.634	.626	1.000

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
H1	27.26804	23.927	.579	.401	.890
H2	27.23711	22.495	.771	.729	.873
H3	27.23711	22.204	.737	.682	.875
H4	27.13402	24.138	.560	.357	.892
H5	27.10309	22.927	.679	.593	.881
H6	27.09278	22.731	.710	.620	.878
H7	27.27835	23.140	.606	.462	.888
H8	27.15464	22.132	.758	.640	.873

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.894	3.773	3.979	.206	1.055	.005	8
Item Variances	.786	.727	.847	.120	1.165	.002	8
Inter-Item Correlations	.527	.370	.803	.434	2.174	.012	8

Mean	Variance	Std. Deviation	N of Items
31.07216	29.547	5.435699	8

No items showed themselves as questionable items in the inter-item correlation matrix in that none of them consistently correlated lower than the mean inter-item correlation (.527) with the remaining items of the subscale. The moderate-high corrected item-total correlation and the moderate squared multiple correlations also confirmed to the absence of problem items in this subscale. More importantly, none of the items showed themselves as outliers in either the corrected item-total correlation distribution or the squared multiple correlation distribution. This suggested that all items responded to a common source of systematic variance, although not necessarily unidimensional nor necessarily the latent performance dimension of interest. The Cronbach’s Alpha decreases when each item is deleted from the scale, indicating that the items tend to respond in unison to changes in the level of the latent variable being measured and the deletion of any item will negatively affect the internal consistency of this subscale. Based on the evidence above it was decided to retain all the items in the *Management sub*scale.

5.4.9 ITEM ANALYSIS: ANALYSING AND PROBLEM-SOLVING

The *Analysing and Problem-Solving* subscale comprised 8 items. Table 5.10 depicts the results of the item analysis for the *Analysing and Problem-Solving* subscale. The *Analysing and Problem-Solving* subscale obtained a satisfactory Cronbach's Alpha of .887. The item means ranged from 3.649 to 3.907 and the item's standard deviation ranged from .784 to .860. None of the items returned extreme means. None of the item response distributions were therefore truncated. None of the items showed themselves as outliers in the item standard deviation distribution. None of the items normatively failed to discriminate between relatively small differences in standing on the latent performance dimensions. The inter-item correlation matrix revealed correlations ranging from 0.288 to 0.636.

Table 5. 15

Item statistics for the Analysing and Problem-Solving scale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.887	.888	8

	Mean	Std. Deviation	N
I1	3.74227	.845063	97
I2	3.89691	.783748	97
I3	3.82474	.803771	97
I4	3.73196	.860178	97
I5	3.83505	.825131	97
I6	3.69072	.821087	97
I7	3.90722	.842646	97
I8	3.64948	.854415	97

	I1	I2	I3	I4	I5	I6	I7	I8
I1	1.000	.636	.592	.535	.551	.499	.288	.451
I2	.636	1.000	.533	.577	.392	.500	.427	.490
I3	.592	.533	1.000	.564	.569	.501	.360	.607
I4	.535	.577	.564	1.000	.480	.412	.353	.594
I5	.551	.392	.569	.480	1.000	.631	.322	.523
I6	.499	.500	.501	.412	.631	1.000	.530	.586
I7	.288	.427	.360	.353	.322	.530	1.000	.417
I8	.451	.490	.607	.594	.523	.586	.417	1.000

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
I1	26.53608	18.980	.672	.553	.872
I2	26.38144	19.363	.676	.543	.872
I3	26.45361	19.000	.713	.542	.868
I4	26.54639	18.917	.666	.510	.873
I5	26.44330	19.208	.657	.534	.873
I6	26.58763	18.974	.698	.584	.869
I7	26.37113	20.173	.496	.337	.889
I8	26.62887	18.736	.700	.543	.869

Table 5. 16

Item statistics for the Analysing and Problem-Solving scale (continued)

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.793	3.680	3.907	.227	1.062	.008	8
Item Variances	.685	.614	.740	.126	1.205	.002	8
Inter-Item Correlations	.487	.251	.696	.445	2.773	.010	8

Mean	Variance	Std. Deviation	N of Items
30.27835	24.640	4.963916	8

None of the items showed themselves as questionable items in the inter-item correlation matrix. None of the items consistently correlated lower than the mean inter-item correlation (.487) with the remaining items of the subscale. Item I7 almost qualified to be flagged but for its correlation with item I6. Item I7 was again identified as somewhat suspicious when inspecting the corrected item-total and squared multiple correlations as it had relatively lower corrected item-total and squared multiple correlations that approached outlier status. Furthermore, the Cronbach's Alpha of the sub-scale is positively affected, albeit only marginally, (.887 to .889) when the item was deleted. Due to the small increase in the Cronbach's Alpha it was decided not to delete item I7. Based on the evidence above it was decided to retain all the items in the *Analysing and Problem-Solving sub*scale.

5.4.10 ITEM ANALYSIS: COUNTERPRODUCTIVE WORK BEHAVIOUR

The *Counterproductive Work Behaviour* subscale comprised 8 items. Table 5.11 depicts the results of the item analysis for the *Counterproductive Work Behaviour* subscale. The *Counterproductive Work Behaviour* subscale obtained a satisfactory Cronbach's Alpha of .850. The item means ranged from 3.990 to 4.629 and the item's standard deviation ranged from .682 to .896. item J8 returned a rather larger mean (4.62887) on a 5-point scale that raised the concern that this might have restricted the range of responses on this item. The item standard deviation for item J7 was somewhat smaller but was not yet regarded as a convincing outlier in the item standard deviation distribution. The inter-item correlation matrix revealed correlations ranging from .250 to .636.

Table 5. 17

Item statistics for the Counterproductive Work Behaviour scale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.850	.852	8

	Mean	Std. Deviation	N
J1	4.02062	.853661	97
J2	3.98969	.895531	97
J3	4.10309	.809894	97
J4	4.01031	.859928	97
J5	4.55670	.721241	97
J6	4.53608	.736855	97
J7	4.44330	.877604	97
J8	4.62887	.681903	97

	J1	J2	J3	J4	J5	J6	J7	J8
J1	1.000	.600	.464	.482	.336	.396	.405	.300
J2	.600	1.000	.533	.501	.283	.277	.350	.250
J3	.464	.533	1.000	.597	.400	.343	.419	.447
J4	.482	.501	.597	1.000	.343	.435	.491	.273
J5	.336	.283	.400	.343	1.000	.511	.347	.636
J6	.396	.277	.343	.435	.511	1.000	.321	.524
J7	.405	.350	.419	.491	.347	.321	1.000	.452
J8	.300	.250	.447	.273	.636	.524	.452	1.000

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
J1	30.26804	15.552	.614	.453	.829
J2	30.29897	15.566	.573	.459	.835
J3	30.18557	15.549	.659	.504	.824
J4	30.27835	15.328	.646	.522	.825
J5	29.73196	16.615	.558	.465	.836
J6	29.75258	16.563	.552	.419	.837
J7	29.84536	15.757	.558	.371	.837
J8	29.65979	16.789	.566	.549	.836

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.290	3.990	4.629	.639	1.160	.079	8
Item Variances	.646	.465	.802	.337	1.725	.015	8
Inter-Item Correlations	.425	.250	.636	.387	2.550	.011	8

Mean	Variance	Std. Deviation	N of Items
34.28866	20.416	4.518386	8

None of the items consistently correlated lower than the mean inter-item correlation (.425) with the remaining items of the subscale. Items J2 and J8, however, showed themselves as questionable items in the inter-item correlation matrix in that they tend to correlate not even moderately (r_{ij}>.30) with most of other items in the *Counterproductive Work Behaviour sub*scale. However, the presence of questionable items in the *Counterproductive Work Behaviour* subscale is not given credence when investigating the corrected item-total and squared multiple correlations. None of the items (not even J7 and J8) showed themselves as clear outlier in the corrected item-total and squared multiple correlation distribution. Moreover, the Cronbach's Alpha is not positively affected when any of the items were deleted from the sub-scale. Based on the evidence above it was decided to retain all the items in the *Counterproductive Work Behaviour sub*scale. The results in the inter-correlation matrix point towards possible factor fission though.

5.4.11 ITEM ANALYSIS: ORGANISATIONAL CITIZENSHIP BEHAVIOUR

The *Organisational Citizenship Behaviour sub*scale comprised 8 items. Table 5.12 depicts the results of the item analysis for the *Organisational Citizenship Behaviour* subscale. The *Organisational Citizenship Behaviour* subscale obtained a satisfactory Cronbach's Alpha of .887. The item means ranged from 4.000 to 4.340 and the item's standard deviation ranged from 0.734 to 0.890. None of the items returned extreme means on the 5-point scale. None of the items showed themselves as outliers in the item standard deviation distribution. None of the items were normatively less able to differentiate between relatively small differences on the latent performance dimension than their item colleagues in the subscale. The inter-item correlation matrix revealed correlations ranging from .314 to .636.

Table 5. 18

Item statistics for the Organisational Citizenship Behaviour scale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.887	.887	8

	Mean	Std. Deviation	N
K1	4.25773	.832646	97
K2	4.13402	.861550	97
K3	4.21649	.880658	97
K4	4.07216	.844682	97
K5	4.08247	.799350	97
K6	4.34021	.734373	97
K7	4.13402	.824480	97
K8	4.00000	.889757	97

	K1	K2	K3	K4	K5	K6	K7	K8
K1	1.000	.532	.491	.314	.375	.383	.511	.506
K2	.532	1.000	.593	.573	.483	.503	.532	.462
K3	.491	.593	1.000	.497	.596	.497	.490	.492
K4	.314	.573	.497	1.000	.531	.531	.509	.513
K5	.375	.483	.596	.531	1.000	.466	.457	.513
K6	.383	.503	.497	.531	.466	1.000	.543	.510
K7	.511	.532	.490	.509	.457	.543	1.000	.497
K8	.506	.462	.492	.513	.513	.510	.497	1.000

Table 5. 19

Item statistics for the Organisational Citizenship Behaviour scale (continued)

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
K1	28.97938	19.875	.585	.436	.880
K2	29.10309	18.906	.703	.531	.868
K3	29.02062	18.812	.697	.518	.869
K4	29.16495	19.327	.656	.497	.873
K5	29.15464	19.674	.649	.463	.874
K6	28.89691	20.093	.650	.443	.874
K7	29.10309	19.364	.671	.469	.872
K8	29.23711	18.995	.661	.463	.873

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.153	4.000	4.340	.340	1.085	.012	8
Item Variances	.696	.539	.792	.252	1.468	.007	8
Inter-Item Correlations	.497	.314	.596	.282	1.898	.004	8

Mean	Variance	Std. Deviation	N of Items
33.23711	24.912	4.991186	8

No items showed themselves as questionable items in the inter-item correlation matrix in that no item consistently correlated lower than the mean inter-item correlation (.497) with the remaining items of the subscale. The moderate-high corrected item-total correlation and the moderate squared multiple correlations also confirmed to the absence of problem items in this subscale. More importantly none of the items showed themselves as outliers in the corrected item-total correlation distribution or the squared multiple correlation distribution. All items therefore tapped into a common source of systematic variance although not necessarily a unidimensional source of variance and not necessarily the intended latent performance dimension. The item analysis results are, nonetheless, compatible with the latter position. As a result, the Cronbach's Alpha decreased when each item was deleted from the subscale, indicating that the items tend to respond in unison to changes in the level of the latent variable being measured and the deletion of any item will negatively affect the internal consistency of this subscale. Based on the evidence above it was decided to retain all the items in the *Organisational Citizenship Behaviour* subscale.

5.4.12 ITEM ANALYSIS: SELF-DEVELOPMENT

The *Self-Development sub*scale comprised 8 items. Table 5.13 depicts the item analysis results for the *Self-Development* subscale. The *Self-Development* subscale obtained a satisfactory Cronbach's Alpha of .883. The item means ranged from 3.969

to 4.443 and the item's standard deviation ranged from .822 to .939. None of the items returned extreme high means on the 5-point scale that truncated the item response distribution and lowered the item standard deviation. None of the items showed themselves as outliers in the item standard deviation distribution. The inter-item correlation matrix revealed correlations ranging from .273 to .698.

Table 5. 20

Item statistics for the Self-Development scale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.883	.883	8

	Mean	Std. Deviation	N
L1	4.44330	.828768	97
L2	4.25773	.820040	97
L3	4.19588	.861674	97
L4	4.18557	.939081	97
L5	4.15464	.845826	97
L6	3.96907	.822263	97
L7	4.14433	.865901	97
L8	4.29897	.879926	97

	L1	L2	L3	L4	L5	L6	L7	L8
L1	1.000	.459	.519	.522	.451	.387	**.273**	.531
L2	.459	1.000	.429	.492	.603	.537	.372	.470
L3	.519	.429	1.000	.457	.415	.435	.436	.320
L4	.522	.492	.457	1.000	.698	.453	.441	.575
L5	.451	.603	.415	.698	1.000	.591	.467	.679
L6	.387	.537	.435	.453	.591	1.000	.562	.459
L7	**.273**	.372	.436	.441	.467	.562	1.000	.531
L8	.531	.470	.320	.575	.679	.459	.531	1.000

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
L1	29.20619	20.707	.597	.483	.873
L2	29.39175	20.470	.641	.451	.869
L3	29.45361	20.709	.567	.419	.876
L4	29.46392	19.230	.702	.562	.862
L5	29.49485	19.482	.763	.681	.856
L6	29.68041	20.366	.654	.502	.867
L7	29.50515	20.565	.583	.473	.875
L8	29.35052	19.751	.687	.597	.864

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.192	3.979	4.443	.464	1.117	.020	8
Item Variances	.757	.667	.985	.317	1.475	.010	8
Inter-Item Correlations	.466	.242	.722	.479	2.979	.011	8

Mean	Variance	Std. Deviation	N of Items
33.64948	25.897	5.088879	8

No items showed themselves as questionable items in the inter-item correlation matrix. None of the items consistently correlated lower than the mean inter-item correlation (.466) with its item colleagues in the subscale. The moderate-high corrected item-total correlations and the moderate squared multiple correlations also confirmed the absence of problem items in this subscale. More importantly none of the items showed themselves as outliers in the corrected item-total distribution or the squared multiple correlation distribution. The items therefore all responded to a common source of systematic variance although not necessarily a unidimensional source of variance nor necessarily the intended latent performance dimension. Consequently, the Cronbach's Alpha decreased when each item was deleted from the scale, indicating that the items tend to respond in unison to changes in the level of the latent variable being measured and the deletion of any item will negatively affect the internal consistency of this subscale. Based on the evidence above it was decided to retain all the items in the *Self-Development* subscale.

5.4.13 ITEM ANALYSIS: EMPLOYEE GREEN BEHAVIOUR

The *Employee Green Behaviour* subscale comprised 8 items. Table 5.14 depicts the results of the item analysis for the *Employee Green Behaviour* subscale. The *Employee Green Behaviour* subscale obtained a highly satisfactory Cronbach's Alpha of .900. The item means ranged from 3.392 to 4.196 and the item's standard deviation ranged from .825 to 1.246. None of the items returned extreme high means on the 5-point scale that truncated the item response distribution and lowered the item standard deviation. None of the items showed themselves as outliers in the item standard deviation distribution. The inter-item correlation matrix revealed correlations ranging from 0.356 to 0.795.

Table 5. 21

Item statistics for the Employee Green Behaviour scale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.900	.904	8

	Mean	Std. Deviation	N
M1	4.13402	.873557	97
M2	4.05155	.905667	97
M3	4.19588	.824611	97
M4	3.82474	.957539	97
M5	3.43299	1.232437	97

Table 5. 22

Item statistics for the Employee Green Behaviour scale (continued)

	Mean	Std. Deviation	N
M6	3.72165	.986812	97
M7	3.39175	1.246300	97
M8	3.54639	1.127503	97

	M1	M2	M3	M4	M5	M6	M7	M8
M1	1.000	.755	.628	.663	.545	.430	.430	.454
M2	.755	1.000	.628	.671	.493	.413	.406	.462
M3	.628	.628	1.000	.572	.356	.490	.411	.388
M4	.663	.671	.572	1.000	.506	.532	.547	.543
M5	.545	.493	.356	.506	1.000	.468	.648	.653
M6	.430	.413	.490	.532	.468	1.000	.674	.569
M7	.430	.406	.411	.547	.648	.674	1.000	.795
M8	.454	.462	.388	.543	.653	.569	.795	1.000

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
M1	26.16495	32.306	.700	.661	.887
M2	26.24742	32.209	.680	.651	.889
M3	26.10309	33.510	.611	.508	.894
M4	26.47423	31.252	.734	.591	.884
M5	26.86598	29.367	.684	.545	.889
M6	26.57732	31.705	.661	.520	.890
M7	26.90722	28.585	.742	.729	.883
M8	26.75258	29.709	.736	.677	.883

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.786	3.392	4.196	.804	1.237	.101	8
Item Variances	1.067	.680	1.559	.879	2.293	.122	8
Inter-Item Correlations	.539	.354	.795	.441	2.247	.013	8

Mean	Variance	Std. Deviation	N of Items
30.29897	40.024	6.326474	8

No items showed themselves as questionable items in the inter-item correlation matrix in that none of them consistently correlated lower than the mean inter-item correlation (.539) with the remaining items of the subscale. The moderate-high item-total correlation and the moderate squared multiple correlations also confirmed to the absence of problem items in this subscale. No item showed itself as an outlier in either the corrected item-total correlation distribution or the squared multiple correlation distribution. All the items therefore tapped into a common source of systematic variance although not necessarily a unidimensional source of variance nor necessarily the intended latent performance dimension. Consequently, the Cronbach's Alpha decreases when each item was deleted from the scale, indicating that the items tend to respond in unison to changes in the level of the latent variable being measured and the deletion of any item will negatively affect the internal consistency of this subscale.

Based on the evidence above it was decided to retain all the items in the *Employee Green Behaviour* subscale.

5.4.14 ITEM ANALYSIS: QUALITY OF OUTPUTS

The *Quality of Outputs* subscale comprised 8 items. Table 4.15 depicts the item analysis for the *Quality of Outputs* subscale of the GOQ. The *Quality of Outputs* subscale obtained a satisfactory Cronbach's Alpha of .893. The item means ranged from 3.753 to 4.423 and the item's standard deviation ranged from .762 to 1.007. None of the items returned extreme high means on the 5-point scale that truncated the item response distribution and lowered the item standard deviation. None of the items showed themselves as outliers in the item standard deviation distribution. The inter-item correlation matrix revealed correlations ranging from 0.279 to 0.810.

Table 5. 23

Item statistics for the Quality of Outputs scale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.893	.897	8

	Mean	Std. Deviation	N
N1	4.42268	.801497	97
N2	4.31959	.872573	97
N3	4.34021	.762214	97
N4	4.22680	.835478	97
N5	4.16495	1.007063	97
N6	3.75258	.890119	97
N7	4.05155	.928385	97
N8	4.07216	.892648	97

	N1	N2	N3	N4	N5	N6	N7	N8
N1	1.000	.594	.478	.493	.545	.440	.474	.525
N2	.594	1.000	.696	.728	.378	.452	.545	.612
N3	.478	.696	1.000	.810	.279	.509	.446	.576
N4	.493	.728	.810	1.000	.401	.595	.455	.578
N5	.545	.378	.279	.401	1.000	.441	.414	.334
N6	.440	.452	.509	.595	.441	1.000	.621	.521
N7	.474	.545	.446	.455	.414	.621	1.000	.624
N8	.525	.612	.576	.578	.334	.521	.624	1.000

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
N1	28.92784	22.443	.664	.504	.880
N2	29.03093	21.343	.747	.665	.872
N3	29.01031	22.469	.703	.697	.878
N4	29.12371	21.547	.758	.755	.872
N5	29.18557	22.299	.506	.382	.898
N6	29.59794	21.785	.668	.541	.880

Table 5. 24

Item statistics for the Quality of Outputs scale (continued)

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
N7	29.29897	21.503	.669	.557	.880
N8	29.27835	21.515	.702	.544	.877

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.169	3.750	4.427	.677	1.181	.047	8
Item Variances	.763	.586	.966	.380	1.648	.016	8
Inter-Item Correlations	.534	.381	.813	.432	2.135	.011	8

Mean	Variance	Std. Deviation	N of Items
33.35052	28.126	5.303382	8

No items showed themselves as questionable items in the inter-item correlation matrix. None of the items consistently correlated lower than the mean inter-item correlation (.534) with the remaining items of the subscale. Item N5 came close to being flagged as problematic but for its correlation with item N1 (.545). Item N5 was also identified as a questionable item when inspecting the corrected item-total and squared multiple correlations as it had relatively lower corrected item-total and squared multiple correlations that approached outlier status. Furthermore, the Cronbach's Alpha of the sub-scale is positively affected (.893 to 0.898) when item N5 was deleted. Due to the small increase in the Cronbach's Alpha it was decided not to delete item N5. Based on the evidence above it was decided to retain all the items in the *Quality of Outputs* subscale.

5.4.15 ITEM ANALYSIS: QUANTITY OF OUTPUTS

The *Quantity of Outputs sub*scale comprised 8 items. Table 5.16 depicts the results of the item analysis for the *Quantity of Outputs* subscale of the GOQ. The *Quantity of Outputs* subscale obtained a highly satisfactory Cronbach's Alpha of .911. The item means ranged from 4.072 to 4.309 and the item's standard deviation ranged from .774 to .878. None of the items returned extreme high means on the 5-point scale that truncated the item response distribution and lowered the item standard deviation. None of the items showed themselves as outliers in the item standard deviation distribution. The inter-item correlation matrix revealed correlations ranging from .318 to .742.

Table 5. 25

Item statistics for the Quantity of Outputs scale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.911	.912	8

	Mean	Std. Deviation	N
O1	4.07216	.819647	97
O2	4.09278	.878949	97
O3	4.23711	.774236	97
O4	4.06186	.875767	97
O5	4.30928	.833677	97
O6	4.18557	.781690	97
O7	4.08247	.849879	97
O8	4.17526	.878093	97

	O1	O2	O3	O4	O5	O6	O7	O8
O1	1.000	.742	.613	.458	.318	.548	.530	.518
O2	.742	1.000	.626	.588	.472	.551	.603	.546
O3	.613	.626	1.000	.562	.531	.615	.540	.689
O4	.458	.588	.562	1.000	.473	.470	.595	.568
O5	.318	.472	.531	.473	1.000	.598	.522	.651
O6	.548	.551	.615	.470	.598	1.000	.604	.605
O7	.530	.603	.540	.595	.522	.604	1.000	.664
O8	.518	.546	.689	.568	.651	.605	.664	1.000

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
O1	29.14433	21.916	.668	.629	.904
O2	29.12371	20.922	.748	.667	.897
O3	28.97938	21.645	.759	.616	.897
O4	29.15464	21.528	.667	.482	.904
O5	28.90722	22.043	.635	.533	.907
O6	29.03093	21.843	.720	.559	.900
O7	29.13402	21.221	.737	.581	.898
O8	29.04124	20.769	.771	.659	.895

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.149	4.062	4.278	.216	1.053	.007	8
Item Variances	.706	.599	.773	.173	1.289	.005	8
Inter-Item Correlations	.567	.310	.742	.432	2.395	.007	8

Mean	Variance	Std. Deviation	N of Items
33.21649	27.713	5.264319	8

No items showed themselves as questionable items in the inter-item correlation matrix in that they no item consistently correlated lower than the mean inter-item correlation with the remaining items of the subscale. The moderate-high corrected item-total correlation and the moderate squared multiple correlations also confirmed to the absence of problem items in this subscale. None of the items showed themselves as outliers in the corrected item-total correlation distribution or squared multiple correlation distribution. All the items responded to the same source of systematic variance although not necessarily a unidimensional source of systematic variance and not necessarily the intended latent performance dimension. The item statistics were, however, compatible with the latter position. The Cronbach's Alpha consequently decreases when each item was deleted from the scale, indicating that the items tend to respond in unison to changes in the level of the latent variable being measured and the deletion of any item will negatively affect the internal consistency of this subscale. Based on the evidence above it was decided to retain all the items in the *Quantity of Outputs* subscale.

5.4.16 ITEM ANALYSIS: TIMELINESS

The *Timeliness* subscale comprised 8 items. Table 5.17 depicts the item analysis results for the *Timeliness* subscale of the GOQ. The *Timeliness* subscale obtained a satisfactory Cronbach's Alpha of .889. The item means ranged from 3.969 to 4.515 and the item's standard deviation ranged from .738 to .889. None of the items returned extreme high means on the 5-point scale that truncated the item response distribution and lowered the item standard deviation. None of the items showed themselves as outliers in the item standard deviation distribution. The inter-item correlation matrix revealed correlations ranging from .247 to .819.

Table 5. 26

Item statistics for the Timeliness scale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.889	.892	8

	Mean	Std. Deviation	N
P1	4.24742	.816891	97
P2	3.96907	.883337	97
P3	4.20619	.889032	97
P4	4.16495	.874171	97
P5	4.45361	.764044	97
P6	4.51546	.737583	97
P7	4.42268	.761510	97
P8	4.41237	.773959	97

	P1	P2	P3	P4	P5	P6	P7	P8
P1	1.000	.617	.574	.526	.386	.426	.349	.331
P2	.617	1.000	.366	.560	.253	.344	.283	.247
P3	.574	.366	1.000	.599	.520	.519	.532	.587
P4	.526	.560	.599	1.000	.448	.497	.442	.591
P5	.386	.253	.520	.448	1.000	.819	.526	.702
P6	.426	.344	.519	.497	.819	1.000	.647	.773
P7	.349	.283	.532	.442	.526	.647	1.000	.726
P8	.331	.247	.587	.591	.702	.773	.726	1.000

Table 5. 27

Item statistics for the Timeliness scale (continued)

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
P1	30.14433	18.896	.609	.540	.880
P2	30.42268	19.267	.495	.495	.892
P3	30.18557	17.840	.700	.555	.871
P4	30.22680	17.948	.699	.583	.871
P5	29.93814	18.809	.678	.698	.874
P6	29.87629	18.526	.759	.775	.867
P7	29.96907	18.989	.651	.574	.876
P8	29.97938	18.354	.744	.761	.867

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.309	4.000	4.515	.515	1.129	.031	8
Item Variances	.644	.544	.791	.247	1.455	.008	8
Inter-Item Correlations	.514	.236	.819	.583	3.469	.023	8

Mean	Variance	Std. Deviation	N of Items
34.39175	23.887	4.887392	8

None of the items consistently correlated lower than the mean inter-item correlation (.514) with the remaining items of the subscale. Item P2 came close to being flagged as problematic but for its correlation with item P1 (.616) and item P4 (.560). The suspicion surrounding item P2 was confirmed when inspecting the corrected item-total and squared multiple correlations as it had lower item-total and squared multiple correlations. Furthermore, the Cronbach's Alpha of the sub-scale is positively affected (.889 to .892) when item P2 was deleted. Due to the small increase in the Cronbach's Alpha it was decided not to delete item P2. Based on the evidence above it was decided to retain all the items in the *Timeliness* subscale.

5.4.17 ITEM ANALYSIS: COST-EFFECTIVENESS

The *Cost-Effectiveness* subscale of the GOQ comprised 8 items. Table 5.18 depicts the results for the item analysis for the *Cost-Effectiveness* subscale. The *Cost-Effectiveness* subscale obtained a satisfactory Cronbach's Alpha of .867. The item means ranged from 3.979 to 4.175 and the item's standard deviation ranged from .797 to 1.020. None of the items returned extreme high means on the 5-point scale that truncated the item response distribution and lowered the item standard deviation. None of the items showed themselves as outliers in the item standard deviation distribution. The inter-item correlation matrix revealed correlations ranging from .144 to .730.

Table 5. 28

Item statistics for the Cost-Effectiveness scale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.867	.875	8

	Mean	Std. Deviation	N
Q1	4.10309	.796928	97
Q2	4.09278	.842646	97
Q3	4.15464	.870108	97
Q4	4.10309	.859803	97
Q5	4.05155	.795445	97
Q6	4.17526	.816628	97
Q7	4.06186	.863790	97
Q8	3.97938	1.020410	97

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
Q1	1.000	.730	.638	.653	.616	.564	.278	.208
Q2	.730	1.000	.662	.619	.521	.536	.278	.160
Q3	.638	.662	1.000	.703	.590	.606	.403	.144
Q4	.653	.619	.703	1.000	.540	.716	.370	.181
Q5	.616	.521	.590	.540	1.000	.675	.571	.232
Q6	.564	.536	.606	.716	.675	1.000	.398	.154
Q7	.278	.278	.403	.370	.571	.398	1.000	.344
Q8	.208	.160	.144	.181	.232	.154	.344	1.000

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Q1	28.61856	18.947	.720	.657	.841
Q2	28.62887	18.902	.678	.604	.845
Q3	28.56701	18.373	.730	.617	.838
Q4	28.61856	18.384	.740	.668	.837
Q5	28.67010	18.869	.735	.647	.839
Q6	28.54639	18.875	.710	.633	.841
Q7	28.65979	19.935	.505	.413	.863
Q8	28.74227	21.110	.259	.140	.897

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.080	4.000	4.155	.155	1.039	.003	8
Item Variances	.749	.633	1.042	.409	1.646	.016	8
Inter-Item Correlations	.460	.142	.774	.632	5.456	.043	8

Mean	Variance	Std. Deviation	N of Items
32.72165	24.578	4.957617	8

Item Q8 emerged as questionable in the inter-item correlation matrix in that it consistently correlated lower than the mean inter-item correlation (.460) with the other items in the *Cost-Effectiveness* subscale. Item Q8 does have sufficiently lower corrected item-total and squared multiple correlations to be regarded as an outlier in these two distributions. Item Q8 therefore to a noteworthy degree responded to a different source of variance than the remaining items of the subscale. Furthermore, Cronbach’s Alpha is positively affected (.867 to .897) when Q8 was deleted from the sub-scale. Despite evidence supporting the deletion of item Q8 it was decided to postpone the deletion of the item until the inspection of the exploratory factor analysis results, as factor fission is suspected. Based on the evidence above it was decided to retain item Q8 from the *Cost-Effectiveness* subscale.

5.4.18 ITEM ANALYSIS: NEED FOR SUPERVISION

The *Need for Supervision* subscale of the GOQ comprised 8 items. Table 5.19 depicts the item analysis results for the *Need for Supervision* subscale. The *Need for Supervision* subscale obtained a highly satisfactory Cronbach's Alpha of .926. The item means ranged from 3.990 to 4.196 and the item's standard deviation ranged from .784 to .909. None of the items returned extreme high means on the 5-point scale that truncated the item response distribution and lowered the item standard deviation. None of the items showed themselves as outliers in the item standard deviation distribution. The inter-item correlation matrix revealed correlations ranging from .437 to .737.

Table 5. 29

Item statistics for the Need for Supervision scale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.926	.926	8

	Mean	Std. Deviation	N
R1	3.98969	.835350	97
R2	4.08247	.909099	97
R3	3.98969	.783885	97
R4	4.17526	.841753	97
R5	4.09278	.830192	97
R6	4.03093	.871464	97
R7	4.19588	.849500	97
R8	4.17526	.866149	97

	R1	R2	R3	R4	R5	R6	R7	R8
R1	1.000	.673	.636	.551	.437	.501	.546	.578
R2	.673	1.000	.674	.539	.638	.654	.532	.696
R3	.636	.674	1.000	.618	.530	.610	.551	.632
R4	.551	.539	.618	1.000	.513	.589	.607	.658
R5	.437	.638	.530	.513	1.000	.687	.639	.600
R6	.501	.654	.610	.589	.687	1.000	.737	.710
R7	.546	.532	.551	.607	.639	.737	1.000	.731
R8	.578	.696	.632	.658	.600	.710	.731	1.000

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
R1	28.74227	24.110	.680	.565	.921
R2	28.64948	22.834	.774	.696	.914

Table 5. 30

Item statistics for the Need for Supervision scale (continued)

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
R3	28.74227	24.047	.745	.589	.917
R4	28.55670	23.854	.708	.534	.919
R5	28.63918	23.962	.706	.574	.919
R6	28.70103	23.003	.792	.684	.913
R7	28.53608	23.397	.763	.685	.915
R8	28.55670	22.874	.816	.700	.911

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.086	3.990	4.175	.186	1.047	.006	8
Item Variances	.733	.614	.826	.212	1.345	.005	8
Inter-Item Correlations	.611	.437	.749	.312	1.714	.006	8

Mean	Variance	Std. Deviation	N of Items
32.73196	30.386	5.512326	8

No items showed themselves as questionable items in the inter-item correlation matrix in that they all tend to correlate moderately (r_{ij}>.30) with each other. None of the items consistently correlated lower than the mean inter-item correlation (.611) with the remaining items of the subscale). The moderate-high corrected item-total correlation and the moderate squared multiple correlations also confirmed to the absence of problem items in this subscale. The Cronbach's Alpha decreased when each item was deleted from the scale, indicating that the items tend to respond in unison to changes in the level of the latent variable being measured and the deletion of any item will negatively affect the internal consistency of this subscale. Based on the evidence above it was decided to retain all the items in the *Need for Supervision* subscale.

5.4.19 ITEM ANALYSIS: INTERPERSONAL IMPACT

The *Interpersonal Impact sub*scale of the GOQ comprised 8 items. Table 5.20 depicts the results of the item analysis for the *Interpersonal Impact* subscale. The *Interpersonal Impact* subscale obtained a satisfactory Cronbach's Alpha of .889. The item means ranged from 4.010 to 4.381 and the item's standard deviation ranged from .715 to .871. None of the items returned extreme high means on the 5-point scale that truncated the item response distribution and lowered the item standard deviation. None of the items showed themselves as outliers in the item standard deviation distribution. The inter-item correlation matrix revealed correlations ranging from 0.270 to 0.737.

Table 5. 31

Item statistics for the Interpersonal Impact scale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.889	.892	8

	Mean	Std. Deviation	N
S1	4.01031	.859928	97
S2	4.05155	.833806	97
S3	4.15464	.808035	97
S4	4.38144	.871341	97
S5	4.31959	.715111	97
S6	4.20619	.815707	97
S7	4.32990	.786893	97
S8	4.32990	.717659	97

	S1	S2	S3	S4	S5	S6	S7	S8
S1	1.000	.697	.447	.440	.486	.428	.503	.450
S2	.697	1.000	.637	.374	.514	.490	.529	.441
S3	.447	.637	1.000	.389	.545	.536	.476	.396
S4	.440	.374	.389	1.000	.354	.299	.270	.280
S5	.486	.514	.545	.354	1.000	.725	.699	.726
S6	.428	.490	.536	.299	.725	1.000	.704	.666
S7	.503	.529	.476	.270	.699	.704	1.000	.746
S8	.450	.441	.396	.280	.726	.666	.746	1.000

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
S1	29.77320	17.761	.650	.551	.876
S2	29.73196	17.615	.701	.627	.871
S3	29.62887	18.132	.644	.511	.877
S4	29.40206	19.118	.438	.251	.898
S5	29.46392	18.043	.767	.673	.866
S6	29.57732	17.622	.719	.626	.869
S7	29.45361	17.709	.738	.668	.868
S8	29.45361	18.438	.691	.651	.873

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.221	4.011	4.400	.389	1.097	.020	8
Item Variances	.625	.512	.734	.222	1.433	.006	8
Inter-Item Correlations	.522	.302	.750	.448	2.485	.019	8

Mean	Variance	Std. Deviation	N of Items
33.78351	23.213	4.817993	8

Item S4 showed itself as a questionable item in the inter-item correlation matrix in that it consistently correlated lower than the mean inter-item correlation (.522) with the remaining items in the *Interpersonal Impact* subscale. Item S4 responded out of step with its colleague items in the subscale because it was underpinned by a different source of variance that underpinned the remaining items of the subscale. The suspicion surrounding item S4 was confirmed when inspecting the corrected item-total and squared multiple correlations. Item S4 showed itself as an outlier in both the corrected item-total correlation distribution and the squared multiple correlation distribution. Item S4 therefore tended to be a bit of a closed book to its item colleagues in the subscale. Furthermore, the Cronbach's Alpha of the sub-scale was positively affected (.889 to .898) when the item was deleted. Due to the already satisfactory Cronbach's Alpha it was decided to delay the decision regarding the deletion of S4 until the inspection of the exploratory factor analysis results, as factor fission is suspected.

5.4.20 ITEM ANALYSIS: CUSTOMER SATISFACTION

The *Customer Satisfaction* subscale of the GOQ comprised 8 items. Table 5.21 depicts the item analysis results for the *Customer Satisfaction* subscale. The *Customer Satisfaction* subscale obtained a highly satisfactory Cronbach's Alpha of .913. The item means ranged from 4.103 to 4.423 and the item's standard deviation ranged from .718 to .930. None of the items returned extreme high means on the 5-point scale that truncated the item response distribution and lowered the item standard deviation. None of the items showed themselves as outliers in the item standard deviation distribution. The inter-item correlation matrix revealed correlations ranging from .264 to .813.

Table 5. 32

Item statistics for the Customer Satisfaction scale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.913	.913	8

	Mean	Std. Deviation	N
T1	4.11340	.864536	97
T2	4.10309	.929656	97
T3	4.19588	.849500	97
T4	4.20619	.815707	97
T5	4.42268	.719303	97
T6	4.34021	.827730	97
T7	4.41237	.718108	97
T8	4.15464	.768389	97

	T1	T2	T3	T4	T5	T6	T7	T8
T1	1.000	.789	.721	.661	.492	.557	.444	.350
T2	.789	1.000	.752	.727	.573	.644	.482	.327
T3	.721	.752	1.000	.813	.647	.601	.464	.320
T4	.661	.727	.813	1.000	.560	.605	.565	.264
T5	.492	.573	.647	.560	1.000	.648	.647	.616
T6	.557	.644	.601	.605	.648	1.000	.638	.506
T7	.444	.482	.464	.565	.647	.638	1.000	.468
T8	.350	.327	.320	.264	.616	.506	.468	1.000

Table 5. 33

Item statistics for the Customer Satisfaction scale (continued)

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
T1	29.83505	19.973	.736	.676	.900
T2	29.84536	19.111	.791	.735	.895
T3	29.75258	19.688	.795	.779	.895
T4	29.74227	20.110	.769	.735	.897
T5	29.52577	20.939	.751	.682	.900
T6	29.60825	20.095	.758	.606	.898
T7	29.53608	21.522	.655	.560	.907
T8	29.79381	22.290	.486	.451	.920

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.244	4.103	4.423	.320	1.078	.017	8
Item Variances	.663	.516	.864	.349	1.676	.014	8
Inter-Item Correlations	.567	.264	.813	.549	3.075	.020	8

Mean	Variance	Std. Deviation	N of Items
33.94845	26.404	5.138440	8

No items showed themselves as questionable items in the inter-item correlation matrix. In as far as no item consistently correlated lower than the mean inter-item correlation (.567) with the remaining items of the subscale. Item T8 came close to being flagged as problematic but for its correlation with item T5 (.616). Item T8 was identified as a questionable item when inspecting the corrected item-total and squared multiple correlations as it had lower item-total and squared multiple correlations that approached outlier status. Furthermore, the Cronbach's Alpha of the subscale is positively affected, albeit only marginally, (.913 to .920) when the item was deleted. Due to the already satisfactory Cronbach's Alpha and the small increase in the Cronbach's Alpha if the item was deleted, it was decided to retain item T8.

5.4.21 ITEM ANALYSIS: ENVIROMENTAL IMPACT

The *Environmental Impact* subscale of the GOQ comprised 8 items. Table 5.22 depicts the results of the item analysis for the *Environmental Impact* subscale. The *Environmental Impact* subscale obtained a highly satisfactory Cronbach's Alpha of .947. The item means ranged from 3.691 to 4.113 and the item's standard deviation ranged from .911 to 1.131. None of the items returned extreme high means on the 5-point scale that truncated the item response distribution and lowered the item standard deviation. None of the items showed themselves as outliers in the item standard deviation distribution. The inter-item correlation matrix revealed correlations ranging from .568 to .841.

Table 5. 34

Item statistics for the Environmental Impact scale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.947	.948	8

	Mean	Std. Deviation	N
U1	3.98969	.984196	97
U2	4.11340	.945122	97
U3	4.04124	.911929	97
U4	3.91753	.931733	97
U5	3.85567	.957315	97
U6	3.93814	.955406	97
U7	3.78351	1.012699	97
U8	3.69072	1.130642	97

	U1	U2	U3	U4	U5	U6	U7	U8
U1	1.000	.808	.813	.783	.717	.609	.677	.643
U2	.808	1.000	.841	.756	.640	.654	.646	.589
U3	.813	.841	1.000	.789	.675	.637	.653	.568
U4	.783	.756	.789	1.000	.781	.708	.709	.638
U5	.717	.640	.675	.781	1.000	.685	.634	.622
U6	.609	.654	.637	.708	.685	1.000	.772	.609
U7	.677	.646	.653	.709	.634	.772	1.000	.805
U8	.643	.589	.568	.638	.622	.609	.805	1.000

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
U1	27.34021	34.164	.841	.772	.937
U2	27.21649	34.796	.818	.770	.939
U3	27.28866	35.062	.825	.783	.938
U4	27.41237	34.495	.863	.773	.936
U5	27.47423	34.981	.787	.683	.941
U6	27.39175	35.137	.773	.694	.941
U7	27.54639	34.084	.820	.790	.938
U8	27.63918	33.816	.739	.685	.945

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.916	3.691	4.113	.423	1.115	.019	8
Item Variances	.962	.832	1.278	.447	1.537	.020	8
Inter-Item Correlations	.695	.568	.841	.272	1.479	.006	8

Mean	Variance	Std. Deviation	N of Items
31.32990	44.807	6.693781	8

No items showed themselves as questionable items in the inter-item correlation matrix in that no item consistently correlated lower than the mean inter-item correlation (.695) with the remaining items of the subscale. The moderate-high corrected item-total correlation and the moderate squared multiple correlations also confirmed to the absence of problem items in this subscale. All the items tapped into a common source of systematic variance. The Cronbach's Alpha consequently decreases when each item was deleted from the scale, indicating that the items tended to respond in unison to changes in the level of the latent variable being measured and the deletion of any item will negatively affect the internal consistency of this subscale. Based on the evidence above it was decided to retain all the items in the *Environmental Impact* subscale.

5.4.22 ITEM ANALYSIS: MARKET REPUTATION

The *Market Reputation* subscale of the GOQ comprised 8 items. Table 5.23 depicts the item analysis results for the *Market Reputation* subscale. The *Market Reputation* subscale obtained a highly satisfactory Cronbach's Alpha of .915. The item means ranged from 3.794 to 4.330 and the item's standard deviation ranged from .760 to .897. None of the items returned extreme high means on the 5-point scale that truncated the item response distribution and lowered the item standard deviation. None of the items showed themselves as outliers in the item standard deviation distribution. The inter-item correlation matrix revealed correlations ranging from 0.376 to 0.798.

Table 5. 35

Item statistics for the Market Reputation scale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.915	.916	8

	Mean	Std. Deviation	N
V1	4.08247	.812277	97
V2	3.79381	.865281	97
V3	4.03093	.847221	97
V4	4.04124	.776176	97
V5	4.32990	.759957	97
V6	4.32990	.800021	97
V7	4.19588	.897208	97
V8	4.24742	.816891	97

	V1	V2	V3	V4	V5	V6	V7	V8
V1	1.000	.602	.677	.639	.529	.503	.535	.581
V2	.602	1.000	.535	.695	.453	.475	.603	.456
V3	.677	.535	1.000	.552	.453	.384	.376	.440
V4	.639	.695	.552	1.000	.524	.481	.617	.509
V5	.529	.453	.453	.524	1.000	.779	.744	.740
V6	.503	.475	.384	.481	.779	1.000	.693	.798
V7	.535	.603	.376	.617	.744	.693	1.000	.772
V8	.581	.456	.440	.509	.740	.798	.772	1.000

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
V1	28.96907	21.093	.729	.618	.903
V2	29.25773	21.047	.680	.597	.908
V3	29.02062	21.750	.598	.525	.915
V4	29.01031	21.406	.722	.603	.904
V5	28.72165	21.286	.760	.712	.901
V6	28.72165	21.140	.736	.725	.903
V7	28.85567	20.104	.781	.744	.899
V8	28.80412	20.763	.774	.760	.900

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.131	3.794	4.330	.536	1.141	.033	8
Item Variances	.677	.578	.805	.227	1.394	.006	8
Inter-Item Correlations	.577	.376	.798	.423	2.125	.015	8

Mean	Variance	Std. Deviation	N of Items
33.05155	27.195	5.214905	8

No items showed themselves as questionable items in the inter-item correlation matrix in that they all tend to correlate moderately (r_{ij}>.30) with each other. None of the items consistently correlated lower than the mean inter-item correlation (.577) with the remaining items of the subscale. The moderate-high corrected item-total correlation and the moderate squared multiple correlations also confirmed to the absence of problem items in this subscale. None of the items showed themselves as outliers in the corrected item-total correlation distribution or the squared multiple correlation distribution. All the items tapped into a common source of systematic variance. Hence the Cronbach's Alpha did not increase when any of the items were deleted from the scale, indicating that the items tended to respond in unison to changes in the level of the latent variable being measured and the deletion of any item will negatively affect the internal consistency of this subscale. Based on the evidence above it was decided to retain all the items in the *Market Reputation* subscale.

5.4.23 SUMMARY OF ITEM ANALYSIS RESULTS

This segment of the results chapter discussed the results of the item analysis. As stated by Myburgh (2013), the design intention with both the questionnaires was to create essentially unidimensional sets of items that reflect variance in each of the latent dimension constituting the generic non-managerial performance construct as measured by the GCQ and the GOQ. The goal of the item analyses was to investigate whether the intention was successful.

Item statistics were calculated for the items in the subscales of both the GCQ and the GOQ. The calculated item statistics included the Cronbach's Alpha, item means, item standard deviations, inter-item correlations, corrected item-total correlations and squared multiple correlations. It is generally accepted that if the intention was successful then the Cronbach's Alpha will exceed .80 and the inter-item correlations, item-total correlation and squared multiple correlations will be moderately high. However, the converse is not necessarily true (Myburgh, 2013). If the expectation of the item statistics is met, it does not necessarily mean that each subscale measures a unidimensional latent variable, nor does it necessarily mean that the latent variable being measured is the intended measure as it was defined (Myburgh, 2013). The item analysis findings in the current study were compatible with the position that the subscales of the GCQ and the GOQ validly and reliably measured the latent performance dimensions they were designated to reflect. The item analysis findings in the current study can, however, not be interpreted as definite evidence that this was the case.

The analysis of the item statistics did bring to the fore a few questionable items; however, it was decided to delay the decision regarding the removal of these items until exploratory factor analysis has been done. The reason for this was indications of meaningful factor fission, and if confirmed, it might be more beneficial to expand the particular dimension under discussion. For this reason, no items were deleted from the GCQ or the GOQ.

5.5 DIMENSIONALITY ANALYSIS

Exploratory factor analysis (EFA) was performed on the various subscales via principal axis factor analysis with oblique rotation. The design intention with the development of the GCQ and GOQ subscales was to measure a single undifferentiated (or indivisible) latent performance dimension. In the conceptualisation of the generic non-managerial latent competencies and the generic non-managerial latent outcomes no provision was made for the identification of narrower facets or dimensions. The aim of the analysis is to investigate whether each subscale measured a unidimensional latent variable. The eigenvalue-greater-than-one rule and scree plot were used to determine the number of factors to extract for each subscale. Furthermore, if the percentage non-redundant residual correlations that were greater than .05 exceeded 30% the extracted factor solution was considered not to provide a valid and credible explanation of the observed inter-item correlation matrix. Additional factors were then extracted. The unidimensionality assumption was considered to be reinforced if the eigenvalue-greater-than-one-rule resulted in the extraction of a single factor, the factor loadings were reasonably high, and a small percentage of the reproduced correlations deviated more than .05 from the corresponding observed inter-item correlation.

Where two or more factors were extracted the first-order measurement models implied by the pattern matrix was fitted separately for each subscale via CFA using structural equation modelling. If the first-order measurement model showed at least close fit, a second-order measurement model was fitted in which the EFA extracted first-order factors loaded on a single second-order factor. If the first-order measurement model showed poor fit a bifactor model was fitted where each item measured a specific narrow factor (indicated by the EFA) as well as a broad, general factor (Reise, 2012; Wessels, 2018). The latter option was considered appropriate when a large number of statistically significant ($p<.01$) modification index values were obtained for the first-order measurement model for the off-diagonal elements of the measurement error variance-covariance matrix $\boldsymbol{\Theta}_\delta$.

The objective with the fitting of the second-order measurement model or the bi-factor measurement model was to evaluate the extent to which the items successfully reflected the second-order factor, or in the case of the bi-factor model, the extent to which the items successfully reflected the broad, general factor and one of the narrower, more specific group factors.

5.5.1 DIMENSIONALITY ANALYSIS: TASK PERFORMANCE

The design intention that guided the development of the *Task Performance* subscale of the WUCQ was for the eight items, written for the subscale, to reflect a single, indivisible underlying latent dimension. The *Task Performance* subscale was considered factor analysable as the correlation matrix contained numerous statistically significant correlations of .3 or greater, the Bartlett's test of sphericity[26] was statistically significant ($p < .05$), and the Kaiser-Meyer Olkin measure of sampling adequacy value was greater than .6[27]. Initially a single factor with an eigenvalue greater than one was

[26] The Bartlett test of sphericity tests the hull hypothesis that the inter-item correlation matrix is an identity matrix in the parameter. The null hypothesis implies that each item measures something unique, that the items correlate zero in the parameter and that it is pointless to search for one or more common factors via exploratory factor analysis.

[27] The Kaiser-Meyer Olkin measure of sampling adequacy (MSA) is calculated as the ratio of the sum of the squared inter-item correlations divided by the sum of the squared inter0item correlations plus the sum of the squared partial inter-item correlations (when controlling for all other items in the subscale. If the items reflect a limited number of

extracted. The position of the elbow in the scree plot also indicated the extraction of a single factor. The factor matrix indicated that all the items had satisfactory loadings of larger than .5. However, there were 9 (32%) non-redundant residual correlations with absolute values greater than .05 and as a result it was decided to investigate a more credible solution for the observed inter-item correlation matrix by forcing the extracting two factors.

Table 5. 36

Pattern matrix for the Task Performance scale with two factors forced

	Factor	
	1	2
A1	**.410**	.305
A2	**.742**	-.062
A3	**.644**	.115
A4	**.759**	-.042
A5	**.560**	.217
A6	**.661**	-.033
A7	.145	**.501**
A8	-.055	**.896**

Table 4.24 indicates that items A1-A6 loaded on the first factor and items A7-A8 loaded on the second factor. All the items, except for item A1, had satisfactory loadings larger than .5. Item A1 showed itself as somewhat of a complex item as it had similar unsatisfactory loadings on both factors. The first factor was identified as an *effectiveness and efficiency of task performance* factor and the second factor as a *meeting of objectives and complying with instructions* factor. Item A1 (meeting of production or service goals) straddles both these factors. The factor fission was regarded as conceptually meaningful. The two extracted factors correlated moderately and positively in the factor correlation matrix (.676). The forced two-factor structure provided a credible explanation for the observed inter-item correlation matrix as only 4 (14.0%) of the non-redundant residual correlations had absolute values larger than 0.05. The unidimensionality assumption was therefore not supported in the case of the Task performance subscale.

To examine the construct validity of the *Task Performance* subscale the first-order measurement model implied by the pattern matrix was fitted. The first-order measurement model in which items A1-A6 only loaded on factor one and items A7 and A8 only loaded on factor two showed exact fit (χ^2=4.87; p>.05). All factor loadings in the first-order measurement model proved to be statistically significant (p<.05). The

common underlying factors the squared partial correlations will be small. The ratio will be approaching unity. According to Tabachnick and Fidell a suitable critical cut-off value for the MSA is .60.

second-order measurement model also achieved exact fit[28] (χ^2=4.54; p>.05). However, none of the factor loadings were statistically significant (p>.05)[29] and TASKP2 did not load significantly (p>.05) on the second-order factor. The path diagram of the completely standardised solution of the second-order measurement model is shown in Figure 5.1.

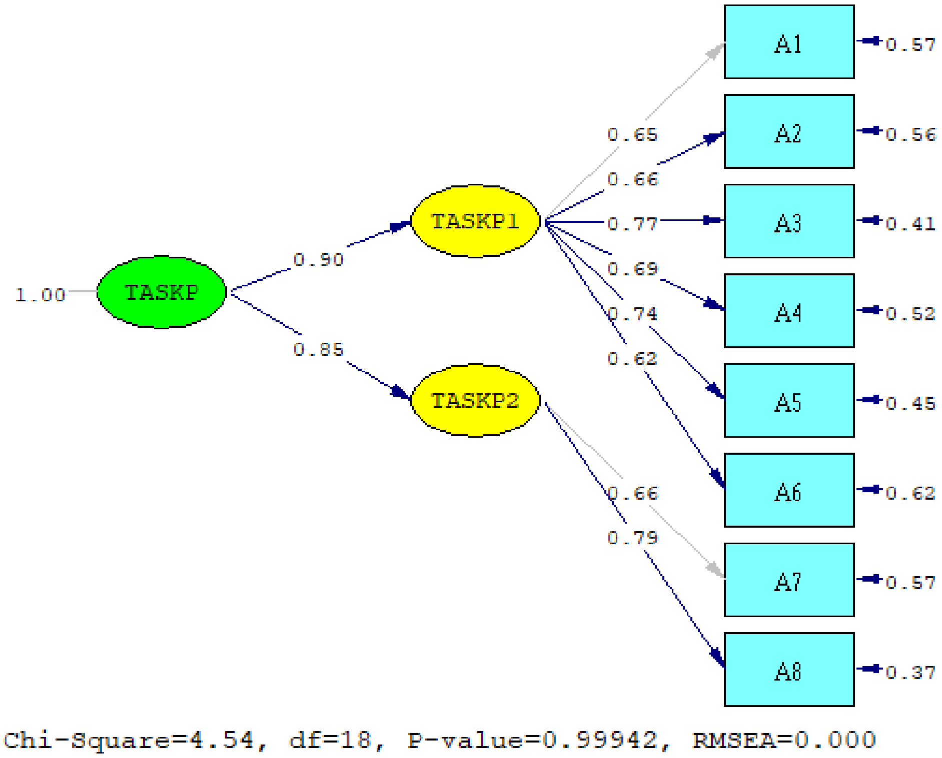

Figure 5. 1 *Second-order* Task Performance *measurement model (completely standardised solution)*

Subsequently, the eight indirect effects were obtained by calculating the products $\lambda_{ij}\gamma_{j1}$ and by testing the statistical significance of the calculated indirect effects. The results are shown in Table 5.25.

[28] It is acknowledged that due to the small sample and the small degrees of freedom the CFA analyses reported here have low statistical power. This is acknowledged as a methodological limitation.

[29] The finding that the factor loadings were statistically significant (p<.05) in the first-order measurement model but no longer so in the second-order measurement model raises the question how the second-order measurement model factor loadings should be interpreted. More specifically the question is raised whether the second-order measurement model factor loadings should be interpreted as the slope of the regression of the item response on the first-order latent performance dimension when controlling for the effect of the second-order factor.

Table 5. 37

Unstandardised indirect effects for the Task Performance measurement model

PA(1)	PA(2)	PA(3)	PA(4)	PA(5)	PA(6)
0.44	0.41	0.53	0.49	0.53	0.43
(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)
4.35	4.05	5.22	4.82	5.20	4.24
PA(7)	PA(8)				
0.51	0.73				
(0.10)	(0.10)				
4.96	7.12				

Table 5.25 indicates that all the indirect effects were statistically significant (p<.05) despite the fact that the factor loadings of the items were not statistically significant (p>.05). This means that respondents standing on *Task Performance* as a second-order factor statistically significantly (p<.05) affected the scores obtained on each of the eight items. This justified the use of all eight items of the *Task Performance* subscale as indicators of task performance interpreted as a second-order factor representing the common theme shared by the two first-order factors. This also justified the use of all eight items in the calculation of two composite indicators for the *Task Performance* latent variable in the model.

5.5.2 DIMENSIONALITY ANALYSIS: EFFORT

The design intention underpinning the *Effort* subscale was for the eight items, written for the subscale, to reflect a single underlying latent dimension. The *Effort* subscale was considered factor analysable as the correlation matrix contained numerous statistically significant (p<.05) correlations of .3 or greater, the Bartlett's test of sphericity was statistically significant (p<0.05), and the Kaiser-Meyer Olkin measure of sampling adequacy (MSA) value was greater than .6. Initially two factors with an eigenvalue greater than one were extracted. The position of the elbow scree plot indicated the extraction of ta single factor. However, there were 10 (35.0%) non-redundant residual correlations with absolute values greater than .05 and as a result it was decided to investigate a more credible solution for the observed inter-item correlation matrix by forcing the extraction of three factors. Table 5.26 shows the pattern matrix of the forced three-factor solution.

Table 5. 38

Pattern matrix for the Effort subscale with three factors forced

	Factor		
	1	2	3
B1	**.385**	-.062	.151
B2	**.434**	-.056	.020
B3	**.994**	.169	-.020
B4	**.690**	-.192	-.046
B5	-.155	-.326	**.782**
B6	.175	-**.828**	.035
B7	.249	**-.287**	.275
B8	.159	.150	**.573**

Items B1, B2, B3 and B4 loaded positively on the first factor, items B6 and B7 loaded negatively on the second factor; and items B5 and B8 loaded positively on factor three. Items B1 and B7 showed themselves as somewhat complex items as they had similarly unsatisfactory loadings on all three factors. The first factor was identified as a *perseverance through persistent-effort* factor, the second factor as an *energy investment-dedication* factor and the third factor as a tenacity-commitment factor. The factor fission was regarded as conceptually meaningful albeit rather subtle. Factor one and factor three correlated moderately and positively (.480). factor 2 correlated moderately and negatively with factor one (-.320) and factor 3 (-.387). The forced three-factor structure provided a credible explanation for the observed inter-item correlation matrix as only 6 (21.0%) of the non-redundant residual correlations had absolute values larger than .05. The unidimensionality assumption was therefore not supported in the case of the Effort subscale.

To examine whether the Effort subscale items can be considered valid measures the first-order *Effort* measurement model implied by the pattern matrix was fitted. The first-order measurement model in which items B1-B4 only loaded on factor one, items B6 and B7 only loaded on factor two and items B5 and B8 loaded on factor three showed exact fit (χ^2=23.81; p>.05). All factor loadings proved to be statistically significant. The second-order measurement model achieved exact fit (χ^2=23.81; p>.05). Items B1-B4 only loaded on first-order factor one, items B6-B7 only loaded on the second factor and items B5 and B8 only loaded on factor three. Statistically significant gamma estimates where indicated for all three dimensions. The path diagram of the completely standardised solution of the second-order measurement model is shown in Figure 5.2.

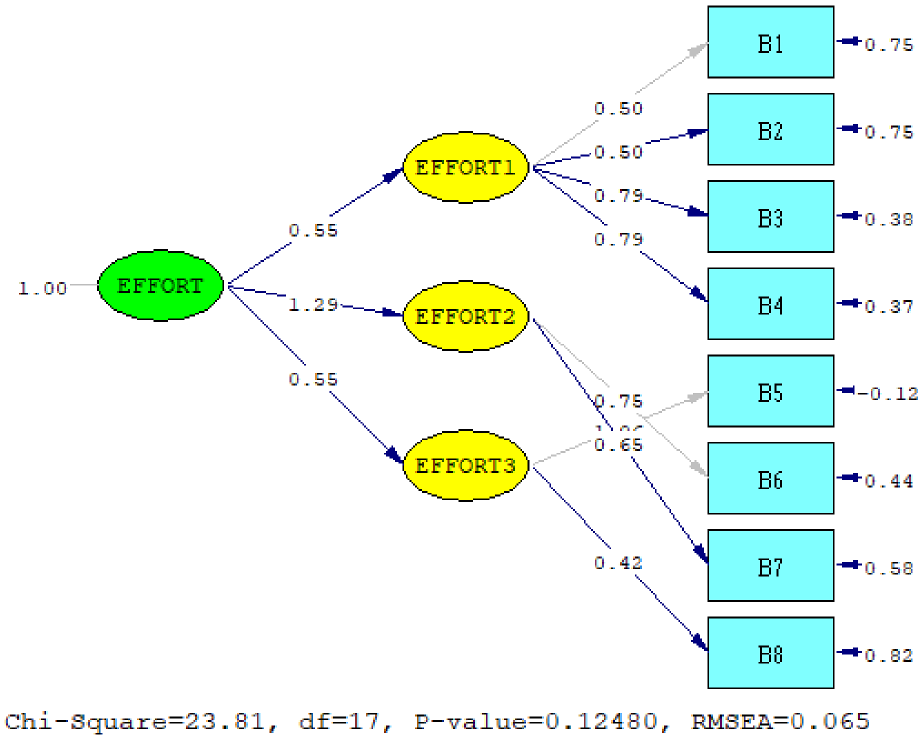

Figure 5. 2 Second-order *Effort* measurement model (completely standardised solution)

Subsequently, the eight indirect effects were obtained by calculating the products $\lambda_{ij}\gamma_{j1}$ and by testing the statistical significance of the calculated indirect effects. The results are shown in Table 5.27.

Table 5. 39

Unstandardised indirect effects for the Effort measurement model

PA(1)	PA(2)	PA(3)	PA(4)	PA(5)	PA(6)
0.24	0.23	0.38	0.33	0.69	0.56
(0.07)	(0.07)	(0.09)	(0.08)	(0.10)	(0.10)
3.35	3.35	4.09	4.09	6.61	5.64
PA(7)	PA(8)				
0.39	0.15				
(0.08)	(0.01)				
4.98	2.30				

Table 5.27 indicates that all the indirect effects were statistically significant ($p < .05$). This means that respondents standing on *Effort* as a second-order factor statistically significantly ($p<.05$) affected the scores obtained on each of the eight items. This

justified the use of all eight items of the *Effort* subscale in the calculation of two composite indicators[30] for the *Effort* latent variable in the model

5.5.3 DIMENSIONALITY ANALYSIS: ADAPTABILITY

The design intention that guided the development of the *Adaptability* subscale was for the eight items, written for the subscale, to reflect a single underlying latent dimension. The *Adaptability* subscale was considered factor analysable as the correlation matrix contained numerous statistically significant ($p<.05$) correlations of .3 or greater, the Bartlett's test of sphericity was statistically significant ($p< .05$), and the Kaiser-Meyer Olkin MSA value was greater than .6. Two factors with an eigenvalue greater than one were extracted. The position of the elbow in the scree plot indicated the extraction of a single factor. Table 5.28 indicates that item C1-C4 and C8 loaded positively on the first factor, while items C5-C7 loaded positively on the second factor. Items C3, C7 and C8 returned loadings marginally smaller than .5. on the factors that they loaded on[31]. Item C7 was flagged in the item analysis as a marginally problematic item. This is explained by the fact that item C7 returned a somewhat marginal factor loading on a second, less dominant factor in the factor structure. The first factor was interpreted based on the common theme shared by the items loading on it, as an *adapting to change and setbacks* factor whereas the second factor was interpreted as a *comfortable under pressure caused by change* factor. The two extracted factors correlated moderately and positively (.587) in the factor correlation matrix. There were 6 (21.0%) non-redundant residuals with absolute values greater than .05, which indicated that the two-factor solution provided a satisfactory explanation for the observed inter-item correlation matrix. The unidimensionality assumption was therefore not supported in the case of the *Adaptability* subscale. The still reasonable factor loading on factor 2 in conjunction with the conceptually meaningful factor fission resulted in the retention of item C7.

[30] The small sample size hindered the calculation of more than two item parcels per subscale.

[31] It is acknowledged that the .50 cut-off should be used with circumspection in the case of factor fission when interpreting the pattern matrix. The pattern matrix reflects the partial regression weights when regressing each item on the extracted factors. The factor loadings therefore reflect the influence of each factor on the item when controlling for the other factor(s).

Table 5. 40

Pattern matrix for the Adaptability subscale with two factors extracted

	Factor	
	1	2
C1	**.602**	.044
C2	**.687**	-.004
C3	**.462**	.213
C4	**.695**	-.027
C5	.074	**.614**
C6	-.012	**.721**
C7	-.020	**.469**
C8	**.488**	-.043

To examine the construct validity of the *Adaptability* subscale the first-order measurement model implied by the pattern matrix was fitted. The first-order *Adaptability* measurement model achieved exact fit (χ^2=0.97; p>.05). Items C1-C4 and C8 loaded on the first factor and items C5-7 loaded on the second factor. All the loadings of the items were considered statistically significant (p<.05) with the exception of item C8. The second-order measurement model also achieved exact fit (χ^2=0.91; p>0.05) but none of the factor loadings were statistically significant (p>.05). Both factors loaded significantly (p<.05) on the second-order factor. The path diagram of the completely standardised solution of the second-order measurement model is shown in Figure 5.3.

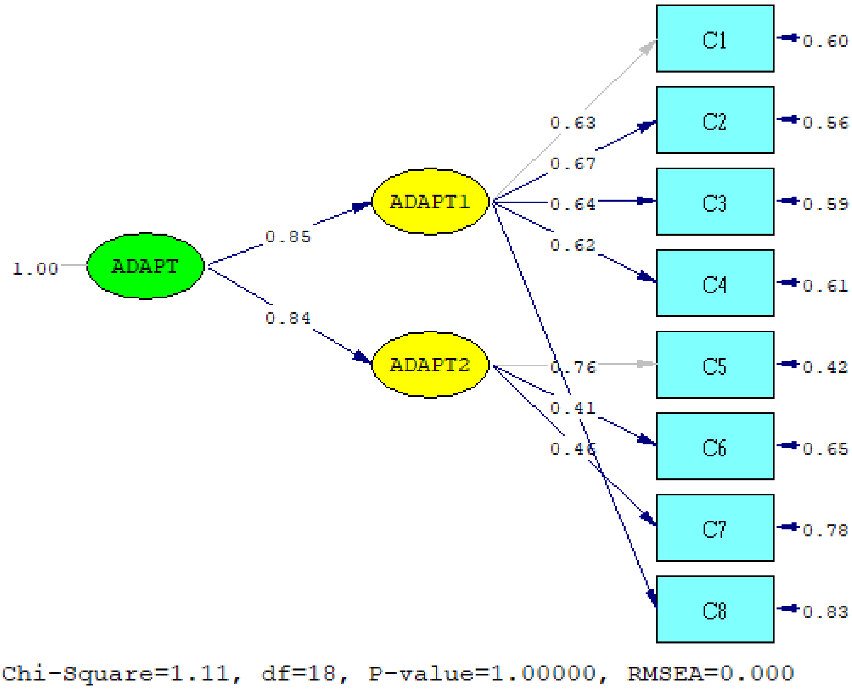

Figure 5. 3 Second-order *Adaptability* measurement model (completely standardised solution)

Subsequently, the eight indirect effects were obtained by calculating the products $\lambda_{ij}\gamma_{j1}$ and by testing the statistical significance of the calculated indirect effects. The results are shown in Table 5.29.

Table 5. 41

Unstandardised indirect effects for the Adaptability measurement model

PA(1)	PA(2)	PA(3)	PA(4)	PA(5)	PA(6)
0.47	0.45	0.42	0.49	0.61	0.46
(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)
4.61	4.39	4.10	4.79	5.98	4.49
PA(7)	PA(8)				
0.51	0.35				
(0.10)	(0.10)				
4.98	3.46				

Table 5.29 indicates that all the indirect effects were statistically significant ($p<.05$). This means that respondents standing on *Adaptability* as a second-order factor statistically significantly ($p<.05$) affected the scores obtained on each of the eight items. This justified the use of all eight items of the *Adaptability* subscale in the calculation of two composite indicators for the *Adaptability* latent variable in the model.

5.5.4 DIMENSIONALITY ANALYSIS: INNOVATING

The design intention of the *Innovating* subscale of the WUCQ was for the eight items, written for the subscale, to reflect a single, undifferentiated underlying latent dimension. The *Innovating* subscale was considered factor analysable as the correlation matrix contained numerous statistically significant correlations ($p<.05$) of .3 or greater, the Bartlett's test of sphericity was statistically significant ($p<.05$), and the Kaiser-Meyer Olkin MSA value was greater than .6. A single factor with an eigenvalue greater than one was extracted. The position of the elbow in the scree plot also indicated the extraction of a single factor. Table 5.30 shows that all the items had satisfactorily high factor loadings on the single extracted factor. There were 8 (28.0%) nonredundant residual correlations with absolute values greater than .05, which indicates that the single-factor solution offers a satisfactory explanation of the observed inter-item correlation matrix. The unidimensionality assumption was therefore supported in the case of the *Innovating* subscale.

Table 5. 42

Factor matrix for the Innovating subscale

	Factor
	1
D1	.723
D2	.683
D3	.654
D4	.741
D5	.628
D6	.728
D7	.510
D8	.523

5.5.5 DIMENSIONALITY ANALYSIS: LEADERSHIP POTENTIAL

The design intention underlying the *Leadership Potential* subscale of the WUCQ was for the eight items, written for the subscale, to reflect a single, undifferentiated underlying latent dimension. The *Leadership Potential* subscale was considered factor analysable as the correlation matrix contained numerous statistically significant ($p<.05$) correlations of .3 or greater, the Bartlett's test of sphericity was statistically significant ($p< .05$), and the Kaiser-Meyer Olkin MSA value was greater than .6. Two factors with an eigenvalue greater than one were extracted. The position of the elbow in the scree plot in contrast indicated the extraction of a single factor. Table 5.31 presents the pattern matrix which indicates that items E4-E8 all loaded positively on the first factor, whilst items E1-E3 loaded negatively on the second factor. All the items, except for item E4, had satisfactory loadings. The first factor was interpreted, based on the common theme shared by the items that loaded on it, as an informal transformational leader factor and the second factor was interpreted as an informal transactional leadership factor. The factor fission was regarded as conceptually meaningful. The two extracted factors correlated moderately and negatively (-.675) in the factor correlation matrix. There were 7 (25.0%) non-redundant residuals with absolute values greater than .05, which indicated that the two-factor solution provided a satisfactory explanation for the observed inter-item correlation matrix. The unidimensionality assumption was therefore not supported in the case of the *Leadership* subscale.

Table 5. 43

Pattern matrix for the Leadership Potential subscale with two factors extracted

	Factor	
	1	2
E1	.005	**-.846**
E2	-.046	**-.764**
E3	.100	**-.772**
E4	**.418**	-.298
E5	**.655**	-.138
E6	**.817**	.053
E7	**.673**	.001
E8	**.775**	.045

To examine the construct validity of the *Leadership Potential sub*scale the first-order measurement model implied by the pattern matrix was fitted. The first-order measurement model in which items E4-E8 only loaded on factor one, items E1-E3 only loaded on factor two showed exact fit (χ^2=4.03; p>.05). All the factor loadings were statistically significant (p<.05). The second-order measurement model achieved exact fit (χ^2=4.18; p>.05). Items E4-E8 only loaded on first-order factor one, although items E4, E5, and E7 did not have statistically significant (p>.05) factor loadings. Items E1-E3 had statistically significant (p<.05) loadings on factor 2. Both the factors had statistically significant (p<.05) gamma estimates. The path diagram of the completely standardised solution of the second-order measurement model is shown in Figure 5.4

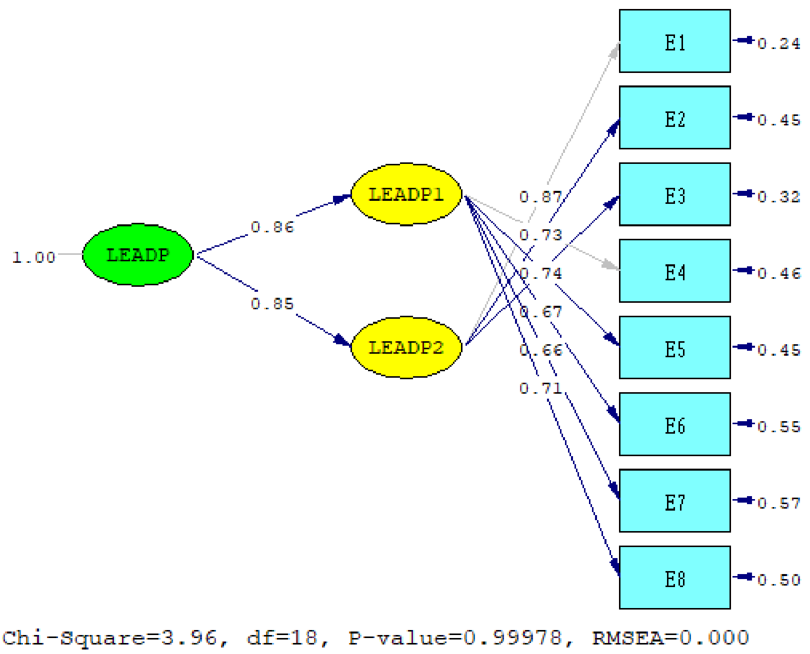

Figure 5. 4 Second-order *Leadership Potential* measurement model (completely standardised solution)

Subsequently, the eight indirect effects were obtained by calculating the products $\lambda_{ij}\gamma_{j1}$ and by testing the statistical significance of the calculated indirect effects. The results are shown in Table 5.32.

Table 5. 44

Unstandardised indirect effects for the second-order Leadership Potential measurement model

PA(1)	PA(2)	PA(3)	PA(4)	PA(5)	PA(6)
0.60	0.53	0.64	0.67	0.67	0.61
(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)
5.87	5.19	6.28	6.58	6.55	6.00
PA(7)	PA(8)				
0.54	0.69				
(0.10)	(0.10)				
5.31	6.72				

Table 5.32 indicates that all the indirect effects were statistically significant ($p<.05$) despite the fact that the factor loading of items E4, E5 and E7 on factor 1 were not statistically significant ($p>.05$). This means that respondents standing on *Leadership Potential* as a second-order factor statistically significantly ($p<.05$) affected the scores obtained on each of the eight items. This justified the use of all eight items of the *Leadership Potential* subscale in the calculation of two composite indicators for the *Leadership Potential subscale* latent variable in the model.

5.5.6 DIMENSIONALITY ANLYSIS: COMMUNICATION

The design intention underpinning the *Communication* subscale of the WUCQ was for the eight items, written for the subscale, to reflect a single, undifferentiated underlying latent performance dimension. The *Communication* subscale was considered factor analysable as the correlation matrix contained numerous statistically significant ($p<.05$) correlations of .3 or greater, the Bartlett's test of sphericity was statistically significant ($p<.05$), and the Kaiser-Meyer Olkin MSA value was greater than .6. Two factors with an eigenvalue greater than one were extracted. The position of the elbow in the scree plot was somewhat ambiguous and could be interpreted to indicate the extraction of either one or two factors. The factor loadings of the items can be seen in Table 5.33. Items F3-F8 all loaded on the first factor, whilst items F1 and F2, and to some degree F3 as well, loaded on the second factor. Items F3 and F4 showed themselves as complex items in that they tended to cross-load on both factors. The first factor was identified as a *networking and persuasion* factor and the second factor as a *written communication* factor. Items F3 and F4 referred to the extent to which comments, explanations and arguments were eloquently worded and logically structured. This competency tapped into both factors. The factor fission was regarded as conceptually meaningful. There were 7 (25.0%) non-redundant residuals with absolute values greater than .05, which indicated that the two-factor solution provided a satisfactory explanation for the observed inter-item correlation matrix. The unidimensionality assumption was therefore not supported in the case of the *Communication* subscale.

Table 5. 45

Pattern matrix for the Communication scale with two factors extracted

	Factor	
	1	2
F1	-.023	**.704**
F2	-.007	**.842**
F3	**.513**	.447
F4	**.528**	.375
F5	**.878**	-.157
F6	**.841**	-.075
F7	**.801**	.024
F8	**.516**	.182

To examine the construct validity of the *Communication* subscale the first-order measurement model implied by the pattern matrix was fitted. The first-order *Communication* measurement model showed poor fit (RMSEA=.150; p-value=0.000). The first-order measurement model calculated only three statistically significant (p<.01) modification indices for the off-diagonal covariance terms for the first-order *Communication* measurement model (see Figure 5.5). It needed to be considered, however, that LISREL identified the statistically significant modification index values at a .01 significance level. When operating at a .05 significance level the critical chi-square value for one degree of freedom would be 3.841 instead of 6.64. Interpreted in this sense eight statistically significant (p<.05) modification indices were calculate for the off-diagonal elements of the theta-delta matrix of the first-order *Communication* measurement model. This represented *circa* 29% of the currently fixed off-diagonal covariance terms in Θ_δ. This suggested that the items of the *Communication* scale also reflected general source of systematic variance currently not acknowledged by the model. The Communication bi-factor model is shown in Figure 5.6

The *Communication* bi-factor model achieved exact fit (χ^2=10.37; p>0.05). Table 5.34 show that items F3-F8 loaded statistically significantly (p<.05) on their designated narrow group factor and items F1 and F2 loaded statistically significantly (p<.05) on their narrow group factor. All the items of the *Communication* scale, except for items E5, E6 and E7 loaded statistically significantly (p<.05) on the broad, general *Communication* factor.

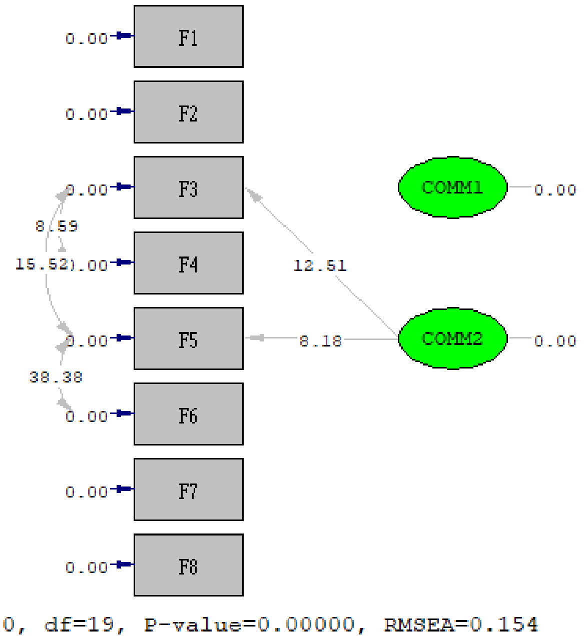

Figure 5. 5 Statistically significant (p<.01) modification indices calculated for the first-order *Communication* measurement model

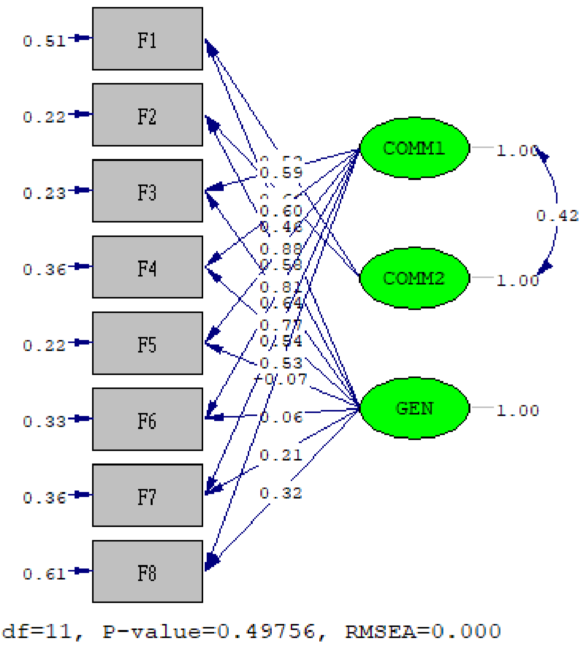

Figure 5. 6 Bi-factor *Communication* measurement model (completely standardised solution)

Table 5. 46

Unstandardised lambda-x matrix for the bi-factor Communication subscale

	COMM1	COMM2	GEN
F1	- -	0.439*	0.375*
		(0.131)	(0.119)
		3.343	3.158
F2	- -	0.572*	0.506*
		(0.168)	(0.092)
		3.402	5.475
F3	0.547*	- -	0.593*
	(0.070)		(0.104)
	7.791		5.682
F4	0.522*	- -	0.467*
	(0.071)		(0.091)
	7.297		5.133
F5	0.885*	- -	-0.074
	(0.111)		(0.118)
	8.002		-0.629
F6	0.855*	- -	0.063
	(0.086)		(0.101)
	9.981		0.626
F7	0.777*	- -	0.206
	(0.101)		(0.133)
	7.660		1.558
F8	0.517*	- -	0.314*
	(0.084)		(0.122)
	6.138		2.578

* (p,.05)

Table 5.34 shows that all the items of the *Communication* subscale statistically significantly at least one of the three factors comprising the multidimensional *Communication* competency. The broad general *Communication* factor and the narrow, more specific *Communication* factor the item reflected according to the pattern matrix explained satisfactory proportions of variance in the subscale items. R^2 for the items ranged between 0.388 and 0.777. The current study consequently concluded that all the items currently included in the subscale validly reflected the multidimensional *Communication* construct.

5.5.7 DIMENSIONALITY ANALYSIS: INTERPERSONAL RELATIONS

The design intention that guided the development of the *interpersonal Relations* subscale of the GCQ was for the eight items, written for the subscale, to reflect a single, undifferentiated underlying latent performance dimension. The *Interpersonal*

*Relations sub*scale was considered factor analysable as the correlation matrix contained numerous statistically significant ($p<.05$) correlations of .3 or greater, the Bartlett's test of sphericity was statistically significant ($p< .05$), and the Kaiser-Meyer Olkin MSA value was greater than .6. Two factors with an eigenvalue greater than one were extracted. The position of the elbow in the scree plot indicated the extraction of a single factor. Table 5.35 presents the pattern matrix for the *Interpersonal Relations sub*scale. Items G5-G8 all loaded positively on the first factor, whilst items G1-G4 loaded positively on the second factor. All the items, except for item G1, had satisfactory loadings. Item G1 presented itself as somewhat of a complex item with similarly unsatisfactory loadings on both factors. The first factor was interpreted, based on the common theme shared by the items loading on it, as a *getting along with colleagues* factor and the second factor was interpreted as a *socially interacting with colleagues* factor. The factor fission was regarded as conceptually meaningful. The two extracted factors correlated moderately and positively (.629) in the factor correlation matrix. There were 6 (21.0%) non-redundant residual correlations with absolute values greater than .05, which indicated that the two-factor solution provided a satisfactory explanation for the observed inter-item correlation matrix. The unidimensionality assumption was therefore not supported in the case of the *Interpersonal Relations* subscale.

Table 5. 47

Pattern matrix for the Interpersonal Relations subscale with two factors extracted

	Factor	
	1	2
G1	.362	.485
G2	-.072	.763
G3	.000	.901
G4	.304	.513
G5	.748	.066
G6	.733	.095
G7	.935	-.107
G8	.683	.008

To examine the construct validity of the *Interpersonal Relations* subscale the first-order measurement model implied by the pattern matrix was fitted. The first-order measurement model in which items G5-G8 only loaded on factor one, items G1-G4 only loaded on factor two showed exact fit (χ^2=4.77; $p>.05$). All the factor loadings were statistically significant ($p<.05$). The second-order measurement model achieved exact fit (χ^2=5.32; $p>.05$) Items G5-G8 only loaded on first-order factor one. Item G1-

G4 only loaded on factor 2. None of the factor loadings were statistically significant (p>.05). Both the factors had statistically significant gamma estimates. The path diagram of the completely standardised solution of the second-order measurement model is shown in Figure 5.7

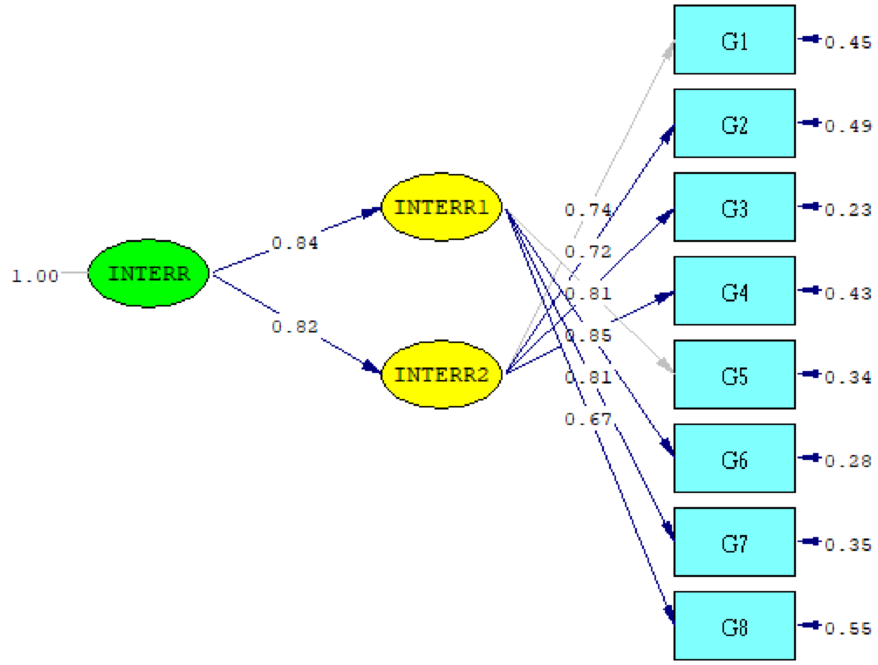

Figure 5. 7 Second-order *Interpersonal Relations* measurement model (completely standardised solution)

Subsequently, the eight indirect effects were obtained by calculating the products $\lambda_{ij}\gamma_{j1}$ and by testing the statistical significance of the calculated indirect effects. The results are shown in Table 5.36

Table 5. 48

Unstandardised indirect effects for the second-order Interpersonal Relations measurement model

PA(1)	PA(2)	PA(3)	PA(4)	PA(5)	PA(6)
0.44	0.48	0.55	0.48	0.60	0.65
(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)
4.27	4.68	5.41	4.71	5.89	6.39
PA(7)	PA(8)				
0.62	0.50				
(0.10)	(0.10)				
6.11	4.92				

As seen in Table 4.36 all the indirect effects were statistically significant (p<.05) despite the fact that the factor loadings of all the items were not statistically significant (p>.05). This indicates that respondent's reaction on *Interpersonal Relations* as a second-order factor statistically significantly (p<.05) influenced the scores on each of the eight items. This warranted the use of all eight items of the *Interpersonal Relations* subscale in the calculation of two composite indicators for the *Interpersonal relations subscale* latent variable in the model.

5.5.8 DIMENSIONALITY ANALYSIS: MANAGEMENT

The design intention underpinning the *Management* subscale of the GCQ was for the eight items, written for the subscale, to reflect a single, undifferentiated underlying latent performance dimension. The *Management* subscale was considered factor analysable as the correlation matrix contained numerous statistically significant (p<.05) correlations of .3 or greater, the Bartlett's test of sphericity was statistically significant (p<.05), and the Kaiser-Meyer Olkin MSA value was greater than .6. Initially a single factor with an eigenvalue greater than one was extracted. The position of the inflection point in the plot test also indicated the extraction of one factor. However, there were 13 (46.0%) non-redundant residual correlations with absolute values greater than .05 that indicated that the single-factor solution did not offer a valid and credible explanation of the observed inter-item correlation matrix. As a result, it was decided to investigate a more credible solution for the observed inter-item correlation matrix by forcing the extraction of two factors.

Table 5. 49

Pattern Matrix for the Management scale with two factors forced

	Factor	
	1	2
H1	**.550**	.099
H2	**1.052**	-.150
H3	**.771**	.072
H4	**.480**	.145
H5	-.111	**.950**
H6	.183	**.654**
H7	.192	**.507**
H8	**.413**	**.449**

Table 5.37 shows the pattern matrix of the forced two-factor solution. Items H1-H4 loaded positively on the first factor and items H5-H8 loaded positively on the second factor. All of the items, H8, clearly loaded on a single factor. Items H8 showed itself as

a somewhat complex item as it had similarly unsatisfactory loadings on both factors. The first factor was interpreted, based om the common theme shared by the items that loaded on it, as a *systematic organised work* factor and the second factor was interpreted as a goal setting and monitoring progress factor. The factor fission was regarded as conceptually meaningful albeit subtle. The two extracted factors correlated moderately-high and positively (.712) in the factor correlation matrix. The forced two-factor structure provided a valid and credible explanation for the observed inter-item correlation matrix as only 7 (25.0%) of the non-redundant residual correlations had absolute values larger than .05. The unidimensionality assumption was therefore not supported in the case of the *Management* subscale.

To examine the construct validity of the *Management* subscale the first-order measurement model implied by the pattern matrix shown in Table 5.37 was fitted. The first-order measurement model in which items H1-H4 only loaded on factor one and items H5-H8 only loaded on factor two showed exact fit (χ^2=25.90; p>.05). All factor loadings proved to be statistically significant (p<.05). The second-order measurement model achieved exact fit (χ^2=24.85; p>.05). Items H1-H4 only loaded on first-order factor one, items H5-H8 only loaded on the second factor. All the factor loadings proved to be statistically significant(p<.05). Statistically significant (p<.05) gamma estimates where indicated for both dimensions. The path diagram of the completely standardised solution of the second-order measurement model is shown in Figure 5.8.

Subsequently, the eight indirect effects were obtained by calculating the products $\lambda_{ij}\gamma_{j1}$ and by testing the statistical significance of the calculated indirect effects. The results are shown in Table 5.38

Table 5. 50

Unstandardised indirect effects for the second-order Management measurement model

PA(1)	PA(2)	PA(3)	PA(4)	PA(5)	PA(6)
0.50	0.68	0.70	0.47	0.62	0.65
(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)
4.93	6.64	6.89	4.64	6.11	6.34
PA(7)	PA(8)				
0.59	0.72				
(0.10)	(0.10)				
5.76	7.02				

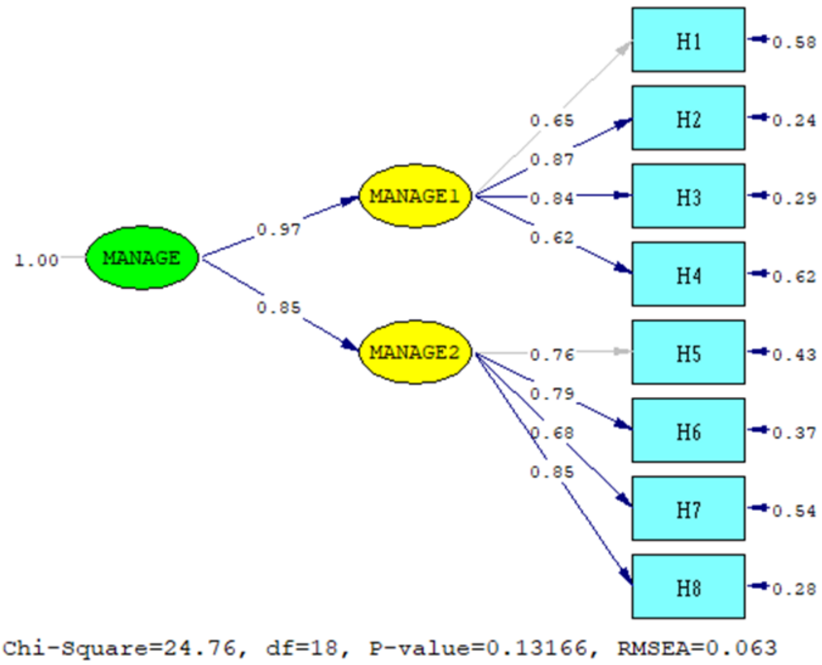

Figure 5. 8 Second-order *Management* measurement model (completely standardised solution)

As seen in Table 5.38 all the indirect effects were statistically significant (p<.05) despite the fact that the factor loadings of all the items were not statistically significant (p>.05). This indicates that the respondent's reaction on *Management* as a second-order factor statistically significantly (p<.05) influenced the scores on each of the eight items. This warranted the use of all eight items of the *Management* subscale in the calculation of two composite indicators for the *Management subscale* latent variable in the model.

5.5.9 DIMENSIONALITY ANALYSIS: ANALYSING AND PROBLEM-SOLVING

The design intention that guided the development of the *Analysing and Problem-Solving* subscale of the GCQ was for the eight items, written for the subscale, to reflect a single, undifferentiated underlying latent performance dimension. The *Analysing and Problem-Solving* subscale was considered factor analysable as the correlation matrix contained numerous statistically significant correlations of .3 or greater, the Bartlett's test of sphericity was statistically significant (p < .05), and the Kaiser-Meyer Olkin MSA value was greater than .6. Initially a single factor with an eigenvalue greater than one was extracted. The scree plot also indicated the extraction of a single factor. However, 10 (39.0%) non-redundant residual correlations with absolute values greater than .05

were calculated and as a result it was decided to investigate a more credible solution for the observed inter-item correlation matrix by forcing the extraction of two factors. SPSS 25 was unable to extract two factors and reported that the communality of a variable exceeded 1.0. This forced the extraction of three factors. Table 5.39 show the pattern matrix of the forced three-factor solution.

Table 5. 51

Pattern matrix for the Analysing and Problem-Solving subscale with three factors forced

	Factor		
	1	2	3
I1	**.773**	-.084	-.114
I2	**.800**	.124	.234
I3	**.654**	.039	-.189
I4	**.743**	.002	-.004
I5	.273	.185	**-.599**
I6	.012	**.723**	-.289
I7	.031	**.694**	.101
I8	**.423**	**.304**	-.149

Items I1-I4 and I8 loaded positively on the first factor, items I6 and I7 loaded positively on the second factor; and only item I5 loaded negatively on factor three. Items I8 showed itself as a somewhat complex item as it had similarly unsatisfactory loadings on factors one and two. The first factor was identified as a *diagnostic problem -solving* factor, the second factor as a *deductive-problem-solving* factor and the third factor as a *logical problem-solving* factor. The factor fission was regarded as conceptually meaningful albeit rather subtle. Factor one correlated moderately and positively (.675) with factor two and low-moderately and negatively (-.394) with factor three. Factor two correlated low and negatively (-.292) with factor three. The forced three-factor structure provided a credible explanation for the observed inter-item correlation matrix as only 4 (14.0%) of the non-redundant residual correlations had absolute values larger than .05. The unidimensionality assumption was therefore not supported in the case of the *analysing and Problem-solving* subscale.

To examine the construct validity of the *Analysing and Problem-Solving* subscale the first-order measurement model implied by the pattern matrix shown in Table 5.39 was fitted. The first-order measurement model in which items I1-I4 and I8 only loaded on factor one, items I6 and I7 only loaded on factor two and item I5 loaded on factor three showed exact fit (χ^2=14.14; p>.05). All factor loadings proved to be statistically significant (p<.05). The second-order measurement model achieved exact fit (χ^2=12.83; p>.05). Items I1-I4 and I8 only loaded on first-order factor one, items I6-I7 only loaded on the second factor and item I5 loaded on factor three. All the factor loadings, except for item I4, proved to be statistically significant (p<.05). Statistically significant (p<.05) gamma estimates where indicated for all three dimensions. The path diagram of the completely standardised solution of the second-order measurement model is shown in Figure 5.9

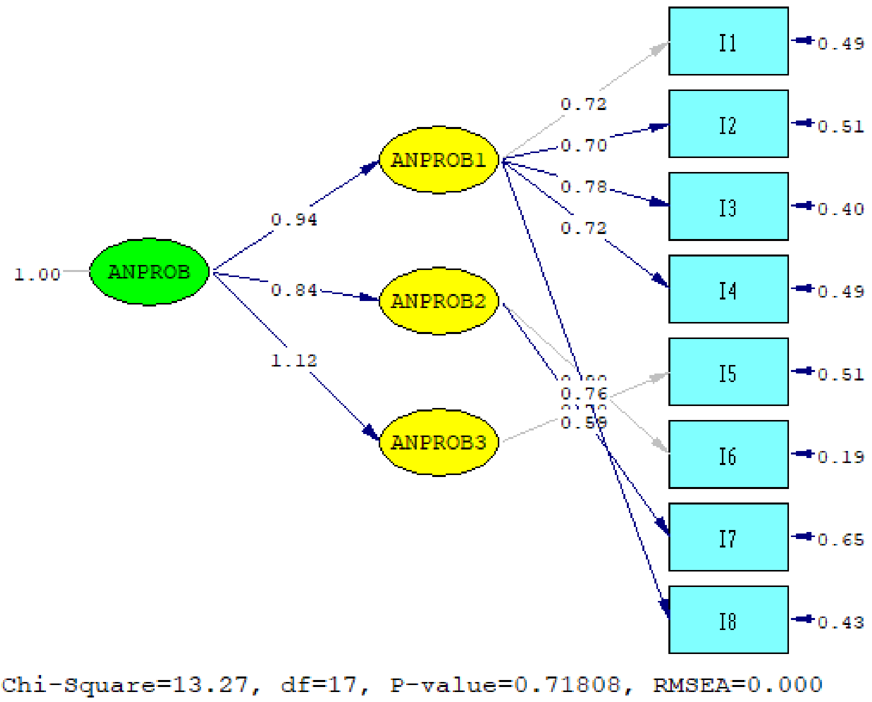

Figure 5. 9 Second-order *Analysing and Problem-Solving* measurement model (completely standardised solution)

Subsequently, the eight indirect effects were obtained by calculating the products $\lambda_{ij}\gamma_{j1}$ and by testing the statistical significance of the calculated indirect effects. The results are shown in Table 5.40

Table 5. 52

Unstandardised indirect effects for the second-order Analysing and Problem-Solving measurement model

PA(1)	PA(2)	PA(3)	PA(4)	PA(5)	PA(6)
0.62	0.63	0.50	0.68	0.81	0.63
(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)
6.05	6.13	4.94	6.70	7.89	6.19
PA(7)	PA(8)				
0.90	0.79				
(0.10)	(0.10)				
8.78	7.79				

As seen in Table 5.40 all the indirect effects were statistically significant (p<.05) despite the fact that the initial factor loading of item I4 was not statistically significant (p>.05). This indicates that the respondents' reaction on *Analysing and Problem-Solving* as a second-order factor statistically significantly (p<.05) influenced the scores on each of the eight items. This warranted the use of all eight items of the *Analysing and Problem-Solving* subscale in the calculation of two composite indicators for the *Analysing and Problem-Solving subscale* latent variable in the model. Item I7 was flagged in the preceding item analysis as a marginally problematic item. The results reported for the second-order factor justified the retention of item I7.

5.5.10 DIMENSIONALITY ANALYSIS: COUNTERPRODUCTIVE WORK BEHAVIOUR

The design intention that underpinned the *Counterproductive Work Behaviour* subscale pf the GCQ was for the eight items, written for the subscale, to reflect a single, undifferentiated underlying latent performance dimension. The *Counterproductive Work Behaviour* subscale was considered factor analysable as the correlation matrix contained numerous statistically significant correlations of .3 or greater, the Bartlett's test of sphericity was statistically significant (p<.05), and the Kaiser-Meyer Olkin MSA value was greater than .6. Two factors with an eigenvalue greater than one were extracted. The position of the reflection point in the scree plot suggested the extraction of either one or two factors. Table 5.41 presents the pattern matrix which indicates that items J1-J4 and J7 all loaded positively on the first factor, whilst items J5, J6 and J8 loaded positively on the second factor. All the items, except for item J7, had satisfactory loadings. The first factor was interpreted, based on the common theme shared by the items that loaded on it, as an *organisational offence* factor and the second factor as a *criminal offence* factor. The factor fission was regarded as conceptually meaningful. The two extracted factors correlated moderately and positively (.564) in the factor correlation matrix. There were 8 (28.0%) non-redundant residuals with absolute values greater than .05, which indicated that the two-factor solution provided a satisfactory explanation for the observed inter-item correlation matrix. The unidimensionality assumption was therefore not supported in the case of the *Counterproductive Work behaviour* subscale.

Table 5. 53

Pattern matrix for the Counterproductive Work Behaviour subscale with two factors extracted

	Factor	
	1	2
J1	**.706**	.015
J2	**.814**	-.129
J3	**.624**	.163
J4	**.732**	.031
J5	.047	**.715**
J6	.185	**.526**
J7	**.406**	.268
J8	-.102	**.932**

To examine the construct validity of the *Counterproductive Work Behaviour* subscale the first-order measurement model implied by the pattern matrix shown in Table 5.41 was fitted. The first-order measurement model in which items J1-J4 and J7 only loaded on factor one and items J5, J6 and J8 only loaded on factor two showed exact fit (χ^2=2.42; p>.05). All the factor loadings, except for item J6, were statistically significant (p<.05). The second-order measurement model achieved exact fit (χ^2=2.30; p>0.05) None of the items had statistically significant (p>.05) factor loadings in the second-order measurement model. Both the factors had statistically significant (p<.05) gamma estimates. The path diagram of the completely standardised solution of the second-order measurement model is shown in Figure 5.10.

Subsequently, the eight indirect effects were obtained by calculating the products $\lambda_{ij}\gamma_{j1}$ and by testing the statistical significance of the calculated indirect effects. The results are shown in Table 5.42

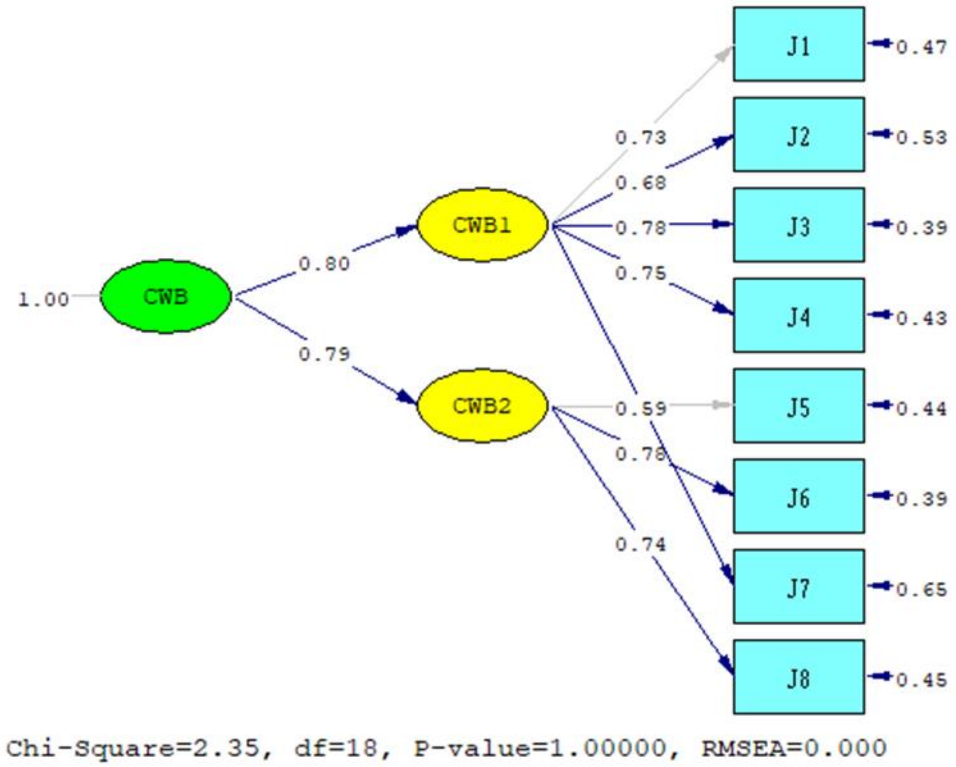

Figure 5. 10 Second-order *Counterproductive Work Behaviour* measurement model (completely standardised solution)

Table 5. 54

Unstandardised indirect effects for the second-order Counterproductive Work Behaviour measurement model

PA(1)	PA(2)	PA(3)	PA(4)	PA(5)	PA(6)
0.48	0.47	0.49	0.50	0.44	0.48
(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)
4.71	4.62	4.76	4.88	4.35	4.66
PA(7)	PA(8)				
0.4	0.41				
(0.10)	(0.10)				
3.92	4.07				

As seen in Table 4.42 all the indirect effects were statistically significant (p<.05) despite the fact that none of the items had statistically significant (p>.05) factor loadings in the second-order measurement model. This indicates that the respondents' reaction on *Counterproductive Work Behaviour* as a second-order factor statistically significantly (p<.05) influenced the scores on each of the eight items. This warranted the use of all eight items of the *Counterproductive Work Behaviour* subscale in the calculation of two composite indicators for the *Counterproductive Work Behaviour subscale* latent variable in the model.

5.5.11 DIMENSIONALITY ANALYSIS: ORGANISATIONAL CITIZENSHIP BEHAVIOUR

The design intention that guided the development of the *Organisational Citizenship Behaviour* subscale of the GCQ was for the eight items, written for the subscale, to reflect a single, undifferentiated underlying latent performance dimension. The *Organisational Citizenship Behaviour subscale* was considered factor analysable as the correlation matrix contained numerous statistically significant(p<.05) correlations of .3 or greater, the Bartlett's test of sphericity was statistically significant (p<.05), and the Kaiser-Meyer Olkin MSA value was greater than .6. A single factor with an eigenvalue greater than one was extracted. The reflection point in the scree plot also indicated the extraction of a single factor. Table 5.43 shows that all the items had satisfactorily high factor loadings on the single extracted factor. There were 7 (25.0%) nonredundant residual correlations with absolute values greater than .05, which indicated that the single-factor factor structure provided a satisfactory explanation of the observed inter-item correlation matrix. The unidimensionality assumption was therefore supported in the case of the *Organisational Citizenship Behaviour* subscale.

Table 5. 55

Factor matrix for the Organisational Citizenship Behaviour subscale

	Factor 1
K1	.622
K2	.752
K3	.747
K4	.706
K5	.693
K6	.696
K7	.717
K8	.705

5.5.12 DIMENSIONALITY ANALYSIS: SELF-DEVELOPMENT

The design intention that underpinned the *Self-Development* subscale was for the eight items, written for the subscale, to reflect a single underlying, undifferentiated latent performance dimension. The *Self-Development* subscale was considered factor analysable as the correlation matrix contained numerous statistically significant correlations of .3 or greater, the Bartlett's test of Sphericity was statistically significant (p<.05), and the Kaiser-Meyer Olkin MSA value was greater than .6. Initially a single factor with an eigenvalue greater than one was extracted. The position of the elbow in the scree plot also indicated the extraction of a single factor. However, there were 16

(57.0%) non-redundant residual correlations with absolute values greater than .05. The single factor structure therefore did not offer a valid and credible explanation of the observed inter-item correlation matrix. As a result, it was decided to investigate a more credible solution for the observed inter-item correlation matrix by forcing the extraction of two factors. The two-solution proved to still not provide a valid and credible explanation of the observed inter-item correlation matrix with 12 (42.0%) non-redundant residual correlations with absolute values greater than .05. Consequently, it was decided to investigate a more credible solution for the observed inter-item correlation matrix by forcing the extraction of three factors. Table 5.44 show the pattern matrix of the forced three-factor solution.

Table 5. 56

Pattern matrix for the Self-Development subscale with three factors forced

	Factor		
	1	2	3
L1	.273	**.727**	-.111
L2	**.413**	.180	.200
L3	-.081	**.502**	.418
L4	**.621**	.189	.044
L5	**.946**	-.095	.036
L6	.236	.032	**.563**
L7	.114	-.057	**.705**
L8	**.671**	.059	.080

Items L2, L4, L5 and L8 load on the first factor, items L1 and L3 load on the second factor; and item L6 and L7 loaded on factor three. The first factor was interpreted as a career management factor, the second factor was interpreted as an *acceptance of responsibility for own development* factor and the third factor was interpreted as an *active involvement in one's own career development* factor. The factor fission was regarded as conceptually meaningful. The forced three-factor structure provided a credible explanation for the observed inter-item correlation matrix as only 5 (17.0%) of the non-redundant residuals had absolute values larger than .05. The unidimensionality assumption was therefore not supported in the case of the *Self-development* subscale.

To examine the construct validity of the *Self-Development* subscale the first-order measurement model implied by the pattern matrix depicted in Table 5.44 was fitted. The first-order measurement model in which items L2, L4, L5 and L8 only loaded on factor one, items L1 and L3 only loaded on factor two; and items L6 and L7 loaded on factor three showed exact fit (χ^2=17.62; p>.05). All factor loadings proved to be statistically significant (p<.05). The second-order measurement model achieved exact fit (χ^2=17.62; p>0.05). Items L2, L4, L5 and L8 only loaded on first-order factor one, items L1 and L3 only loaded on the second factor; and items L6 and L7 loaded on factor three. All the factor loadings proved to be statistically significant (p<.05). Statistically significant (p<.05) gamma estimates where indicated for all three dimensions. The path diagram of the completely standardised solution of the second-order measurement model is shown in Figure 5.11

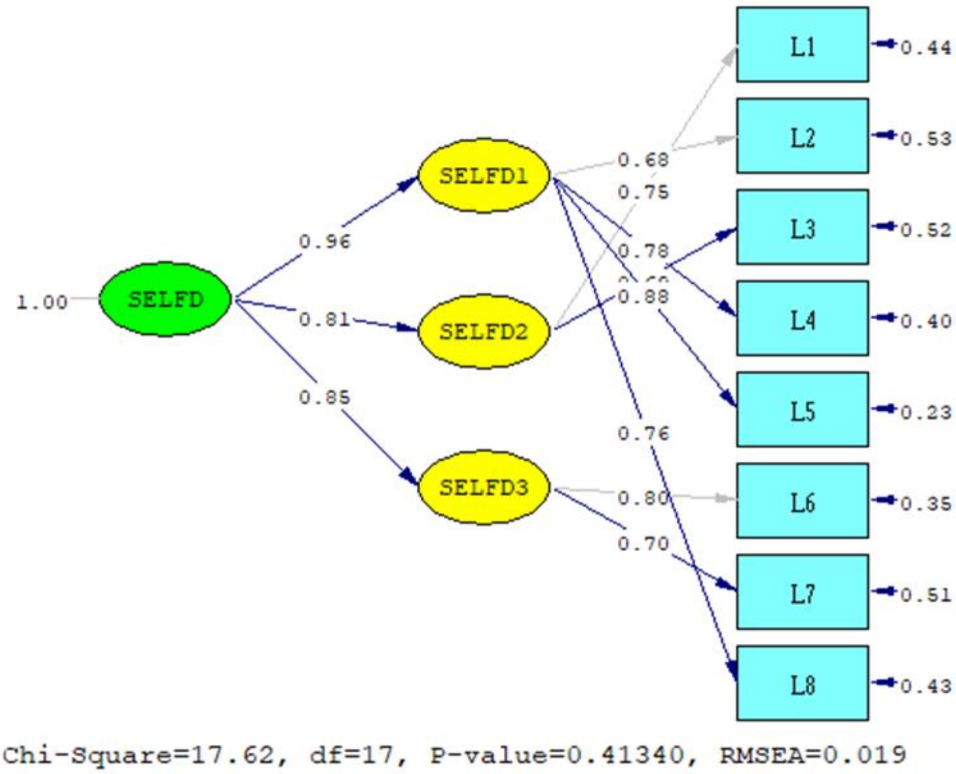

Figure 5. 11 Second-order *Self-Development* measurement model (completely standardised solution)

Subsequently, the eight indirect effects were obtained by calculating the products $\lambda_{ij}\gamma_{j1}$ and by testing the statistical significance of the calculated indirect effects. The results are shown in Table 5.45

Table 5. 57

Unstandardised indirect effects for the second-order Self-Development measurement model

PA(1)	PA(2)	PA(3)	PA(4)	PA(5)	PA(6)
0.50	0.54	0.48	0.70	0.71	0.56
(0.08)	(0.08)	(0.09)	(0.09)	(0.08)	(0.08)
5.98	6.45	5.44	7.39	8.44	6.82

PA(7)	PA(8)
0.52	0.64
(0.09)	(0.09)
5.77	7.20

As seen in Table 5.45 all the indirect effects were statistically significant ($p<.05$). This indicates that the respondents' reaction on *Self-Development* as a second-order factor statistically significantly ($p<.05$) influenced the scores on each of the eight items. All items of the subscale may therefore be regarded as valid indicators of the second-order *Self-development* factor. This warranted the use of all eight items of the *Self-Development* subscale in the calculation of two composite indicators for the *Self-Development* subscale latent variable in the model.

5.5.13 DIMENSIONALITY ANALYSIS: EMPLOYEE GREEN BEHAVIOUR

The design intention that guided the development of the *Employee Green Behaviour* subscale was for the eight items, written for the subscale, to reflect a single, indivisible underlying latent performance dimension. The *Employee Green Behaviour* subscale was considered factor analysable as the correlation matrix contained numerous statistically significant ($p<.05$) correlations of .3 or greater, the Bartlett's test of sphericity was statistically significant ($p<.05$), and the Kaiser-Meyer Olkin MSA value was greater than .6. Two factors with an eigenvalue greater than one were extracted. The position of the inflection point in the scree plot was rather ambiguous and indicated the extraction of either one or three factors. Table 5.46 presents the pattern matrix which indicates that items M1-M4 all loaded positively on the first factor, whilst items M5- M8 loaded negatively on the second factor. The first factor was interpreted, based on the common theme shared by the items that loaded on it, as a *conserving, avoiding harm, working sustainably* factor and the second factor was interpreted as an *intellectual engagement with acting green* factor. The factor fission was regarded as conceptually meaningful. The two extracted factors correlated moderately and negatively (.634) in the factor correlation matrix. There were 8 (28.0%) non-redundant residuals with absolute values greater than .05, which indicated that the two-factor solution provides a satisfactory explanation for the observed inter-item correlation matrix. The unidimensionality assumption was therefore not supported in the case of the *Employee Green Behaviour* subscale.

Table 5. 58

Pattern matrix for the Employee Green Behaviour subscale with two factors extracted

	Factor	
	1	2
M1	**.883**	.022
M2	**.906**	.059
M3	**.699**	-.040
M4	**.625**	-.240
M5	.204	**-.578**
M6	.171	**-.585**
M7	-.145	**-1.044**
M8	.008	**-.845**

To examine the construct validity of the *Employee Green Behaviour* subscale the first-order measurement model implied by the pattern matrix depicted in Table 5.46 was fitted. The first-order measurement model in which items M1-M4 only loaded on factor one and items M5-M8 only loaded on factor two showed exact fit (χ^2=.42; p>.05). All the factor loadings, except for item M6, were statistically significant (p<.05). The second-order measurement model achieved exact fit (χ^2=.34; p>.05;). Only items M7 and M8 had statistically significant (p<.05) factor loadings in the second-order measurement model. Only the second factor had a statistically significant (p<.05) gamma estimate. The path diagram of the completely standardised solution of the second-order measurement model is shown in Figure 5.12

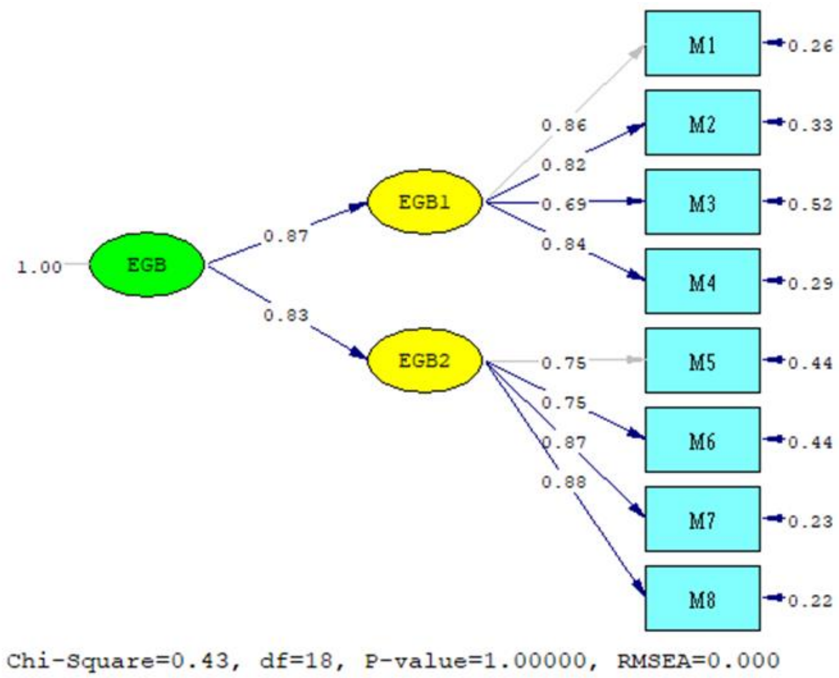

Figure 5. 12 Second-order *Employee Green Behaviour* measurement model (completely standardised solution*)*

Subsequently, the eight indirect effects were obtained by calculating the products $\lambda_{ij}\gamma_{j1}$ and by testing the statistical significance of the calculated indirect effects. The results are shown in Table 5.47

Table 5. 59

Unstandardised indirect effects for the second-order Employee Green Behaviour measurement model

PA(1)	PA(2)	PA(3)	PA(4)	PA(5)	PA(6)
0.65	0.65	0.5	0.7	0.77	0.62
(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)
6.41	6.33	4.87	6.90	7.55	6.04
PA(7)	PA(8)				
0.91	0.83				
(0.10)	(0.10)				
8.90	8.12				

As seen in Table 5.47 all the indirect effects were statistically significant (p<.05) despite the fact that the initial factor loadings of only items M7 and M8 were statistically significant (p<.05). This indicated that the respondents' reaction on *Employee Green Behaviour* as a second-order factor statistically significantly (p<.05) influenced the scores on each of the eight items. This warranted the use of all eight items of the *Employee Green Behaviour* subscale in the calculation of two composite indicators for the *Employee Green Behaviour* subscale latent variable in the model.

5.5.14 DIMENSIONALITY ANALYSIS: QUALITY OF OUTPUTS

The design intention that underpinned the *Quality of Outputs* subscale of the GOQ was for the eight items, written for the subscale, to reflect a single, indivisible underlying latent performance dimension. The *Quality of Outputs* subscale was considered factor analysable as the correlation matrix contained numerous statistically significant correlations of .3 or greater, the Bartlett's test of Sphericity was statistically significant ($p < 0.05$), and the Kaiser-Meyer Olkin MSA value was greater than .6. Initially a single factor with an eigenvalue greater than one was extracted. The inflection point in the scree plot also indicated the extraction of a single factor. However, there were 14 (50.0%) large non-redundant residual correlations with absolute values greater than .05. the single-factor factor structure therefore did not provide a valid and credible explanation for the observed inter-item correlation matrix. As a result, it was decided to investigate a more credible solution for the observed inter-item correlation matrix by forcing the extraction of two factors. The two-factor solution still proved not to provide a valid and credible explanation for the observed inter-item correlation matrix as there were still 11 (39.0%) non-redundant residual correlations with absolute values greater than .05. Again, it was decided to investigate a more credible solution for the observed inter-item correlation matrix by forcing the extraction of three factors Table 5.48 show the pattern matrix of the forced three-factor solution.

Table 5. 60

Pattern matrix for the Quality of Outputs subscale with three factors forced

	Factor		
	1	2	3
N1	.189	.004	**.655**
N2	**.640**	.095	.173
N3	**.956**	.002	-.098
N4	**.875**	-.036	.083
N5	-.077	.017	**.759**
N6	.249	**.392**	.177
N7	-.056	**1.002**	-.008
N8	**.394**	.390	.076

Items N2, N3, N4 and N8 loaded positively on the first factor, items N6 and N7 loaded positively on the second factor; and items N1 and N5 loaded positively on factor three. Items N6 and N8 presented themselves as somewhat complex items as it they unsatisfactory loadings on all three factors. The first factor was interpreted, based on the common theme shared by the items that loaded on it as a *meeting of quality standards* factor, the second factor was interpreted as a *mistake in work* factor and the third factor was interpreted as a *work quality criticised* factor. The factor fission was regarded as conceptually meaningful. Factor 1 correlated moderately and positively with factor 2 (.583) and with factor three (.579). Factor two correlated moderately and positively with factor three (.616). The forced three-factor structure provided a credible explanation for the observed inter-item correlation matrix as only 3 (10.0%) of the non-redundant residual correlations were large with absolute values larger than .05. The unidimensionality assumption was therefore not supported in the case of the *Quality of Outputs* subscale.

To examine the construct validity of the *Quality of Outputs* subscale the first-order measurement model implied by the pattern matrix shown in Table 5.48 was fitted. The first-order measurement model in which items N2, N3, N4 and N8 only loaded on factor one, items N6 and N7 only loaded on factor two; and items N1 and N5 loaded on factor three showed exact fit (χ^2=.98; p>.05). All factor loadings in the first-order measurement model, except items N6 and N7, proved to be statistically significant(p<.05). The second-order measurement model achieved exact fit (χ^2=.98; p>.05). Items N2, N3, N4 and N8 only loaded on first-order factor one, items N6 and N7 only loaded on the second factor; and items N1 and N5 loaded on factor three. All factor loadings in the second-order measurement model, except items N6 and N7, proved to be statistically significant (p<.05). Statistically significant (p<.05) gamma estimates were indicated for the first and the third dimensions. The path diagram of the completely standardised solution of the second-order measurement model is shown in Figure 5.13

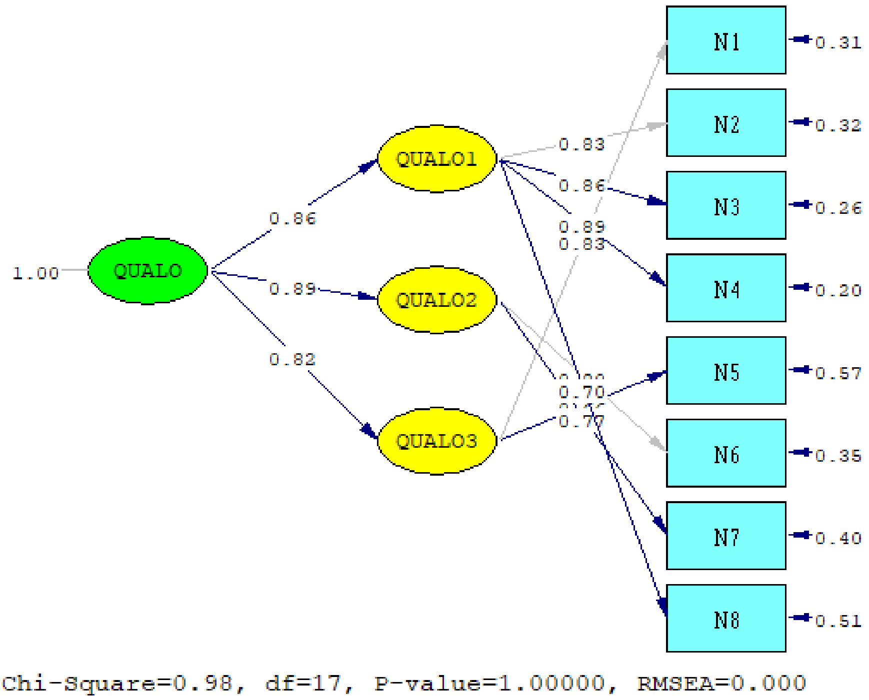

Figure 5. 13 Second-order *Quality of Outputs* measurement model (completely standardised solution)

Subsequently, the eight indirect effects were obtained by calculating the products $\lambda_{ij}\gamma_{j1}$ and by testing the statistical significance of the calculated indirect effects. The results are shown in Table 5.49

Table 5. 61

Unstandardised indirect effects for the second-order Quality of Outputs measurement model

PA(1)	PA(2)	PA(3)	PA(4)	PA(5)	PA(6)
0.55	0.62	0.57	0.64	0.54	0.64
(0.08)	(0.08)	(0.07)	(0.08)	(0.11)	(0.09)
6.83	7.38	7.67	7.95	5.08	7.07
PA(7)	PA(8)				
0.64	0.54				
(0.09)	(0.08)				
6.72	6.36				

As seen in Table 5.49 all the indirect effects were statistically significant ($p<.05$) despite the fact that the initial factor loadings of items N6 and N7 were statistically insignificant ($p>.05$). This indicates that the respondents' reaction on *Quality of Outputs* as a second-order factor statistically significantly ($p<.05$) influenced the scores on each of the eight items. This warranted the use of all eight items of the

Quality of Outputs subscale in the calculation of two composite indicators for the *Quality of Outputs* subscale latent variable in the model. Item N5 was flagged in the item analysis as a marginally problematic item. The results reported here justified the retention of item N5.

5.5.15 DIMENSIONALITY ANALYSIS: QUANTITY OF OUTPUTS

The design intention that guided the development of the *Quality of Outputs* subscale of the GOQ was for the eight items, written for the subscale, to reflect a single, indivisible underlying dimension. The *Quality of Outputs* subscale was considered factor analysable as the correlation matrix contained numerous statistically significant correlations of .3 or greater, the Bartlett's test of sphericity was statistically significant ($p < .05$), and the Kaiser-Meyer Olkin MSA value was greater than .6. Initially a single factor with an eigenvalue greater than one was extracted. The position of the elbow in the scree plot also indicated the extraction of a single factor. The factor matrix indicated that all the items had satisfactory loadings larger than .5. However, the validity and credibility of the single-factor factor structure was called into questions as there were 10 (35%) large non-redundant residuals with absolute values greater than .05. As a result, it was decided to investigate a more credible solution for the observed inter-item correlation matrix by forcing the extracting two factors. The pattern matrix for the two-factor solution is shown in Table 5.50.

Table 5. 62

Pattern matrix for the Quantity of Outputs subscale with two factors forced

	Factor	
	1	2
O1	.013	**-.895**
O2	.279	**-.643**
O3	**.562**	-.308
O4	**.540**	-.214
O5	**.894**	.202
O6	**.644**	-.165
O7	**.629**	-.199
O8	**.838**	-.020

Table 5.50 indicates that items O3-O8 loaded positively on the first factor and items O1-O2 loaded negatively on the second factor. All the items had satisfactory loadings of larger than .5. Item. The first factor was interpreted as a *performance appraisal and criticism* factor and the second factor as a *meeting of quantity objectives and standards* factor. The factor fission was regarded as conceptually meaningful. The two

extracted factors correlated moderately and negatively (-626) in the factor correlation matrix. The forced two-factor structure provided a credible explanation for the observed inter-item correlation matrix as only 3 (10.0%) of the non-redundant residual correlations were large with absolute values larger than .05. The unidimensionality assumption was therefore not supported in the case of the *Quantity of Outputs* subscale.

To examine the construct validity of the *Quantity of Outputs* subscale the first-order measurement model implied by the pattern matrix shown in Table 5.50 was fitted. The first-order measurement model in which items O3-O8 only loaded on factor one, items O1 and O2 only loaded on factor two showed exact fit (χ^2=.37; p>.05). All factor loadings in the first-order measurement model proved to be statistically significant (p<.05). The second-order measurement model also achieved exact fit (χ^2=.32; p>0.05). The factor loadings of items O1, O2, O5 and O7 were not statistically significant (p>.05) but those for items O3, O4, O6 and O8 were (p<.05). The gamma estimates of both factors proved to be statistically significant (p<.05). The path diagram of the completely standardised solution of the second-order measurement model is shown in Figure 5.14.

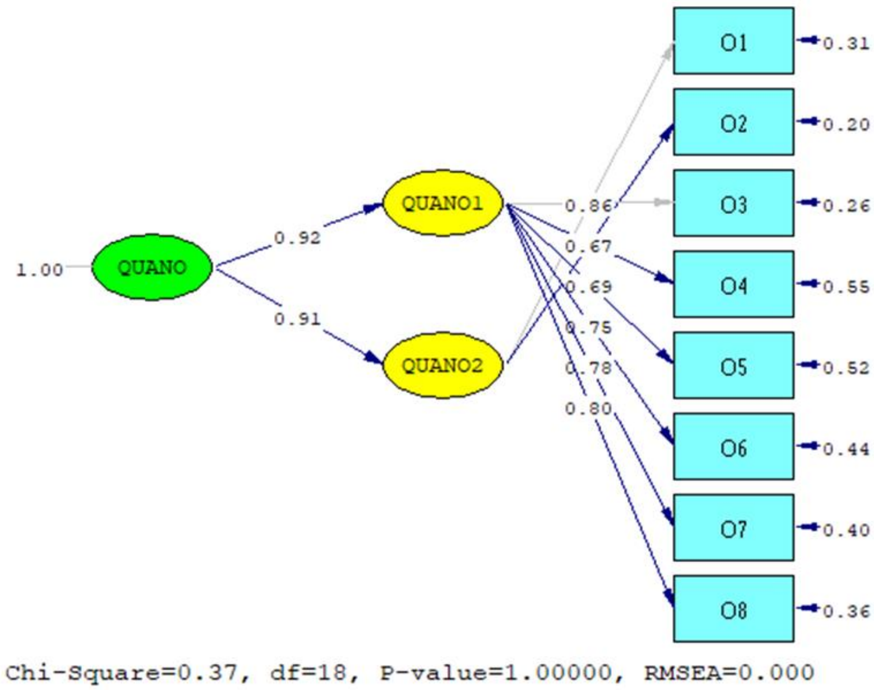

Figure 5. 14 Second-order *Quantity of Outputs* measurement model (completely standardised solution)

Subsequently, the eight indirect effects were obtained by calculating the products $\lambda_{ij}\gamma_{j1}$ and by testing the statistical significance of the calculated indirect effects. The results are shown in Table 5.51

Table 5. 63

Unstandardised indirect effects for the second-order Quantity of Outputs measurement model

PA(1)	PA(2)	PA(3)	PA(4)	PA(5)	PA(6)
0.65	0.75	0.58	0.51	0.51	0.51
(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)
6.35	7.33	5.71	5.03	4.95	5.02
PA(7)	PA(8)				
0.58	0.61				
(0.1)	(0.10)				
5.65	5.99				

Table 5.51 indicates that all the indirect effects were statistically significant ($p<.05$) despite the fact that the factor loadings of items O1, O2, O5 and O7 were not statistically significant ($p>.05$). This means that respondents' standing on *Quantity of Outputs* as a second-order factor statistically significantly ($p<.05$) affected the scores obtained on each of the eight items. This justified the use of all eight items of the *Quantity of Outputs* subscale in the calculation of two composite indicators for the *Quantity of Outputs* latent variable in the model.

5.5.16 DIMENSIONALITY ANALYSIS: TIMELINESS

The design intention that underpinned the development of the *Timeliness* subscale of the GOQ was for the eight items, written for the subscale, to reflect a single, indivisible underlying latent performance dimension. The objective of the exploratory factor analysis is to determine to what extent this design intention succeeded. The *Timeliness* subscale was considered factor analysable as the correlation matrix contained numerous statistically significant ($p<.05$) correlations of .3 or greater, the Bartlett's test of sphericity was statistically significant ($p< .05$), and the Kaiser-Meyer Olkin (MSA) value was greater than .6. Two factors with an eigenvalue greater than one were extracted. The position of the infection point in the scree plot also indicated the extraction of two factors. Table 5.52 presents the pattern matrix which indicates that items P3 and P5-P8 all loaded on the first factor, whilst items P1, P2 and P4 loaded on the second factor. All the items, except for item P3, had satisfactory loadings. Item P3 presented itself as a somewhat complex item in that it had similarly unsatisfactory loadings on both factors. The first factor was interpreted, based on the common theme shared by the items that loaded on it, as a *delay, holding-up work, causing frustration* factor and the second factor was interpreted as an *on-time, ahead of time* factor. The factor fission was regarded as conceptually meaningful. The two extracted correlated moderately and positively (.537) in the factor correlation matrix. There were 8 (28.0%) large non-redundant residual correlations with absolute values greater than .05, which indicated that the two-factor solution provides a valid (i.e. permissible) and credible explanation for the observed inter-item correlation matrix. The unidimensionality assumption was therefore not supported in the case of the *Timeliness* subscale.

Table 5. 64

Pattern matrix for the Timeliness subscale with two factors extracted

	Factor	
	1	2
P1	.026	**.791**
P2	-.101	**.809**
P3	**.438**	.403
P4	.307	**.552**
P5	**.814**	-.015
P6	**.880**	.012
P7	**.711**	.048
P8	**.956**	-.074

To examine the construct validity of the *Timeliness* scale the first-order measurement model implied by the pattern matrix shown in Table 5.52 was fitted. The first-order measurement model in which items P3 and P5-P8 only loaded on factor one, items P1, P2 and P4 only loaded on factor two showed exact fit (χ^2=3.03; p>.05). All factor loadings in the first-order measurement model, except for item P4, proved to be statistically significant (p<.05). The second-order measurement model also achieved exact fit (χ^2=2.55; p>.05). None of the items had statistically significant (p>.05) factor loadings in the second-order measurement model, although both factors had statistically significant (p<.05) gamma estimates. The path diagram of the completely standardised solution of the second-order measurement model is shown in Figure 5.15.

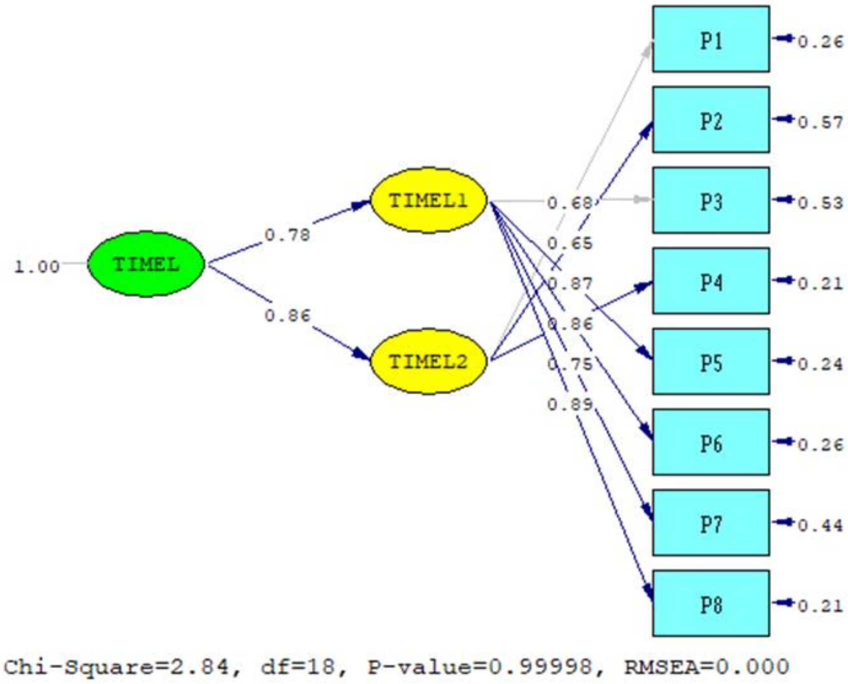

Figure 5. 15 Second-order *Timeliness* measurement model (completely standardised solution)

Subsequently, the eight indirect effects were obtained by calculating the products $\lambda_{ij}\gamma_{j1}$ and by testing the statistical significance of the calculated indirect effects. The results are shown in Table 5.53

Table 5. 65

Unstandardised indirect effects for the second-order Timeliness measurement model

PA(1)	PA(2)	PA(3)	PA(4)	PA(5)	PA(6)
0.62	0.51	0.46	0.69	0.51	0.48
(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)
6.10	5.00	4.52	6.74	4.96	4.73
PA(7)	PA(8)				
0.43	0.52				
(0.10)	(0.10)				
4.25	5.13				

Table 4.53 indicates that all the indirect effects in the second-order measurement model were statistically significant (p<.05) despite the fact that the factor loadings of all the items were not statistically significant (p>.05). This means that respondents' standing on *Timeliness* as a second-order factor statistically significantly (p<.05) affected the scores obtained on each of the eight items. This justified the use of all

eight items of the *Timeliness* subscale in the calculation of two composite indicators for the *Timeliness* latent variable in the model.

5.5.17 DIMENSIONALITY ANALYSIS: COST EFFECTIVENESS

The design intention that guided the development of the *Cost Effectiveness* subscale of the GOQ was for the eight items, written for the subscale, to reflect a specific single, undifferentiated underlying latent performance dimension. The subscale was considered factor analysable as the correlation matrix contained numerous statistically significant ($p<.05$) correlations of .3 or greater, the Bartlett's test of sphericity was statistically significant ($p< 0.05$), and the Kaiser-Meyer Olkin MSA value was greater than .6. Two factors with an eigenvalue greater than one were extracted. The position of the elbow in the scree plot in contrasted indicated the extraction of a single factor. Table 5.54 presents the pattern matrix which indicates that items Q1-Q6 all loaded positively on the first factor, whilst items Q7-Q8 loaded positively on the second factor. All the items, except for item Q8, had satisfactory loadings. Item Q8 was flagged as a problematic item in the item analysis. Its problem status was confirmed by its low loading on the major second factor. The first factor was interpreted, based on the common theme shared by the items that loaded on it, as an *effective and efficient utilisation of resources* factor and the second factor was interpreted as a *wasteful utilisation of resources* factor. The factor fission was regarded as conceptually meaningful.

Table 5. 66

Pattern matrix for the Cost Effectiveness subscale with two factors extracted

	Factor	
	1	2
Q1	**.866**	-.078
Q2	**.851**	-.110
Q3	**.782**	.056
Q4	**.810**	.026
Q5	**.521**	.398
Q6	**.680**	.158
Q7	-.051	**.917**
Q8	.030	**.344**

The two extracted factors correlated moderately and positively (.516) in the factor correlation matrix. There were 7 (25.0%) non-redundant residuals with absolute values greater than .05, which indicates that the two-factor solution is a satisfactory explanation for the observed inter-item correlation matrix. The unidimensionality assumption was therefore not supported in the case of the *Cost-effectiveness* subscale. An inspection of item Q8 revealed a fault in the coding of the item. The decision was thus to retain the item and to edit the wording of the response option in future versions of the GOQ.

To examine the construct validity of the *Cost Effectiveness* subscale the first-order measurement model implied by the pattern matrix depicted in Table 5.54 was fitted. The first-order measurement model in which items Q1-Q6 only loaded on factor one and items Q7 and Q8 only loaded on factor two, showed exact fit (χ^2=7.13; p>.05). All factor loadings in the first-order measurement model, except items Q7 and Q8, proved to be statistically significant (p<.05). The second-order measurement model also achieved exact fit (χ^2=6.84; p>.05). The factor loadings of items Q3, Q7 and Q8 were not statistically significant (p>.05) in the second-order measurement model although the remaining items were still statistically significant (p<.05). Both factors did not have statistically significant gamma estimates (p>.05). The path diagram of the completely standardised solution of the second-order measurement model is shown in Figure 5.16.

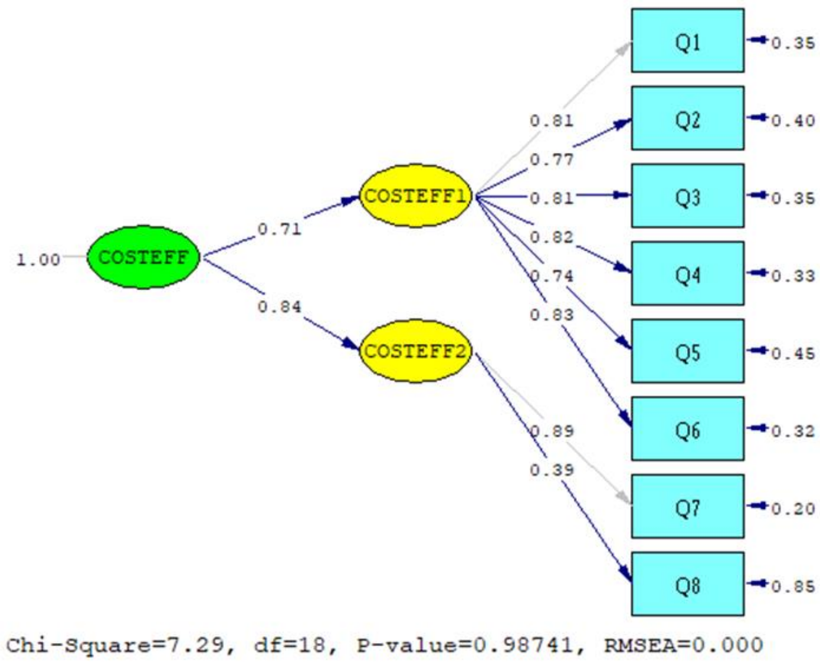

Figure 5. 16 Second-order *Cost Effectiveness* measurement model (completely standardised solution*)*

Subsequently, the eight indirect effects were obtained by calculating the products $\lambda_{ij}\gamma_{j1}$ and by testing the statistical significance of the calculated indirect effects. The results are shown in Table 5.55

Table 5. 67

Unstandardised indirect effects for the second-order Cost Effectiveness measurement model

PA(1)	PA(2)	PA(3)	PA(4)	PA(5)	PA(6)
0.47	0.48	0.52	0.52	0.43	0.49
(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)
4.62	4.68	5.05	5.06	4.21	4.84
PA(7)	PA(8)				
0.62	0.32				
(0.10)	(0.10)				
6.11	3.12				

Table 5.55 indicates that all the indirect effects were statistically significant (p<.05) despite the fact that the factor loadings of some of the items were not statistically significant (p>.05) and the fact that both gamma paths were statistically insignificant (p>.05). This means that respondents' standing on *Cost Effectiveness* as a second-order factor statistically significantly (p<.05) affected the scores obtained on each of the eight items. This justified the use of all eight items of the *Cost Effectiveness* subscale in the calculation of two composite indicators for the *Cost Effectiveness* latent variable in the model.

5.5.18 DIMENSIONALITY ANALYSIS: NEED FOR SUPERVISION

The design intention that underpinned the development of the *Need for Supervision* subscale of the GOQ was for the eight items, written for the subscale, to reflect a specific single, undifferentiated underlying latent performance dimension. The *Need for Supervision* subscale was considered factor analysable as the correlation matrix contained numerous statistically significant correlations of .3 or greater, the Bartlett's test of sphericity was statistically significant (p<.05), and the Kaiser-Meyer Olkin MSA value was greater than .6. Initially a single factor with an eigenvalue greater than one was extracted. The scree test also indicated the extraction of a single factor. The factor matrix indicated that all the items had satisfactory loadings larger than .5. However, there were 10 (35%) large non-redundant residual correlations with absolute values greater than .05 that eroded confidence in the single-factor solution as a valid and credible explanation of the observed inter-item correlation matrix. As a result, it was decided to investigate a more credible solution for the observed inter-item correlation matrix by forcing the extracting two factors. Table 5.56 depicts the pattern matrix.

Table 5. 68

Pattern matrix for the Need for Supervision subscale with two factors forced

	Factor	
	1	2
R1	-.096	**.877**
R2	.186	**.678**
R3	.116	**.718**
R4	**.394**	.382
R5	**.728**	.040
R6	**.898**	-.027
R7	**.883**	-.046
R8	**.609**	.283

Table 5.56 indicates that items R4-R8 loaded positively on the first factor and items R1-R3 loaded positively on the second factor. All the items, except for item R4 had satisfactory loadings of larger than 0.5. Item R4 presented itself as a somewhat complex item as it had similarly unsatisfactory loadings on both factors. The first factor was interpreted, based on the common these shared by the items that loaded on it, as a *need for oversight, regulation and intervention* factor and the second factor as a *need for direction, guidance and control* factor. Item R4 referred the need to be managed. Management encompasses both oversight and the giving of directions. The cross-loading therefore made sense. The factor fission was regarded as conceptually meaningful. The two extracted factors correlated high and positively (.796) in the factor correlation matrix. The forced two-factor structure provided a credible explanation for the observed inter-item correlation matrix as only 4 (14.0%) of the non-redundant residuals were large and had absolute values larger than .05. The unidimensionality assumption was therefore not supported in the case of the *Need for Supervision* subscale.

To examine construct validity of the *Need for Supervision* subscale the first-order measurement model implied by the pattern matrix shown in Table 5.56 was fitted. The first-order measurement model in which items R4-R8 only loaded on factor one and items R1-R3 only loaded on factor two showed exact fit (χ^2=.18; p>.05). All factor loadings in the first-order measurement model, except for item R2, proved to be statistically significant (p<.05). The second-order measurement model also achieved exact fit (χ^2=.14; p>.05). None of the item's factor loadings proved to be statistically significant (p>.05) in the second-order measurement model, however the gamma estimates of both factors proved to be statistically significant (p<.05). The path diagram of the completely standardised solution of the second-order measurement model is shown in Figure 5.17.

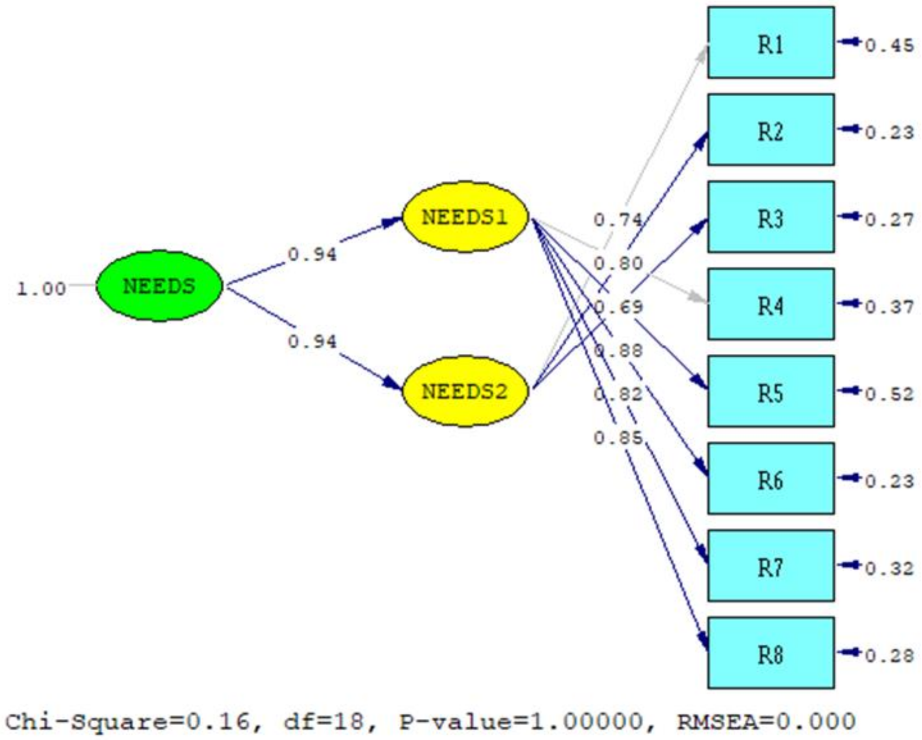

Figure 5. 17 Second-order *Need for Supervision* measurement model (completely standardised solution)

Subsequently, the eight indirect effects were obtained by calculating the products $\lambda_{ij}\gamma_{j1}$ and by testing the statistical significance of the calculated indirect effects. The results are shown in Table 5.57.

Table 5. 69

Unstandardised indirect effects for the second-order Need for Supervision measurement model

PA(1)	PA(2)	PA(3)	PA(4)	PA(5)	PA(6)
0.56	0.73	0.61	0.65	0.56	0.74
(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)
5.53	7.11	5.97	6.39	5.48	7.28
PA(7)	PA(8)				
0.68	0.72				
(0.10)	(0.10)				
6.68	7.03				

Table 5.55 indicates that all the indirect effects were statistically significant ($p<.05$) despite the fact that the factor loadings of all the items were not statistically significant

(p>.05) in the second-order measurement model. This means that respondents' standing on *Need for Supervision* as a second-order factor statistically significantly (p<.05) affected the scores obtained on each of the eight items. This justified the use of all eight items of the *Need for Supervision* subscale in the calculation of two composite indicators for the *Need for Supervision* latent variable in the model.

4.5.19 DIMENSIONALITY ANALYSIS: INTERPERSONAL IMPACT

The design intention that guided the development of the *Interpersonal Impact* subscale of the GOQ was for the eight items, written for the subscale, to reflect a specific single, undifferentiated underlying latent performance dimension. The subscale was considered factor analysable as the correlation matrix contained numerous statistically significant (p<.05) correlations of .3 or greater, the Bartlett's test of sphericity was statistically significant (p<.05), and the Kaiser-Meyer Olkin MSA value was greater than .6. Two factors with an eigenvalue greater than one was extracted. The position of the elbow in the scree plot was, however, rather ambiguous and could be interpreted to indicate the extraction of one, two or four factors. Table 5.58 presents the pattern matrix which indicates that items S5-S8 all loaded positively on the first factor, whilst items S1-S4 loaded positively on the second factor. The loading for item S4 was only marginally below .50.

Table 5. 70

Pattern matrix for the Interpersonal Impact subscale with two factors extracted

	Factor	
	1	2
S1	.016	**.750**
S2	-.081	**.940**
S3	.163	**.578**
S4	.007	**.498**
S5	**.793**	.092
S6	**.788**	.050
S7	**.818**	.047
S8	**.912**	-.096

Item S4 was flagged in the item analysis as a marginally problematic item. The pattern matrix results explained this finding. The first factor was interpreted, based on the common theme shared by the items that loaded on factor one, as a *promotion of trusting, positive inter-personal relations at work* factor and the second factor was interpreted as an *interpersonal relations impact/influence* factor. The factor fission was regarded as conceptually meaningful. There were 5 (17.0%) large non-redundant residual correlation s with absolute values greater than .05, which indicated that the two-factor solution provided a satisfactory explanation for the observed inter-item correlation matrix. The unidimensionality assumption was therefore not supported in the case of the *Interpersonal Impact* subscale. Item S4 was retained based on its factor loading on factor two that approximated .50.

To examine the construct validity of the *Interpersonal Impact* subscale the measurement model implied by the pattern matrix shown in Table 5.58 was fitted. The first-order measurement model in which items S5-S8 only loaded on factor one and items S1-S4 only loaded on factor two, showed exact fit (χ^2=8.10; p>.05). All factor loadings proved to be statistically significant. The second-order measurement model also achieved exact fit (χ^2=8.56; p>.05). Only the factor loadings of items S1, S2 and S3 proved to be statistically significant (p<.05) in the second-order measurement model. Both factors had statistically significant (p<.05) gamma estimates. The path diagram of the completely standardised solution of the second-order measurement model is shown in Figure 5.18.

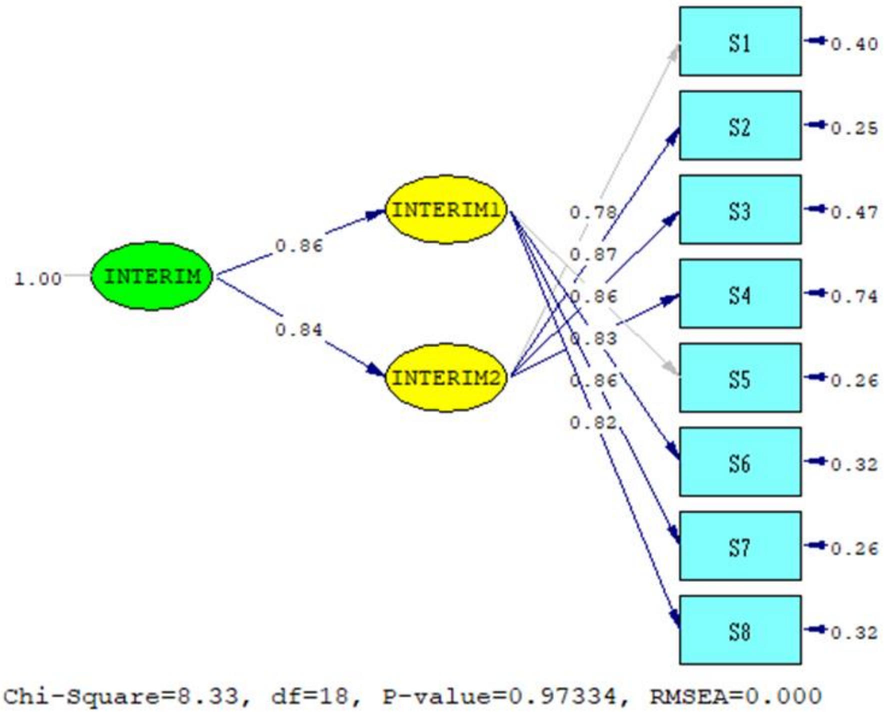

Figure 5. 18 Second-order *Interpersonal Impact* measurement model (completely standardised solution)

Subsequently, the eight indirect effects were obtained by calculating the products $\lambda_{ij}\gamma_{j1}$ and by testing the statistical significance of the calculated indirect effects. The results are shown in Table 5.59.

Table 5. 71

Unstandardised indirect effects for the second-order Interpersonal Impact measurement model

PA(1)	PA(2)	PA(3)	PA(4)	PA(5)	PA(6)
0.57	0.62	0.50	0.38	0.52	0.57
(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)
5.58	6.04	4.92	3.70	5.10	5.59
PA(7)	PA(8)				
0.58	0.50				
(0.10)	(0.10)				
5.64	4.90				

Table 5.59 indicates that all the indirect effects were statistically significant (p<.05) despite the fact that the factor loadings of only a few of the items were statistically significant (p<.05). This means that respondents' standing on *Interpersonal Impact* as a second-order factor statistically significantly (p<.05) affected the scores obtained on each of the eight items. This justified the use of all eight items of the *Interpersonal Impact* subscale in the calculation of two composite indicators for the *Interpersonal* Impact latent variable in the model.

5.5.20 DIMENSIONALITY ANALYSIS: CUSTOMER SATISFACTION

The design intention that underpinned the development of the *Customer Satisfaction* subscale of the GOQ was for the eight items, written for the subscale, to reflect a specific single, undifferentiated underlying latent performance dimension. The subscale was considered factor analysable as the correlation matrix contained numerous statistically significant (p<.05) correlations of .3 or greater, the Bartlett's test of sphericity was statistically significant (p< .05), and the Kaiser-Meyer Olkin MSA value was greater than .6. Two factors with an eigenvalue greater than one were extracted. The position of the inflection point in the scree plot was somewhat moot and suggested the extraction of either one or two factors. Table 5.60 presents the pattern matrix which indicates that items T1-T4 all loaded positively on the first factor, whilst items T5-T8 loaded positively on the second factor. All the items had satisfactory loadings. Item T8 was flagged during the item analysis as a marginally problematic item. In the pattern matrix shown in Table 5.60 item T8 returned the highest loading on the second factor. If item T8 would have been deleted in the item analysis the items loading on factor 2 would have come to the fore as problematic items in the order of the magnitude with which they load on factor two. Despite the nice simple structure reflected in the pattern matrix shown in Table 5.60 it was rather difficult to conceptually separate the identity of the two extracted factors. The first factor was interpreted as a *was interpreted* factor and the second factor as (a *customer confidence and trust* factor. The factor fission was regarded as conceptually meaningful. But rather subtle and a little uncertain There were 5 (17.0%) large non-redundant residual correlations with absolute values greater than .05, which indicated that the two-factor solution provided a satisfactory explanation for the observed inter-item correlation matrix. The unidimensionality assumption was therefore not supported in the case of the *Customer satisfaction* subscale. Item T8 was retained as an item in the subscale.

Table 5. 72

Pattern matrix for the Customer Satisfaction subscale with two factors extracted

	Factor	
	1	2
T1	**.813**	.004
T2	**.877**	.012
T3	**.879**	.018
T4	**.847**	.020
T5	.178	**.746**
T6	.359	**.532**
T7	.179	**.619**
T8	-.139	**.791**

To examine the construct validity of the *Customer Satisfaction* subscale the first-order measurement model implied by the pattern matrix depicted in Table 5.60 was fitted. The first-order measurement model in which items T1-T4 only loaded on factor one an items T5-T8 only loaded on factor two, showed exact fit (χ^2=2.16; p>0.05). All factor loadings in the first-order measurement model proved to be statistically significant (p<.05). The second-order measurement model also achieved exact fit (χ^2=1.86; p>0.05). Only the factor loadings of items T3 and T4 proved to be statistically significant (p<.05). Both factors had statistically significant (p<.05) gamma estimates. The path diagram of the completely standardised solution of the second-order measurement model is shown in Figure 5.19.

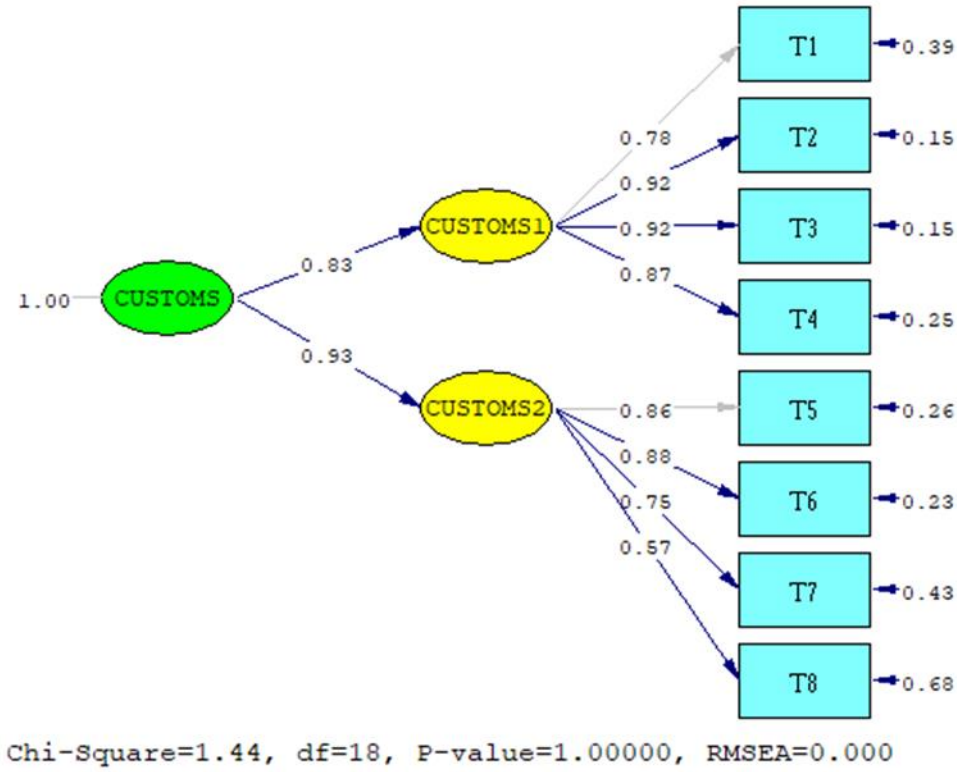

Figure 5. 19 Second-order *Customer Satisfaction* measurement model (completely standardised solution)

Subsequently, the eight indirect effects were obtained by calculating the products $\lambda_{ij}\gamma_{j1}$ and by testing the statistical significance of the calculated indirect effects. The results are shown in Table 5.61

Table 5. 73

Unstandardised indirect effects for the second-order Customer Satisfaction measurement model

PA(1)	PA(2)	PA(3)	PA(4)	PA(5)	PA(6)
0.55	0.69	0.63	0.57	0.59	0.69
(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)
5.36	6.78	6.22	5.61	5.74	6.75
PA(7)	PA(8)				
0.51	0.41				
(0.10)	(0.10)				
5.02	4.06				

Table 5.61 indicates that all the indirect effects were statistically significant ($p<.05$) despite the fact that the factor loadings of most of the items were not statistically significant ($p>.05$). This means that respondents’ standing on *Customer Satisfaction*

as a second-order factor statistically significantly (p<.05) affected the scores obtained on each of the eight items. This justified the use of all eight items of the *Customer Satisfaction* subscale in the calculation of two composite indicators for the *Customer Satisfaction* latent variable in the model.

5.5.21 DIMENSIONALITY ANALYSIS: ENVIRONMENTAL IMPACT

The design intention that guided the development of the *Environmental Impact* of the GOQ scale was for the eight items, written for the subscale, to reflect a specific single, indivisible underlying latent performance dimension. The *Environmental Impact* subscale was considered factor analysable as the correlation matrix contained numerous statistically significant correlations (p<.05) of .3 or greater, the Bartlett's test of sphericity was statistically significant (p<.05), and the Kaiser-Meyer Olkin MSA value was greater than .6. Initially a single factor with an eigenvalue greater than one was extracted. The position of the elbow in the scree plot also indicated the extraction of a single factor. The factor matrix indicated that all the items had satisfactory loadings of larger than 05. However, validity and credibility of the single factor structure as an explanation of the observed inter-item correlation matrix had to be questioned as there were 12 (42%) large non-redundant residual correlations with absolute values greater than .05. As a result, it was decided to investigate a more credible solution for the observed inter-item correlation matrix by forcing the extracting two factors. The resultant pattern matrix is shown in Table 5.62.

Table 5. 74

Pattern matrix for the Environmental Impact subscale with two factors forced

	Factor	
	1	2
U1	**.854**	.050
U2	**.911**	-.030
U3	**.988**	-.096
U4	**.715**	.214
U5	**.550**	.297
U6	.279	**.572**
U7	-.075	**1.026**
U8	.079	**.752**

Table 5.62 indicates that items U1-U5 loaded positively on the first factor and items U6-U8 loaded positively on the second factor. All the items had satisfactory loadings of larger than .5. The first factor was interpreted, based on the common theme shared by the items that loaded on it, as a *minimising environmental harm* factor and the

second factor as a *green lobbying, activism, influencing* factor. The factor fission was regarded as conceptually meaningful. The two extracted factors correlated strongly and positively (.784) in the factor correlation matrix. The forced two-factor structure provided a credible explanation for the observed inter-item correlation matrix as only 4 (14.0%) of the large non-redundant residual correlations had absolute values larger than .05. The unidimensionality assumption was therefore not supported in the case of the *Environmental Impact* subscale.

To examine construct validity of the *Environmental Impact* subscale the first-order measurement model implied by the pattern matrix shown in Table 5.62 was fitted. The first-order measurement model in which items U1-U5 only loaded on factor one and items U1-U3 only loaded on factor two showed exact fit (χ^2=.15; p>0.05). All factor loadings in the first-order measurement model, except for item U1 and U4, proved to be statistically significant (p<.05). The second-order measurement model also achieved exact fit (χ^2=.13; p>0.05). None of the item's factor loadings proved to be statistically significant (p>.05) in the second-order measurement model and only the second factor had a gamma estimate that proved to be statistically significant (p<.05). The path diagram of the completely standardised solution of the second-order measurement model is shown in Figure 5.20.

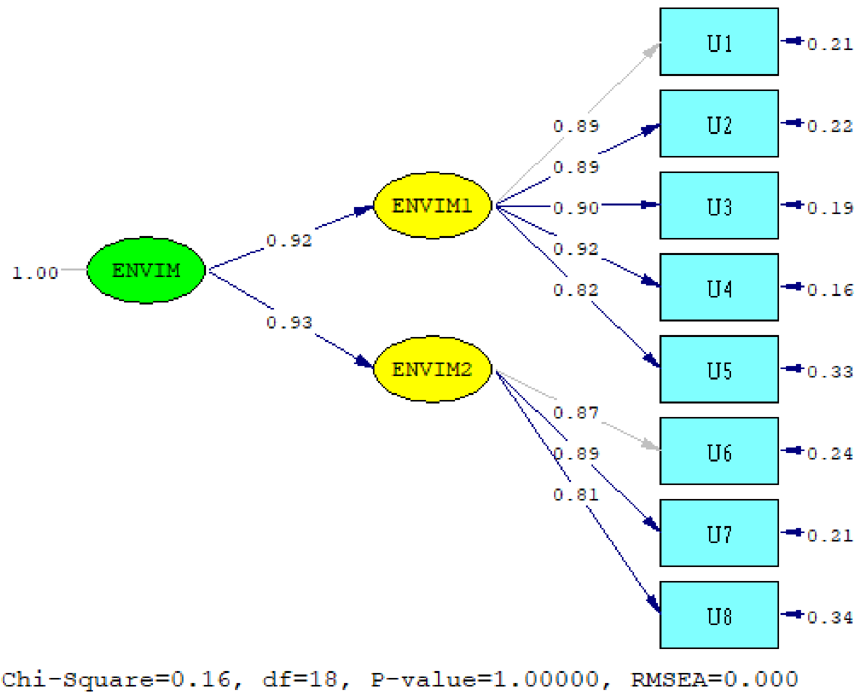

Figure 5. 20 Second-order *Environmental Impact* measurement model (completely standardised solution)

Subsequently, the eight indirect effects were obtained by calculating the products $\lambda_{ij}\gamma_{j1}$ and by testing the statistical significance of the calculated indirect effects. The results are shown in Table 5.63

Table 5. 75

Unstandardised indirect effects for the second-order Environmental Impact measurement model

PA(1)	PA(2)	PA(3)	PA(4)	PA(5)	PA(6)
0.81	0.77	0.76	0.79	0.72	0.77
(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)
7.90	7.56	7.41	7.72	7.06	7.58
PA(7)	PA(8)				
0.83	0.85				
(0.10)	(0.10)				
8.17	8.36				

Table 5.63 indicates that all the indirect effects were statistically significant (p<.05) despite the fact that the factor loadings of all the items in the second-order measurement model were not statistically significant (p>.05). This means that respondents' standing on *Environmental Impact* as a second-order factor statistically significantly (p<.05) affected the scores obtained on each of the eight items. This justified the use of all eight items of the *Environmental Impact* subscale in the calculation of two composite indicators for the *Environmental Impact* latent variable in the model.

5.5.22 DIMENSIONALITY ANALYSIS: MARKET REPUTATION

The design intention that underpinned the development of the *Market Reputation* subscale of the GOQ was for the eight items, written for the subscale, to reflect a specific, single, indivisible underlying latent performance dimension. The subscale was considered factor analysable as the correlation matrix contained numerous statistically significant (p<.05) correlations of .3 or greater, the Bartlett's test of sphericity was statistically significant (p< .05), and the Kaiser-Meyer Olkin MSA value was greater than .6. Two factors with an eigenvalue greater than one were extracted. The scree plot was somewhat ambivalent regarding the position of the inflection point. The scree plot could either be interpreted to indicate the extraction of one factor or the extraction of three factors. Table 5.64 presents the pattern matrix which indicates that items V5-V8 all loaded positively on the first factor, whilst items V1-V4 loaded positively on the second factor. The first factor was interpreted, based on the common theme shared by the items that loaded on it, as a *co-worker reputation* factor and the second factor was interpreted as a *general impressing/image of quality of work* factor. The factor fission was regarded as conceptually meaningful albeit somewhat subtle. The two extracted factors correlated moderate and positively (.697) in the factor correlation matrix. There were 4 (14.0%) non-redundant residuals with absolute values greater than 0.05, which indicates that the two-factor solution provided a satisfactory explanation for the observed inter-item correlation matrix. The unidimensionality assumption was therefore not supported in the case of the *market Reputation* subscale.

Table 5. 76

Pattern matrix for the Market Reputation subscale with two factors extracted

	Factor	
	1	2
V1	.059	**.783**
V2	.030	**.758**
V3	-.075	**.779**
V4	.063	**.769**
V5	**.846**	.024
V6	**.931**	-.077
V7	**.734**	.158
V8	**.892**	.000

To examine the construct validity of the *Market Reputation* subscale the first-order measurement model implied by the pattern matrix derived through the exploratory factor analysis was fitted. The first-order measurement model in which items V5-V8 only loaded on factor one and items V1-V4 only loaded on factor two, showed exact fit (χ^2=24.21; p>.05). All factor loadings in the first-order measurement model proved to be statistically significant (p<.05). The second-order measurement model also achieved exact fit (24.46; p>.05). None of the factor loadings in the second-order measurement model proved to be statistically significant (p>.05). Both factors had statistically significant (p<.05) gamma estimates though. The path diagram of the completely standardised solution of the second-order measurement model is shown in Figure 5.21

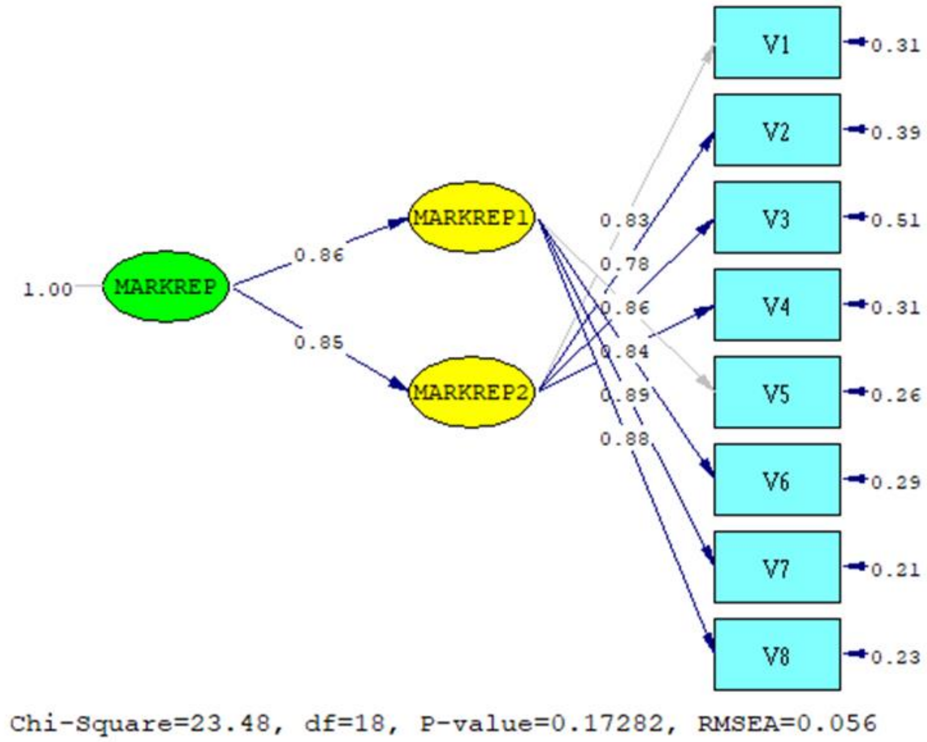

Figure 5. 21 Second-order *Market Reputation* measurement model (completely standardised solution)

Subsequently, the eight indirect effects were obtained by calculating the products $\lambda_{ij}\gamma_{j1}$ and by testing the statistical significance of the calculated indirect effects. The results are shown in Table 5.65.

Table 5. 77

Unstandardised indirect effects for the second-order Market Reputation measurement model

PA(1)	PA(2)	PA(3)	PA(4)	PA(5)	PA(6)
0.58	0.58	0.51	0.55	0.56	0.57
(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)
5.68	5.67	4.98	5.41	5.46	5.62
PA(7)	PA(8)				
0.68	0.61				
(0.10)	(0.10)				
6.67	6.00				

Table 4.65 indicates that all the indirect effects were statistically significant (p<.05) despite the fact that none of factor loadings in the second-order measurement model were statistically significant (p>.05). This means that respondents' standing on *Market Reputation* as a second-order factor statistically significantly (p<.05) affected the

scores obtained on each of the eight items. This justified the use of all eight items of the *Market Reputation* subscale in the calculation of two composite indicators for the *Market Reputation* Impact latent variable in the model.

5.5.23 SUMMARY OF DIMENSIONALITY ANALYSIS RESULTS

Typically, when factor fission occurs dimensions are forced into a single factor by requesting the extraction of a single factor in the exploratory factor analysis. If factor loadings of sufficient magnitude are obtained in the single-factor solution it is argued that items successfully serve as indicators of a multidimensional construct or second-order construct. This creates confusion as it is not clear whether the forced single factor solution should be interpreted as a second-order or multidimensional construct (Wessels, 2018). Furthermore, the percentage of large residual correlations is an indication of the fit of the factor structure and normally forced single factor structures fit poorly in that they typically have high percentages of large residual correlations. This argument then serves to prove that even though items might have factor loadings of sufficient magnitude those factor loadings cannot be interpreted as valid and credible due to the high percentage of large residual correlations which means that those factor solutions cannot accurately reproduce the observed inter-item correlation matrix (Wessels, 2018). Hence the current study, in the case of factor fission, evaluated the validity of items by fitting a second-order measurement model and testing the statistical significance of the indirect effects of the second-order factor, mediated by the first-order factors, on the subscale items.

Only two subscales were able to pass the unidimensionality assumption in that the eigenvalue greater than one rule extracted only one factor and the percentage of large residual correlations were low enough to reflect an accurate representation of the observed inter-item correlation. For eight subscales the eigenvalue greater than one rule extracted a single factor, however the percentage of large residual correlations proved to be too high. Of these eight subscales five subscales could accurately reproduce the observed inter-item correlation matrix with a forced two-factor solution and three subscales could accurately reproduce the inter-item correlation matrix with a forced three factor solution. For eleven subscales the eigenvalue greater than one rule extracted two factors with a low enough residual inter-item correlation matrix to accurately reflect the observed inter-item correlation matrix. Lastly, for one subscale a two-factor solution was extracted via the eigenvalue greater than one rule, but there was a large percentage of large residual correlations. By forcing the extraction of a three-factor solution problem was solved.

In the cases were more than one factor needed to be extracted a first-order measurement model was fitted to examine the construct validity of the subscale. In the cases were the first-order model fitted the data at least closely a second-order measurement model was fitted, and indirect effect parameter estimates were calculated which proved that when respondents responded on the second-order factor it influenced the scores obtained on each of the eight items. In the single case were the first-order measurement model did not fit the data a bi-factor model was fitted to the data which provided the solution which indicated that the items loaded on their separate factor as well as a general factor not currently defined by the model.

In the cases were factor fission occurred or where it was forced it was possible to theoretically interpret the extracted factors.

5.6 ITEM PARCELLING

When making use of LISREL to evaluate large measurement models, it is possible to use the individual items comprising each dimension to operationalise the latent variables encompassed in the model (Prinsloo, 2013). This represents the ideal when evaluating the construct validity of newly developed instruments. This was also the intention in the current study as set out in Chapter 3. However, due the already small sample size the large number of parameters that would have to be estimated made it impossible to fit the GCQ and GOQ measurement models with individual items. To circumvent this problem two item parcels of indicator variables consisting items of each of the subscales of the GOQ were created in order to operationalise the proposed measurement model[32]. Item parcels were created by calculating the means of the even and uneven numbered items of each scale. The formation of item parcels could,

[32] It is acknowledged that the ratio of observations to freed model parameters was not satisfactory. The GOQ measurement model required the estimation of 13 factor loadings, 13 measurement error variances and 36 inter-latent variable correlations. This translated to an observation to freed parameter ratio of 1.3472 to 1 that stood in sharp contrast with the Bentler and Choo's (1985) recommended ratio of between 5 to 1 and 10 to 1.

however, not solve the problem of the ratio of observation to freed model parameters with regards to the GCQ[33]. The GCQ could therefore unfortunately not be fitted.

5.7 EVALUATION OF THE GENERIC OUTCOME QUESTIONNAIRE MEASUREMENT MODEL

The small sample size imposed certain limitations on the initial objectives of the study which meant that only the GOQ measurement model could be evaluated. The objective of the GOQ was to measure the generic outcome construct. The operational denotations were designed to determine the employees' stance on the latent outcome dimensions. The items in the GOQ are assumed to evoke certain responses from the employee that corresponds with the results denoted by the specific outcome dimension. The objective of the study is to evaluate the degree to which the premeditated operational design of the GOQ is successful in providing a valid measure of the defined outcome construct.

5.7.1 UNIVARIATE AND MULTIVARIATE NORMALITY

The GOQ measurement model was fitted by operationalising each of the nine latent outcome dimensions by means of two item parcels. The item parcels were defined as continuous variables. This allowed the analysis of the observed inter-parcel covariance matrix rather than the observed polynomial correlation matrix (Jöreskog & Sörbom, 1996b). Maximum likelihood estimation is the customary estimation procedure used when fitting measurement models to continuous data. The maximum likelihood estimation procedure assumes that the indicator variable data follows a multivariate normal distribution. The same is true for alternative estimation methods such as generalised least squares (GLS) and full information maximum likelihood (FIML) which are also used for structural equation modelling with continuous data (Mels, 2003). Incorrect standard errors and chi-square estimates can be caused by inappropriate analysis of continues non-normal variables in structural equation models (Du Toit & Du Toit, 2001; Mels, 2003). To prevent these consequences of the inappropriate analysis of the indicator variable data in the current study, the univariate

[33] The GCQ measurement model required the estimation of 26 factor loadings, 26 measurement error variances and 78 inter-latent variable correlations. This added up to 130 freed measurement model parameters while the sample only comprised 97 observations.

(Table 5.66) and multivariate (Table 5.67) normality of the indicator variables was evaluated via PRELIS (Jöreskog & Sörbom, 1996b).

Table 5. 78

Test of univariate normality for item parcels

Variable	**Skewness**		**Kurtosis**		**Skewness & Kurtosis**	
	Z-Score	P-Value	Z-Score	P-Value	Chi-Square	P-Value
QUALO_1	-2.801	0.005	-0.202	0.840	7.886	0.019
QUALO_2	-2.191	0.028	-1.178	0.239	6.188	0.045
QUANO_1	-2.374	0.018	0.283	0.777	5.714	0.057
QUANO_2	-2.907	0.004	1.465	0.143	10.595	0.005
TIMEL_1	-3.410	0.001	0.952	0.341	12.535	0.002
TIMEL_2	-3.819	0.000	1.937	0.053	18.335	0.000
COSTEF_1	-1.333	0.183	-0.476	0.634	2.003	0.367
COSTEF_2	-0.468	0.640	-1.946	0.052	4.005	0.135
NEDSUP_1	-2.580	0.010	1.581	0.114	9.155	0.010
NEDSUP_2	-3.225	0.001	2.032	0.042	14.528	0.001
INTIMP_1	-1.427	0.153	-1.965	0.049	5.899	0.052
INTIMP_2	-2.240	0.025	0.080	0.936	5.024	0.081
CUSSAT_1	-2.193	0.028	-1.803	0.071	8.062	0.018
CUSSAT_2	-2.833	0.005	0.425	0.671	8.208	0.017
ENIMP_1	-2.909	0.004	1.400	0.161	10.425	0.005
ENIMP_2	-2.595	0.009	0.934	0.350	7.606	0.022
MARREP_1	-2.645	0.008	-0.023	0.982	6.996	0.030
MARREP_2	-2.029	0.042	-1.540	0.123	6.488	0.039

The null hypothesis of univariate normality had to be rejected for 13 of the 18 indicator variables as shown in Table 5.66.

Table 5. 79

Test of multivariate normality for item parcels

Skewness			Kurtosis			Skewness & Kurtosis	
Value	Z-Score	P-Value	Value	Z-Score	P-Value	Chi-Square	P-Value
100.537	9.003	0.000	399.810	5.778	0.000	114.442	0.00

As shown in Table 5.67 the null hypothesis of multivariate normality was also rejected ($p<.05$). As a consequence, PRELIS was used to normalise the GOQ indicator variables. As shown in Table 5.68, the normalisation attempt was unsuccessful and the null hypothesis for multivariate normality was once again rejected ($p<.05$). The rejection of the normality assumption led to the use of robust maximum likelihood estimation in order to estimate the freed measurement model parameters. It was decided to use the normalised data as the normalisation improved the deviation of the observed multivariate distribution from the theoretical multivariate normal distribution, as seen in the chi-square statistics associated with the original and normalised data.

Table 5. 80

Test of multivariate normality (after normalisation)

Skewness			Kurtosis			Skewness & Kurtosis	
Value	Z-Score	P-Value	Value	Z-Score	P-Value	Chi-Square	P-Value
88.079	5.526	0.000	387.813	4.714	0.000	52.756	0.000

5.7.2 ASSESSING OVERALL GOODNESS-OF-FIT OF THE FIRST ORDER MEASUREMENT MODEL

The fit of the estimated GOQ measurement model and the credibility of the measurement model parameter estimates are evaluated in the sections that follow. The results of the measurement model will be discussed by evaluating the overall model fit (based on the array of model fit indices as reported by LISREL), examining standardised residuals and assessing the modification indices. A visual representation of the fitted GOQ measurement model is provided in Figure 5.22

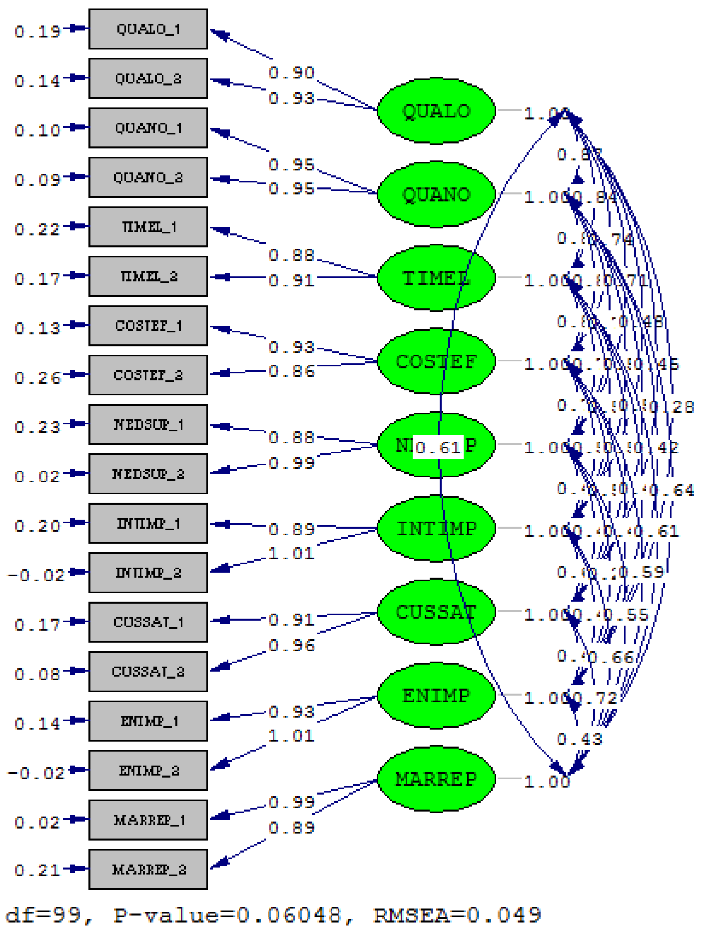

Figure 5. 22 Representation of the fitted Generic Outcome Questionnaire measurement model (completely standardised solution)

5.7.2.1 ASSESSING OVERALL GOODNESS-OF-FIT OF THE FIRST ORDER MEASUREMENT MODEL VIA THE EVALUATION OF THE FIT STATISTICS

The overall fit statistics produced by LISREL 8.8 are presented in Table 5.69.

Table 5. 81

Goodness of fit statistics for the Generic Outcome measurement model

Goodness of Fit Statistics
Degrees of Freedom = 99
Minimum Fit Function Chi-Square = 148.750 (P = 0.000909)
Normal Theory Weighted Least Squares Chi-Square = 132.927 (P = 0.0130)
Satorra-Bentler Scaled Chi-Square = 121.701 (P = 0.0605)
Estimated Non-centrality Parameter (NCP) = 22.701
90 Percent Confidence Interval for NCP = (0.0 ; 54.802)
Minimum Fit Function Value = 1.549
Population Discrepancy Function Value (F0) = 0.236
90 Percent Confidence Interval for F0 = (0.0 ; 0.571)
Root Mean Square Error of Approximation (RMSEA) = 0.0489
90 Percent Confidence Interval for RMSEA = (0.0 ; 0.0759)
P-Value for Test of Close Fit (RMSEA < 0.05) = 0.507
Expected Cross-Validation Index (ECVI) = 2.768
90 Percent Confidence Interval for ECVI = (2.531 ; 3.102)
ECVI for Saturated Model = 3.562
ECVI for Independence Model = 47.980
Chi-Square for Independence Model with 153 Degrees of Freedom = 4570.064
Independence AIC = 4606.064
Model AIC = 265.701
Saturated AIC = 342.000
Independence CAIC = 4670.409
Model CAIC = 523.080
Saturated CAIC = 953.276
Normed Fit Index (NFI) = 0.973
Non-Normed Fit Index (NNFI) = 0.992
Parsimony Normed Fit Index (PNFI) = 0.630
Comparative Fit Index (CFI) = 0.995
Incremental Fit Index (IFI) = 0.995
Relative Fit Index (RFI) = 0.959
Critical N (CN) = 107.211
Root Mean Square Residual (RMR) = 0.0152
Standardized RMR = 0.0321
Goodness of Fit Index (GFI) = 0.867
Adjusted Goodness of Fit Index (AGFI) = 0.770
Parsimony Goodness of Fit Index (PGFI) = 0.502

The Satorra-Bentler Scaled Chi-Square indicated a statistically insignificant value ($p>.05$). An insignificant Satorra-Bentler Chi-Square implies that there is not a significant discrepancy between the covariance implied by the measurement model and the observed covariance matrix and as a result the exact fit null hypothesis was not rejected (Kelloway, 1998; Van Heerden, 2012). In other words, the measurement model is able to reproduce the observed covariance matrix to a degree of accuracy in the sample that can be explained by sampling error only[34]. H_{0185} was therefore not rejected.

The RMSEA (Root Mean Square Error) is an indication of how well the model fits the population covariance matrix with unknown but optimally chosen parameter values. The sample obtained a RMSEA value of .049 with a (rather wide) confidence interval of (0 - .0759). According to Theron (2010) RMSEA values less than .05 are considered indicative of good fit, RMSEA values greater than .05 but less than .08 are considered indicative of reasonable fit, RMSEA vales greater than .08 but less than .10 are considered indicative of mediocre fit and RMSEA values greater than .10 are considered indicative of poor fit. Although the upper bound of the 90 percent confidence interval exceeded the critical cut-off value of .05, the interval included the critical close fit value of .05. Moreover, the formal p-value for test of close fit was .507. The probability of observing the sample RMSEA value of .049 under the assumption that the parametric RMSEA value was .05 was therefore large. Therefore, the close fit null hypothesis (H_{0186}) was not rejected ($p>0.05$).

The Standardised Root Mean Square Residual (SRMR) is the square root of the discrepancy between the sample covariance matrix and the model covariance matrix (Hooper et al.2008). SRMR values less than .05 indicate good fit, whilst SRMR values around .08 border on acceptable. The model obtained a SRMR value of .032, which suggested good model fit.

The Goodness of Fit (GFI) statistic serves as an alternative to the Chi-square test. A GFI cut-off value of .90 is advised for good model fit, although in cases where the sample size is small a cut-off value of .95 is advised. The Adjusted Goodness of Fit statistic adjusts the GFI base in the degrees of freedom, the same cut-off score applies to the AGFI (Hooper et al., 2008). The model obtained a GFI value of .867 and an AGFI value of 0.770, which indicates reasonable fit.

Parsimony Fit Indices assumes that model fit can be improved by adding more paths to the model and by estimating more parameters until perfect fit is achieved in the form of a saturated or just identified model with no degrees of freedom (Kelloway, 1998; Du Toit, 2014). The Parsimonious Normed Fit Index (PNFI=.630) and the Parsimonious

[34] The fact that the current study was plagued by low statistical power is again acknowledged as a methodological limitation.

Goodness of Fit Index (PGFI=.502) evaluate model fit from this perspective. Due the way parsimony indices are penalised for model complexity values larger than .50 can be interpreted as good model fit (Hooper et al., 2008)

The incremental fit indices compare the model Chi-square value to that of a baseline model, instead of using Chi-square on its own to evaluate the model fit. The incremental fit indices include the Normed Fit Index (NFI=.973), the Non-Normed Fit Index (NNFI=.992) and the Comparative Fit Index (CFI=.995). A cut-off value of .95 is advised with value greater than .95 indicating good fit (Hooper et al., 2008).

Based on the results above, it was concluded that the overall fit assessment is indicative of good measurement model fit.

5.7.2.2 ASSESSING OVERALL GOODNESS-OF-FIT OF THE FIRST ORDER MEASUREMENT MODEL VIA THE EVALUATION OF THE STANDARDISED MEASUREMENT MODEL RESIDUALS

Standardised residuals can be interpreted as standard normal deviates. A standardised residual with an absolute value larger than 2.58 would be interpreted as large at a 1% significance level (Diamantopoulos & Sigauw,2000; Myburgh, 2013). Large positive residuals suggest that the model underestimates the covariance between two variables and large negative residuals suggest that the model overestimates the covariance between variables (Myburgh, 2013). Table 5.70 presents a summary of the standardised residuals statistics.

Table 5. 82

Summary of statistics for standardised residuals

Smallest Standardised Residual	-8.364
Median Standardised Residual	0.000
Largest Standardised Residual	2.591
Largest Negative Standardized Residuals	
Residual for MARREP_2 and CUSSAT_1	-8.364
Largest Positive Standardized Residuals	
Residual for MARREP_2 and INTIMP_2	2.591

Only one standardised residual larger than 2.58 and one standardised residual smaller than -2.58 was indicated in Table 5.75. In other words, only two covariance estimates derived from the measurement model parameter estimates deviated significantly (p<.05) from the observed inter-parcel covariances which suggested good model fit.

The stem and leaf residual plot (Figure 5.23) capture the individual residual values and provides graphical information on the standardised residual distribution. Residuals clustered symmetrically around the zero-point which is indicative of good fit. The stem and leaf plot indicated that the median of the distribution is zero with a negatively skewed distribution. The negatively skewed distribution is an indication that there was a tendency for the model to overestimate the observed covariance terms but since the distribution only contained two large, statistically significant (p<.01) standardised residuals the tendency was not pronounced. The fact that only 2 out of 171 unique observed variance and covariance terms were poorly estimated (1.17%) indicated good model fit.

```
- 8|4
 - 7|
 - 6|
 - 5|
 - 4|
 - 3|
 - 2|51
 - 1|86521
 - 0|98888766555444444422222110000000000000000000000000000000000000000000000+35
   0|11122222223344444445555566666888999
   1|000111133345667899
   2|266
```

Figure 5. 23 Stem and leaf plot of the standardised residuals

5.7.2.3 ASSESSING OVERALL GOODNESS-OF-FIT OF THE FIRST ORDER MEASUREMENT MODEL VIA THE EVALUATION OF THE MEASUREMENT MODEL MODIFICATION INDICES

An additional method of evaluating model fit is to determine the extent to which adding one or more paths would significantly improve model fit may be identified by examining the modification indices for the currently fixed parameters of the model. By examining the modification indices, it is possible to estimate the decrease in the X^2 statistic, if parameters that are currently fixed are set free and the model is re-estimated (Van Heerden, 2012). Theron (2010) reports that modification indices with values larger than 6.64 indicate currently fixed parameters that would improve the fit of the model significantly (p<.01) if set free (Diamantopoulos & Siguaw, 2000). Consequently, modification indices calculated for the $\mathbf{\Lambda_x}$ and $\mathbf{\theta_\delta}$ matrices were examined.

Table 5. 83

Modification indices for lambda matrix

	QUALO	QUANO	TIMEL	COSTEF	NEDSUP	INTIMP
QUALO_1	- -	0.477	0.399	0.102	0.659	18.346
QUALO_2	- -	0.337	0.332	0.083	0.478	17.160
QUANO_1	0.282	- -	0.946	0.037	0.170	1.200
QUANO_2	0.273	- -	1.159	0.045	0.222	1.321
TIMEL_1	0.103	0.024	- -	0.039	0.001	0.003
TIMEL_2	0.073	0.014	- -	0.024	0.001	0.002
COSTEF_1	0.758	0.176	0.268	- -	2.331	0.832
COSTEF_2	0.658	0.189	0.27	- -	2.135	0.650
NEDSUP_1	0.205	0.955	0.012	0.757	- -	0.002
NEDSUP_2	0.101	0.327	0.004	0.311	- -	0.002
INTIMP_1	1.295	0.454	0.019	0.081	0.599	- -
INTIMP_2	1.373	0.703	0.032	0.112	0.494	- -
CUSSAT_1	0.209	0.009	0.071	0.011	1.406	0.005
CUSSAT_2	0.18	0.008	0.055	0.009	1.144	0.001
ENIMP_1	1.687	3.858	1.490	5.723	4.964	1.315
ENIMP_2	1.76	3.976	1.445	14.537	4.960	3.465
MARREP_1	1.408	1.216	1.069	2.619	0.104	7.018
MARREP_2	0.698	0.687	0.741	1.223	0.100	8.197

	CUSSAT	ENIMP	MARREP
QUALO_1	4.483	0	4.69
QUALO_2	4.129	0	4.064
QUANO_1	0.324	0.141	0.097
QUANO_2	0.352	0.151	0.091
TIMEL_1	0.016	0.209	0.306
TIMEL_2	0.013	0.19	0.261
COSTEF_1	0.846	1.82	3.641
COSTEF_2	0.986	0.996	2.292
NEDSUP_1	1.176	0.385	0.519
NEDSUP_2	1.218	0.322	0.392
INTIMP_1	- -	3.988	- -
INTIMP_2	0.01	16.957	26.811
CUSSAT_1	- -	2.009	1.971
CUSSAT_2	- -	1.846	- -
ENIMP_1	12.012	- -	3.036
ENIMP_2	9.134	- -	3.583
MARREP_1	35.131	0.012	- -
MARREP_2	10.614	0.008	- -

QUALO= Quality of Outputs COSTEF= Cost Effectiveness CUSSAT= Customer Satisfaction INTIMP= Interpersonal Impact MARREP= Market Reputation
QUANO= Quantity of Outputs NEDSUP= Need for Supervision ENIMP= Environmental Impact TIMEL=Timeliness

Table 5. 84

Modification indices for theta-delta

	QUALO_1	QUALO_2	QUANO_1	QUANO_2	TIMEL_1	TIMEL_2
QUALO_1	- -					
QUALO_2	- -	- -				
QUANO_1	0.703	0.185	- -			
QUANO_2	4.910	0.824	- -	- -		
TIMEL_1	0.014	0.330	9.156	10.446	- -	
TIMEL_2	2.855	0.863	0.252	0.521	- -	- -
COSTEF_1	1.406	0.002	1.131	0.001	0.122	0.018
COSTEF_2	1.898	0.001	0.741	0.127	0.338	0.099
NEDSUP_1	0.206	0.510	0.795	2.552	0.916	0.206
NEDSUP_2	2.529	3.083	0	0.346	0.564	0.137
INTIMP_1	0.025	1.677	5.016	0.859	0.166	0.272
INTIMP_2	3.921	9.498	1.482	0.023	0.037	0.098
CUSSAT_1	0.181	0.057	1.093	1.797	1.065	1.166
CUSSAT_2	0.099	0.023	0.418	0.841	0.523	0.628
ENIMP_1	0.170	0.427	0.046	0.069	0.990	0.319
ENIMP_2	1.076	1.447	0.119	0.007	0.646	0.367
MARREP_1	2.075	1.448	0.451	0.444	0.131	0.299
MARREP_2	1.495	0.934	0.007	0.007	0.019	0.011

	COSTEF_1	COSTEF_2	NEDSUP_1	NEDSUP_2	INTIMP_1	INTIMP_2
COSTEF_1	- -					
COSTEF_2	- -	- -				
NEDSUP_1	0.382	2.297	- -			
NEDSUP_2	2.081	5.028	- -	- -		
INTIMP_1	2.441	0.507	0.023	0.948	- -	
INTIMP_2	1.605	0.244	0.14	1.018	- -	- -
CUSSAT_1	0	0.126	1.808	3.221	0.192	0.169
CUSSAT_2	0.003	0.055	0.136	0.992	0.383	0.308
ENIMP_1	0.006	0.258	0.307	1.153	1.9	2.085
ENIMP_2	0.003	0.227	0.023	1.57	0.361	0.696
MARREP_1	1.873	0.874	0.191	0.319	0.224	0.609
MARREP_2	0.39	0.002	0.011	0.12	0.235	3.114

	CUSSAT_1	CUSSAT_2	ENIMP_1	ENIMP_2	MARREP_1	MARREP_2
CUSSAT_1	- -					
CUSSAT_2	- -	- -				
ENIMP_1	5.713	2.153	- -			
ENIMP_2	6.312	2.841	- -	- -		
MARREP_1	2.067	0.02	8.224	6.831	- -	
MARREP_2	2.098	0.152	14.863	10.801	- -	- -

QUALO= Quality of Outputs   COSTEF= Cost Effectiveness   CUSSAT= Customer Satisfaction   INTIMP= Interpersonal Impact   MARREP= Market Reputation
QUANO= Quantity of Outputs   NEDSUP= Need for Supervision   ENIMP= Environmental Impact   TIMEL=Timeliness

Table 5.71 indicated that there were eleven modification indices with values larger than 6.64. The parameter between *INIMP_2* and *Market Reputation* had the highest modification index value (26.811). The small percentage of large modification index values (7.639%) presents a positive indication of good model fit. According to Table 5.72 there were seven modification indices with values larger than 6.64. The parameter between *MARREP_1* and *ENIMP_1* had the highest modification index value (14.863). Once again, the small percentage of large modification index values (4.861%) presents a positive indication of good model fit.

Evaluation of the evidence provided by the fit statistics, the standardised residuals and the modification indices resulted in an overall verdict of good measurement model fit. The fact that the measurement model parameters were able to accurately reproduce the observed variance-covariance matrix meant that the parameter estimates were valid and credible and this warranted the interpretation of the measurement model parameter estimates.

A rather limited sample was expected from the outset. Hence the original intention as outlined in Chapter 3 was to fit the COQ measurement model by creating four item parcels from the items of the 9 subscales of the GOQ. Due to the disappointingly small sample that the current study managed to collect data on, the parcelling had to be intensified. Two (rather than four) item parcels of indicator variables consisting of items of each of the subscales of the GOQ were created in order to operationalise the proposed measurement model. This, however, then required the renumbering of the statistical hypotheses as originally formulated in Chapter 3 regarding the freed GOQ measurement model parameters[35].

If exact and/or close fit had been achieved for the GOQ measurement model, or alternatively if the measurement model would at least demonstrate reasonable model fit, the following 18 null hypotheses were tested concerning the freed elements in Λ^X:

H_{0i}: $\lambda_{jk}=0$; i=187, 188, …, 204; j=1,2, …, 36; k=1, 2, …, 9

H_{ai}: $\lambda_{jk}\neq 0$; i=187, 188, …, 204; j=1,2, …, 36; k=1, 2, …, 9

[35] The statistical hypotheses related to the freed GCQ measurement model parameters have not been reformulated because the fitting of the GCQ measurement model had to be abandoned due to a too small sample.
The statistical hypotheses related to the generic non-managerial performance structural model have also not been renumbered because the fitting of the structural model also had to be abandoned due to a too small sample size.

If either H_{0185} and/or H_{0186} were not rejected and exact and/or close fit had been achieved, or alternatively if the measurement model would at least demonstrate reasonable model fit, the following 18 null hypotheses were tested concerning the freed elements in Θ_δ:

H_{0i}: $\Theta_{\delta jj}=0$; i=205, 206, …, 222; j=1, 2…; 36

H_{ai}: $\Theta_{\delta jj}>0$; i=205, 206, …, 222; j=1, 2…; 36

If either H_{0185} and/or H_{0186} were not rejected and exact and/or close fit had been achieved, or alternatively if the measurement model would at least demonstrate reasonable model fit, the following 36 null hypotheses were tested concerning the freed elements in Φ:

H_{0i}: $\phi_{jk}=0$; i=223, 224, …, 258; j=1, 2…9; k=1, 2…9; j≠k

H_{ai}: $\phi_{jk}>0$; i=223, 224, …,258; j=1, 2…9; k=1, 2…9; j≠k

5.7.3 INTERPRETATION OF THE MEASUREMENT MODEL

An indication of the validity of the composite indicator variables was obtained by evaluating the magnitude and the significance of the slope of the regression of the observed variables on their respective latent variables. In other words, when inspecting the measurement model, the slope of the regression of X_i on ξ_i has to be substantial and significant for X_i to be a valid representation of a particular latent variable (Diamantopoulos & Siguaw, 2000, Du Toit, 2014).

The unstandardized Λ_X matrix (Table 5.73) contains the regression slope coefficients describing the slope of the regression of the manifest variables (i.e. the item parcels) on the latent variables they were linked to. The regression slope coefficients were considered statistically significant ($p<.05$) if the t-values are larger than 1.6449[36]. If indicator loadings are deemed significant, they serve as validity evidence in in favour of the indicators (Diamantopoulos & Siguaw, 2000; Burger, 2012).

[36] The null hypotheses H_{0i}: $\lambda_{jk}=0$ were tested against directional alternative hypotheses via one-tailed significance tests.

Table 5. 85

Unstandardised factor loading matrix

	QUALO	QUANO	TIMEL	COSTEF	NEDSUP	INTIMP
QUALO_1	0.601*	- -	- -	- -	- -	- -
	(0.049)					
	12.254					
QUALO_2	0.669*	- -	- -	- -	- -	- -
	(0.048)					
	14.071					
QUANO_1	- -	0.618*	- -	- -	- -	- -
		(0.043)				
		14.428				
QUANO_2	- -	0.663*	- -	- -	- -	- -
		(0.047)				
		14.124				
TIMEL_1	- -	- -	0.56*	- -	- -	- -
			(0.043)			
			13.045			
TIMEL_2	- -	- -	0.587*	- -	- -	- -
			(0.048)			
			12.261			
COSTEF_1	- -	- -	- -	0.618*	- -	- -
				(0.048)		
				12.754		
COSTEF_2	- -	- -	- -	0.555*	- -	- -
				(0.051)		
				10.851		
NEDSUP_1	- -	- -	- -	- -	0.591*	- -
					(0.051)	
					11.473	
NEDSUP_2	- -	- -	- -	- -	0.737*	- -
					(0.046)	
					15.995	
INTIMP_1	- -	- -	- -	- -	- -	0.549*
						(0.046)
						12.047
INTIMP_2	- -	- -	- -	- -	- -	0.614*
						(0.042)
						14.714

	CUSSAT	ENIMP	MARREP
QUALO_1	- -	- -	- -
QUALO_2	- -	- -	- -
QUANO_1	- -	- -	- -
QUANO_2	- -	- -	- -

Table 5. 86

Unstandardised factor loading matrix (continued)

	CUSSAT	ENIMP	MARREP
TIMEL_1	- -	- -	- -
TIMEL_2	- -	- -	- -
COSTEF_1	- -	- -	- -
COSTEF_2	- -	- -	- -
NEDSUP_1	- -	- -	- -
NEDSUP_2	- -	- -	- -
INTIMP_1	- -	- -	- -
INTIMP_2	- -	- -	- -
CUSSAT_1	0.59*	- -	- -
	(0.043)		
	13.827		
CUSSAT_2	0.643*	- -	- -
	(0.044)		
	14.454		
ENIMP_1	- -	0.786*	- -
		(0.061)	
		12.948	
ENIMP_2	- -	0.861*	- -
		(0.063)	
		13.591	
MARREP_1	- -	- -	0.667*
			(0.043)
			15.685
MARREP_2	- -	- -	0.596*
			(0.053)
			11.341

* (p<.05)

QUALO= Quality of Outputs
QUANO= Quantity of Outputs
TIMEL=Timeliness
COSTEF= Cost Effectiveness
NEDSUP= Need for Supervision
INTIMP= Interpersonal Impact
CUSSAT= Customer Satisfaction
ENIMP= Environmental Impact
MARREP= Market Reputation

As indicated by Table 5.73 all the factor loadings are considered to be significant (t-value>1.6449). H_{0i}: λ_{jk}=0; i=187, 188, …, 204; j=1,2, …, 36; k=1, 2, …, 9 were therefore rejected for all I in favour of H_{ai}: $\lambda_{jk}\neq0$; i=187, 188, …, 204; j=1,2, …, 36; k=1, 2, …, 9. Diamantopoulos and Siguaw (2000) states that a problem with relying on unstandardised loadings associated t-values, is that it may be difficult to compare the validity of different indicators measuring a particular construct. For this reason, they recommend further inspection of the magnitudes of the standardised loadings. Table 5.74 presents the completely standardised factor loading matrix.

Table 5. 87

Completely standardised factor loading matrix

	QUALO	QUANO	TIMEL	COSTEF	NEDSUP	INTIMP
QUALO_1	0.902	- -	- -	- -	- -	- -
QUALO_2	0.926	- -	- -	- -	- -	- -
QUANO_1	- -	0.95	- -	- -	- -	- -
QUANO_2	- -	0.952	- -	- -	- -	- -
TIMEL_1	- -	- -	0.885	- -	- -	- -
TIMEL_2	- -	- -	0.91	- -	- -	- -
COSTEF_1	- -	- -	- -	0.933	- -	- -
COSTEF_2	- -	- -	- -	0.861	- -	- -
NEDSUP_1	- -	- -	- -	- -	0.877	- -
NEDSUP_2	- -	- -	- -	- -	0.988	- -
INTIMP_1	- -	- -	- -	- -	- -	0.895
INTIMP_2	- -	- -	- -	- -	- -	1.009
CUSSAT_1	- -	- -	- -	- -	- -	- -
CUSSAT_2	- -	- -	- -	- -	- -	- -
ENIMP_1	- -	- -	- -	- -	- -	- -
ENIMP_2	- -	- -	- -	- -	- -	- -
MARREP_1	- -	- -	- -	- -	- -	- -
MARREP_2	- -	- -	- -	- -	- -	- -

	CUSSAT	ENIMP	MARREP
QUALO_1	- -	- -	- -
QUALO_2	- -	- -	- -
QUANO_1	- -	- -	- -
QUANO_2	- -	- -	- -
TIMEL_1	- -	- -	- -
TIMEL_2	- -	- -	- -
COSTEF_1	- -	- -	- -
COSTEF_2	- -	- -	- -
NEDSUP_1	- -	- -	- -
NEDSUP_2	- -	- -	- -
INTIMP_1	- -	- -	- -
INTIMP_2	- -	- -	- -
CUSSAT_1	0.908	- -	- -
CUSSAT_2	0.961	- -	- -
ENIMP_1	- -	0.927	- -
ENIMP_2	- -	1.01	- -
MARREP_1	- -	- -	0.988
MARREP_2	- -	- -	0.89

QUALO= Quality of Outputs
QUANO= Quantity of Outputs
TIMEL=Timeliness
COSTEF= Cost Effectiveness
NEDSUP= Need for Supervision
INTIMP= Interpersonal Impact
CUSSAT= Customer Satisfaction
ENIMP= Environmental Impact
MARREP= Market Reputation

The values shown in Table 5.74 can be interpreted as the regression slopes of the regression of the standardised indicator variables onto the standardised latent variables. The completely standardised factor loadings therefore indicate the average change expressed in standard deviation units in the indicator variable associated with one standard deviation change in the latent variable. Since each composite indicator only reflected a single latent variable the completely standardised factor loadings therefore can be interpreted as correlation coefficients expressing the strength of the correlation between the composite indicator and the latent variable it represented. Factor loading estimates were considered to be satisfactory if the completely standardised factor loading estimates exceeded .71 (Hair et al., 2006, Du Toit, 2014)). Satisfaction of this criterion would imply that at least 50% of the variance in the indicator variables can be explained by the latent variables they were assigned to represent (Du Toit, 2014). Interpreted in this sense, all loadings were greater than .71 and therefore satisfactory. Two completely standardised lambda estimates, however, exceeded unity. Since the completely standardised factor loadings are correlation coefficients when each indicator variable reflects a single latent variable tan estimate larger than one is a logical impossibility. This finding eroded confidence in the fitted model. The critical question is whether the estimates were statistically significantly larger than one. This question was considered by evaluating the statistical significance of the corresponding theta-delta error variance estimates[37].

Determining the validity of the indicators requires an investigation of the squared multiple correlations (R^2) of the indicators. A high R^2 value (>.50) would be indicative of high validity of the indicator as this indicates that a satisfactory proportion of variance in each indicator variable is explained by its underlying latent variable. All of the item parcels had reported validities higher than .50. The results are indicated in Table 5.75.

Table 5. 88

Squared multiple correlations for item parcels

QUALO_1	QUALO_2	QUANO_1	QUANO_2	TIMEL_1	TIMEL_2
0.814	0.858	0.902	0.905	0.783	0.828
COSTEF_1	COSTEF_2	NEDSUP_1	NEDSUP_2	INTIMP_1	INTIMP_2
0.87	0.742	0.769	0.977	0.801	1.017

[37] The problem will express itself in the $\Theta\delta$ matrix in the form of two negative error variance estimates.

Table 5. 89

Squared multiple correlations for item parcels(continued)

CUSSAT_1	CUSSAT_2	ENIMP_1	ENIMP_2	MARREP_1	MARREP_2
0.825	0.923	0.859	1.02	0.976	0.791

The variance in measurement error terms is indicated by the theta-delta matrix. In other words, the percentage of variance in the indicator variable attributed to systematic and random measurement error and that cannot be explained in terms of the latent variable that the indicator variable was designated to reflect (Van Heerden, 2012). Table 5.76 represents the unstandardised theta-delta matrix and Table 5.77 the completely standardised theta-delta matrix which can be also considered the flip side of the squared multiple correlations (R^2) represented in Table 5.75

Table 5. 90

Unstandardised theta-delta matrix

QUALO_1	QUALO_2	QUANO_1	QUANO_2	TIMEL_1	TIMEL_2
0.082*	0.074*	0.042*	0.046*	0.087*	0.072*
(0.019)	(0.022)	(0.011)	(0.013)	(0.02)	(0.022)
4.285	3.32	3.96	3.412	4.37	3.319
COSTEF_1	COSTEF_2	NEDSUP_1	NEDSUP_2	INTIMP_1	INTIMP_2
0.057*	0.107*	0.105*	0.013*	0.07*5	-0.006
(0.026)	(0.025)	(0.025)	(0.027)	(0.029)	(0.025)
2.196	4.208	4.124	0.469	2.633	-0.259
CUSSAT_1	CUSSAT_2	ENIMP_1	ENIMP_2	MARREP_1	MARREP_2
0.074*	0.034	0.102*	-0.014	0.011	0.094*
(0.021)	(0.025)	(0.051)	(0.051)	(0.018)	(0.022)
3.547	1.397	1.994	-0.277	0.589	4.303

* ($p<.05$)

Table 5.76 indicates that thirteen of the 18 composite indicators were statistically significantly ($p<.05$) plagued by measurement error. Five measurement error variances were statistically insignificant ($p>.05$). H_{0i}: $\Theta_{\delta jj}=0$; were therefore rejected for i=205, 206, …, 213, 215, 217, 219, 222 and j=1, 2, 3, …, 9, 11, 13, 15, 18 in favour of H_{ai}: $\Theta_{\delta jj}>0$; i=205, 206, …, 213, 215, 217, 219, 222; j=1, 2, 3, …, 9, 11, 13, 15, 18. H_{0i}: $\Theta_{\delta jj}=0$; were therefore not rejected for i=214, 216, 218, 220, 221 and j=10, 12, 14, 16, 17.

Confidence in the measurement model was negatively impacted by the five insignificant measurement error variances. In addition, two of the measurement error variances were negative. These were inadmissible values since negative variance estimates are a logical impossibility. Fortunately, the negative estimates were statistically insignificant (p>.05). the null hypothesis H_{0i}: $\theta_{\delta jj}=0$ could therefore not be rejected for the two item parcels (INTIMP_2 and ENIMP_2). This to some degree ameliorated the extent to which the negative error variance estimates eroded confidence in the fitted model.

Table 5. 91

Standardised theta-delta matrix

QUALO_1	QUALO_2	QUANO_1	QUANO_2	TIMEL_1	TIMEL_2
0.186	0.142	0.098	0.095	0.217	0.172
COSTEF_1	COSTEF_2	NEDSUP_1	NEDSUP_2	INTIMP_1	INTIMP_2
0.13	0.258	0.231	0.023	0.199	-0.017
CUSSAT_1	CUSSAT_2	ENIMP_1	ENIMP_2	MARREP_1	MARREP_2
0.175	0.077	0.141	-0.02	0.024	0.209

5.7.4 DISCRIMINANT VALIDITY

The aim of the evaluation of the discriminant validity of the GOQ is to investigate whether latent variables that are proposed to be distinct but inter-related constructs really were measured as distinct constructs. The nine latent variables of the GCQ are expected to correlate which each other although not excessively high. Table 5.78 provides the phi matrix as an indication of latent variable inter-correlations.

Table 5. 92

Phi matrix

	QUALO	QUANO	TIMEL	COSTEF	NEDSUP	INTIMP
QUANO	0.867*	1				
	(0.044)					
	19.846					
TIMEL	0.844*	0.875*	1			
	(0.053)	(0.045)				
	15.812	19.489				
COSTEF	0.738*	0.816*	0.813*	1		
	(0.065)	(0.049)	(0.052)			
	11.283	16.775	15.754			
NEDSUP	0.705*	0.744*	0.773*	0.711*	1	
	(0.074)	(0.066)	(0.068)	(0.071)		
	9.505	11.311	11.351	10.031		

Table 5. 93

Phi matrix (continued)

	QUALO	QUANO	TIMEL	COSTEF	NEDSUP	INTIMP
INTIMP	0.481*	0.537*	0.572*	0.588*	0.485*	1
	(0.092)	(0.081)	(0.080)	(0.074)	(0.095)	
	5.231	6.647	7.166	7.937	5.124	
CUSSAT	0.450*	0.510*	0.518*	0.573*	0.454*	0.663*
	(0.099)	(0.096)	(0.097)	(0.096)	(0.108)	(0.079)
	4.543	5.323	5.365	5.996	4.196	8.349
ENIMP	0.280*	0.420*	0.417*	0.477*	0.247*	0.477*
	(0.103)	(0.096)	(0.096)	(0.101)	(0.105)	(0.101)
	2.709	4.372	4.325	4.707	2.341	4.747
MARREP	0.606*	0.636*	0.607*	0.592*	0.548*	0.660*
	(0.084)	(0.078)	(0.091)	(0.085)	(0.096)	(0.070)
	7.249	8.180	6.673	6.940	5.708	9.455

	CUSSAT	ENIMP	MARREP
CUSSAT	1		
ENIMP	0.466*	1	
	(0.095)		
	4.895		
MARREP	0.721*	0.434*	1
	(0.062)	(0.100)	
	11.612	4.321	

QUALO= Quality of Outputs
QUANO= Quantity of Outputs
TIMEL=Timeliness
COSTEF= Cost Effectiveness
NEDSUP= Need for Supervision
INTIMP= Interpersonal Impact
CUSSAT= Customer Satisfaction
ENIMP= Environmental Impact
MARREP= Market Reputation

As seen in Table 5.78 all the inter-latent variable correlations were statistically significant ($p<.05$). H_{0i}: $\phi_{jk}=0$; i=223, 224, …, 258; j=1, 2…9; k=1, 2…9; j≠k were therefore rejected for all I in favour of H_{ai}: $\phi_{jk}>0$; i=223, 224, …,258; j=1, 2…9; k=1, 2…9; j≠k If correlations exceeded a value of .90, they were considered to be excessively high. None of the ϕ_{jk} estimates were considered to be excessively high, although four latent variables correlated with a value higher than .80. According to Myburgh (2013) the absence of excessively high correlations between the latent variables does not provide enough evidence of discriminant validity. There is still a possibility that latent performance dimensions might correlate unity in the parameters, but they still correlate less than unity due to sampling error (Du Toit, 2014). To examine this possibility a 95% confidence interval was calculated for each sample ϕ_{jk} estimate in utilising an Excel macro developed by Scientific Software International (Mels, 2009). If any confidence interval includes the value one it would imply that the null hypothesis

H_0: ρ=1 cannot be rejected. Confidence in the claim that two latent performance dimensions are unique, qualitatively distinct dimensions of the outcome construct would thereby be seriously eroded (Myburgh, 2013).

The 95% confidence intervals for the 36 inter-latent variable correlations are shown in Table 5.79. None of the 36 confidence intervals included unity. The discriminant validity of the GOQ was thereby indicated.

Table 5. 94

95% confidence interval for sample phi estimates

ESTIMATE	STANDARD ERROR ESTIMATE	LOWER LIMIT OF 95% CONFIDENCE INTERVAL	UPPER LIMIT OF 95% CONFIDENCE INTERVAL	PHI
0.867	0.044	0.750	0.931	21
0.844	0.053	0.703	0.921	31
0.738	0.065	0.583	0.841	41
0.705	0.074	0.529	0.823	51
0.481	0.092	0.282	0.640	61
0.450	0.099	0.237	0.622	71
0.280	0.103	0.069	0.467	81
0.606	0.084	0.416	0.746	91
0.875	0.045	0.752	0.939	32
0.816	0.049	0.695	0.892	42
0.744	0.066	0.585	0.848	52
0.537	0.081	0.360	0.677	62
0.510	0.096	0.299	0.673	72
0.420	0.096	0.216	0.589	82
0.636	0.078	0.458	0.765	92
0.813	0.052	0.683	0.893	43
0.773	0.068	0.602	0.876	53
0.572	0.080	0.395	0.708	63
0.518	0.097	0.304	0.682	73
0.417	0.096	0.213	0.586	83
0.607	0.091	0.398	0.756	93
0.711	0.071	0.543	0.824	54
0.588	0.074	0.424	0.714	64
0.573	0.096	0.356	0.732	74
0.477	0.101	0.257	0.650	84
0.592	0.085	0.401	0.734	94
0.485	0.095	0.278	0.649	65
0.454	0.108	0.219	0.639	75
0.247	0.105	0.033	0.439	85
0.548	0.096	0.333	0.709	95
0.663	0.079	0.479	0.791	76
0.477	0.101	0.257	0.650	86
0.660	0.070	0.500	0.776	96
0.466	0.095	0.261	0.631	87
0.721	0.062	0.576	0.822	97
0.434	0.100	0.220	0.608	98

Although none of the 36 confidence intervals included unity the intervals calculated for ϕ_{21}, ϕ_{31}, ϕ_{32} included the value (.90) as can be seen in Table 5.79. This was earlier considered to be a critical value for excessively large correlations. These findings indicated to some degree lowered confidence in the discriminant validity of the GOQ.

5.8 SUMMARY OF THE MEASUREMENT MODEL FIT AND PARAMETER ESTIMATES

The purpose of Chapter 5 was to analyse the psychometric properties of the Generic Outcome Questionnaire in order to arrive at a verdict regarding the reliability of the measures of the GOQ and the construct validity of the construct-references inferences derived from measurement tool.

Due to the small sample size the only the second substantive hypothesis was tested in this study. The second substantive hypothesis proposed that the GOQ provides a construct valid and reliable measure of the latent outcomes that constitute the non-managerial individual employee job performance construct as defined by the instrument, amongst South African non-managerial personnel.

The operational hypothesis implied by the substantive research hypothesis is that the measurement model can closely reproduce the covariances observed between the item parcels created from the items of each dimension

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.1 INTRODUCTION

The objectives of this study were to (a) critically re-examine Myburgh's (2013) constitutive definition of the generic performance construct as it applies to non-managerial, individual positions (b) to adapt the Generic Performance Questionnaire (GPQ) developed by Myburgh (2013) to obtain self-rater assessments of the competencies comprising the generic, non-managerial, individual performance construct (c) to develop a Generic Outcome Questionnaire (GOQ) to obtain self-rater assessments of the competencies comprising the generic, non-managerial, individual performance construct (d) to evaluate the construct validity of the (revised) GCQ (previously GPQ) and the GOQ by evaluating the fit of the measurement models implied by the architecture of the instruments and the constitutive definition of the generic performance construct (e) to develop and empirically test the fit of a second-order generic non-managerial competency measurement model and (f) to develop and empirically test the reduced generic non-managerial performance structural model that structurally maps the second-order competencies on the outcome variables.

As previously stated, the small sample size made it impossible to fulfil the objectives of the research as intended. Finding organisations that are willing to participate in research studies remain a huge challenge in quantitative research studies in industrial psychology. Getting employees in organisations that agreed to participate in research studies to degree to participate in the research and to diligently complete the composite research questionnaire presents a significantly bigger challenge. Explanatory hypotheses that appropriately acknowledge that employee job performance is complexly constituted and complexly determined invariably comprises a large number of latent variables. Large explanatory models in turn require longer research questionnaires and large samples to allow the credible testing of the validity of the explanatory hypotheses. Longer research questionnaires further dissuade already reluctant potential respondents to ignore the passionate invitation of the researcher to participate in the research.

Nonetheless the study was able to achieve some of the initial objectives which in itself did constitute a valuable contribution to research. The objectives that the study eventually met included (a) the critical re-examination of Myburgh's (2013) constitutive definition of the generic performance construct as it applies to non-managerial, individual positions (b) the adaptation of the Generic Performance Questionnaire (GPQ) developed by Myburgh (2013) to obtain self-rater assessments of the competencies comprising the generic, non-managerial, individual performance construct (c) the development of a Generic Outcome Questionnaire (GOQ) to obtain self-rater assessments of the competencies comprising the generic, non-managerial, individual performance construct and (d) the evaluation of the construct validity of the (revised) GOQ by evaluating the fit of the measurement model implied by the architecture of the instrument and the constitutive definition of the generic performance construct

The aim is of this chapter is to provide a summary of the results of this study. Furthermore, the limitations of the study are discussed and recommendations are made for future research.

6.2 SUMMARY OF PRINCIPAL FINDINGS AND DISCUSSIONS

After the critical re-examination of Myburgh's (2013) constitutive definition of the generic performance construct as it applies to non-managerial, individual positions, and the (revised) Generic Competency Questionnaire (GCQ) and the Generic Outcome Questionnaire (GOQ) was developed. The small sample size only permitted the fit of the GOQ measurement model.

Due to the restrictions imposed by the small sample size item parcels were used in the analyses. Item analysis and exploratory factor analysis (EFA) was performed on the subscales of both the GCQ and the GOQ. The aim of theses analyses was to determine whether the design of the GCQ and GOQ subscales succeeded in measuring the latent performance dimension they were intended to measure and whether the subscales measured a single undifferentiated latent performance dimension.

Chapter 4 provided a detailed description of the results. The following conclusions were made with regard to the item analysis, dimensionality analysis and the fit of the measurement model.

6.2.1 ITEM ANALYSIS

The item analysis findings in the current study were compatible with the position that the subscales of the GCQ and the GOQ validly and reliably measured the latent performance dimensions they were designated to reflect. The item analysis findings in the current study can, however, not be interpreted as definite evidence that this was the case.

The analysis of the item statistics did bring to the fore a few questionable items; however, it was decided to delay the decision regarding the removal of these items until exploratory factor analysis has been done. The reason for this was indications of meaningful factor fission, and if confirmed, it might be more beneficial to expand the particular dimension under discussion. For this reason, no items were deleted from the GCQ or the GOQ based on the results of the item analysis.

A comparison between the GCQ subscale reliability results obtained by Myburgh (2013) to those obtained in the current study are shown in Table 6.1.

Table 6.1

Comparison of the GCQ subscale reliabilities found by Myburgh (2013) and those obtained in the current study

Subscale	Reliability Myburgh (2013)	Reliability Current study
Task performance	.775	.859
Effort	.847	.800
Adaptability	.823	.758
Innovating	.839	.850
Leadership potential	.851	.883
Communication	.859	.870
Interpersonal relations	.875	.893
Management	.882	.895
Analysing and problem-solving	.845	.887
Counterproductive work behaviour	.882	.850
Organisational citizenship behaviour	.867	.887
Self-development	.916	.883
Green behaviour	-	.900

The results obtained by Myburgh (2013) and the current study were quite similar for the majority of the subscales. Somewhat more dissimilar reliability coefficients were obtained only for the *Task performance* and the *Adaptability* subscales. In both studies no items were considered sufficiently problematic to be deleted from the GCQ

6.2.2 DIMENSIONALITY ANALYSIS

Exploratory factor analysis (EFA) was performed on the various subscales via principal axis factor analysis with oblique rotation. The design intention with the development of the GCQ and GOQ subscales was to measure a single undifferentiated (or indivisible) latent performance dimension. In the conceptualisation of the generic non-managerial latent competencies and the generic non-managerial latent outcomes no provision was made for the identification of narrower facets or dimensions. The aim of the analysis was to investigate whether each subscale measured a unidimensional latent variable. The eigenvalue-greater-than-one rule and scree plot were used to determine the number of factors to extract for each subscale. Furthermore, if the percentage non-redundant residual correlations that were greater than .05 exceeded 30% the extracted factor solution was considered not to provide a valid and credible explanation of the observed inter-item correlation matrix. Additional factors were then extracted.

Where two or more factors were extracted the first-order measurement models implied by the pattern matrix was fitted separately for each subscale via CFA using structural equation modelling. If the first-order measurement model showed at least close fit, a second-order measurement model was fitted in which the EFA extracted first-order factors loaded on a single second-order factor. If the first-order measurement model showed poor fit a bifactor model was fitted where each item measured a specific narrow factor (indicated by the EFA) as well as a broad, general factor (Reise, 2012; Wessels, 2018).

Only two subscales were able to pass the unidimensionality assumption in that the eigenvalue greater than one rule extracted only one factor and the percentage of large residual correlations were low enough to reflect an accurate representation of the observed inter-item correlation. For eight subscales the eigenvalue greater than one rule extracted a single factor, however the percentage of large residual correlations proved to be too high. Of these eight subscales five subscales could accurately reproduce the observed inter-item correlation matrix with a forced two-factor solution and three subscales could accurately reproduce the inter-item correlation matrix with a forced three factor solution. For eleven subscales the eigenvalue greater than one rule extracted two factors with a low enough residual inter-item correlation matrix to accurately reflect the observed inter-item correlation matrix. Lastly, for one subscale a two-factor solution was extracted via the eigenvalue greater than one rule, but there was a large percentage of large residual correlations. By forcing the extraction of a three-factor solution problem was solved. In the single case were the first-order measurement model did not fit the data a bi-factor model was fitted to the data which provided the solution which indicated that the items loaded on their separate factor as well as a general factor not currently defined by the model.

In the cases were factor fission occurred or where it was forced it was possible to theoretically interpret the extracted factors.

A comparison between the dimensionality analysis findings for the GCQ subscale obtained by Myburgh (2013) to those obtained in the current study are shown in Table 6.2.

Table 6.2

Comparison of the GCQ subscale EFA results obtained by Myburgh (2013) and those obtained in the current study

Subscale	Number of factors extracted Myburgh (2013)	Number of factors extracted Current study
Task performance	**2**	**2**
Effort	1	3
Adaptability	1	2
Innovating	**1**	**1**
Leadership potential	1	2
Communication	**2**	**2**
Interpersonal relations	1	2
Management	1	2
Analysing and problem-solving	2	3
Counterproductive work behaviour	**2**	**2**
Organisational citizenship behaviour	**1**	**1**
Self-development	1	3
Green behaviour	-	2

The number of factors extracted agreed only for five of the twelve subscales. For the remaining subscales the general trend was that the current study found less support for the unidimensionality assumption and tended to extract more factors. The lack of correspondence in findings was considered disconcerting.

6.2.3 MEASUREMENT MODEL FIT

The small sample size imposed certain limitations on the initial objectives of the study which meant that only the GOQ measurement model could be evaluated. The hypothesis of exact fit was not rejected ($p>.05$). In other words, the measurement model was able to reproduce the observed covariance matrix to a degree of accuracy in the sample that can be explained by sampling error only[38].

[38] The fact that the current study was plagued by low statistical power is again acknowledged as a methodological limitation.

Evaluation of the evidence provided by the fit statistics, the standardised residuals and the modification indices resulted in an overall verdict of good measurement model fit. The fact that the measurement model parameters were able to accurately reproduce the observed variance-covariance matrix meant that the parameter estimates were valid and credible, and this warranted the interpretation of the measurement model parameter estimates.

Confidence in the measurement model was negatively impacted by five insignificant measurement error variances. In addition, two of the measurement error variances were negative. These were inadmissible values since negative variance estimates are a logical impossibility. Fortunately, the negative estimates were statistically insignificant ($p>.05$). The null hypothesis H_{0i}: $\theta_{\delta jj}=0$ could therefore not be rejected for the two item parcels (INTIMP_2 and ENIMP_2). This to some degree ameliorated the extent to which the negative error variance estimates eroded confidence in the fitted model.

6.3 LIMITATIONS

In order to complete the GCQ and the GOQ participants are required to make a substantial time sacrifice (40 mins) in order to complete the 176 items. The time sacrifice itself made organisations and possible participants extremely reluctant to participate.

Furthermore, there also seemed to be some misconceptions regarding the nature of the study and organisations misinterpreted the survey as a performance management tool. This led to a reluctance to expose their employees to the survey for the fear of the internal consequences despite the reassurance of complete anonymity.

The knock-on effect of the above-mentioned limitations resulted in a small sample size which imposed major limitations on the study. First of all, the lack of an adequate sample meant that it was not possible to test all the hypotheses as intended, which in itself was a big disappointment. Secondly, although it was indeed possible to fit the Generic Outcome Questionnaire the fact that the measurement model could not be fitted with individual items as indicators variables does create some uncertainty regarding the construct validity of the instrument.

The small sample size invariable had the effect of lowering the statistical power of the analyses. The finding of exact and close fit for the GOQ measurement model was therefore far less convincing evidence of construct validity than the same finding would have been in the case of a larger sample.

6.4 RECOMMENDATIONS FOR FUTURE RESEARCH

The design intention of the GCQ and the GOQ was for each item to provide a valid and reliable measure of the specific latent performance dimension it was intended to measure. The ultimate goal should therefore be to indeed fit the measurement models with individual items as indicators of the specific latent performance dimensions, however in order to this a much larger sample would be required. Therefore, it is recommended to repeat the study with a larger sample.

The study defined performance as a construct that includes both a behavioural and an outcome domain. The study also made the assumption that the latent variables representing each domain are not only inter-related within each domain but between domains as well. Therefore, in order to really provide practitioners with credible information on performance as defined by the study the hypothesised structural model would need to be fitted. Once again this would also be dependent on future researchers' ability to acquire a large enough sample.

The generic non-managerial performance structural model should be expanded in future research into a fully-fledged generic non-managerial competency model by mapping the competency potential latent variables that determine performance onto the latent competencies and latent outcomes that constitute performance.

It is also recommended that future studies consider the effect of situational variables on the generic performance structural model. It is only logical to expect behaviours to vary within different contexts and the generic performance structural model should reflect that. It is acknowledged that it is generally not common for models to consider the effect of situational variables.

Considering all of the above, the ultimate goal of all associated future research should be to advance the development of a fair, valid and credible actuarial prediction model with the GCQ as criterion. Failure to do so would continue to cripple industrial psychology, as the discipline would continue to be devoid of comprehensive performance theory with mass application potential.

6.5 FUTURE PRACTICAL APPLICATION OF RESEARCH

The current research could potentially have various future applications. It would be possible to base performance management systems on the GCQ and GOQ. If justified by research the competencies in the GCQ could be used with the outcome in the GOQ in order to measure the performance of non-managerial employees.

It would also be possible to diagnose performance shortcomings via the (still to be developed) explanatory non-managerial competency model. If research can prove that the structural model is a valid and credible explanation of non-managerial performance, it could well be used to identify certain performance shortcomings not just on an individual level.

The GCQ and GOQ could also be used to evaluate development interventions as it would be possible to measure the variation in performance pre and post intervention. Lastly, the actuarial prediction model could be powerful tool for small organisations that do not have enough resources or more specifically enough employees to develop their own predictions models. By making the model available to these organisations they would be able to implement a variety of human resource interventions with far greater accuracy.

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APPENDIX A

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GENERIC COMPETENCY QUESTIONNAIRE & GENERIC OUTCOME QUESTIONNAIRE

[SELF ASSESSMENT FORM]

INFORMED CONSENT

You are asked to participate in a research study conducted by Philip Botes [Hons BCom] from the Department of Industrial Psychology at Stellenbosch University. The results of the study will be contributed to my master's thesis. You were selected as a possible participant in this study because you occupy a non-managerial position in your organisation.

PURPOSE OF THE STUDY

The objective of the study is to develop a generic South African performance measure that could be used to obtain information on non-managerial, individual performance and to validate the performance measure. Such a generic performance measure would allow the development of a comprehensive non-managerial performance model.

PROCEDURES

If you volunteer to participate in this study, we would ask you to complete the pen-and-paper based questionnaire. Completion of the questionnaire will take approximately 40 minutes. The questionnaire consists of two sections. The completed questionnaire will then be placed in a closed box/container.

POTENTIAL RISKS AND DISCOMFORTS

The only discomfort associated with the study is the time that you will have to set aside to complete the questionnaire. There are no foreseeable risks associated with participation in this research study. The results of the study will be treated as confidential. Only myself and my master's supervisor will have access to the data. Management will not have access to the appraisal of any individual.

POTENTIAL BENEFITS TO SUBJECTS AND/OR SOCIETY

The development of a measure of generic non-managerial performance will allow the development of an assessment tool for all jobs comprising a family of non-managerial jobs and to psychometrically evaluate the results in terms of validity, fairness and utility. Moreover, the development of a measure of generic non-managerial performance will allow the development and testing of generic performance models. Very few if any comprehensive performance models exist that attempt to model the full complexity of performance. To increase the effectiveness of human resource practitioners, valid performance theory should be available to guide the development of human resource interventions. Developing and testing comprehensive generic performance models will provide practitioners with credible information on the determinants of performance and how they influence decision making and will provide a sound foundation to build future performance theory.

PAYMENT FOR PARTICIPATION

Participants will be eligible to win a cash prize of R 3000.00 provided that they have responded to all items in the questionnaire and provided that they have used the response option “cannot rate/unwilling to rate” judiciously. At the end of the questionnaire there will be a lucky draw page that will ask for your cell phone number, this will be teared off and put into the lucky draw box once the questionnaire has been inspected. Responses to the questionnaire and the lucky draw page cannot be linked. One individual will be randomly selected from those that completed the lucky draw page. The winner will be contacted via an SMS message.

CONFIDENTIALITY

Any information that is obtained in connection with this study and that can be identified with the participant will remain confidential and will be disclosed only with the participant's permission or as required by law. Confidentiality will be maintained by means of restricting access to the data to myself and my supervisor, by storing the data on a password-protected computer and by only reporting aggregate statistics for the validation sample. The results of the study will be disseminated by means of an unrestricted electronic thesis and by means of an article published in an accredited scientific journal. Collected data will be kept until the thesis has been examined and an article has been published to allow third parties the opportunity to verify results, if needed. A summary of the research findings will be presented to the South African Board for People Practices (SABPP). In none of these instances will the identity of any research participant be revealed nor will the performance assessments for any focal employee be reported. Only aggregate statistics reflecting the psychometric integrity of the GPQ and the GOQ will be reported.

PARTICIPATION AND WITHDRAWAL

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. Data of participants that withdraw from the study will not be used and will be deleted. You may also refuse to answer any questions you don't want to answer and still remain in the study. The investigator may withdraw you from this research if circumstances arise which warrant doing so.

IDENTIFICATION OF RESEARCHERS

If you have any questions or concerns about the research, please feel free to contact Philip Botes [0734012569; philipbotes12@gmail.com] and/or Prof Callie Theron [0842734139; ccth@sun.ac.za] both from the Department of Industrial Psychology at Stellenbosch University.

RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research subject, contact Maléne Fouché at the Unit for Research Development at Stellenbosch University [mfouche@sun.ac.za; 021 808 4622].

PROVIDING INFORMED CONSENT

Tick the "Yes" option below if you have read the information provided and consent to participate in the research under the conditions that were outlined above. Additionally, by providing consent you also give permission that the data from this study may be utilised for future research purposes. Tick the "No" option below if you have read the information provided and do not consent to participate in the research under the conditions that were outlined above.

I PROVIDE CONSENT

☐ Yes ☐ No

BIOGRAPHICAL INFORMATION

Please fill out the biographical information requested below. The biographical information is required for research purposes to ensure that measures comply with Employment Equity legislation requirements.

First language of rater			**Gender of rater**		**Job grade of rater (Peromnes)**		
English	Afrikaans	Other	Male	Female	7-12	13-16	17-19

Race of rater					**Time working in your current position**			
Asian	Black	Coloured	White	Other	0-6 months	6 months-2 years	2-5 years	> 5 years

Continue to next page

GPQ Instructions

INSTRUCTIONS

GENERIC PERFORMANCE QUESTIONNAIRE

INTRODUCTION

Performance is defined as observable behavioural actions relevant to the organisation's goals that employees perform. These behaviours are regarded as relevant because they are instrumental in achieving specific, desired outcomes. The behaviours are expressions of underlying latent performance dimensions. This questionnaire attempts to assess the level of competence with which non-managerial personnel perform on these performance dimensions. Your ratings along with those of other suitably qualified respondents will be combined to form an overall performance rating that will describe your work performance on each of the non-managerial performance dimensions. That will assist you to come to a better understanding of your performance strengths and weaknesses and to identify avenues to improve performance on those dimensions on which you are currently underperforming.

INSTRUCTIONS

The Generic Performance Questionnaire [GPQ] consists of 104 items measuring 13 latent performance dimensions. You have been asked to evaluate yourself. Please read each item carefully and choose the appropriate response option (1-5) that best describes the standard of performance that you displayed over the past 12 months by choosing the specific behaviours referred to in the item that you have typically displayed over the assessment period by selecting the corresponding scale value. Please note that you may make use of all 5 response options including those that have not been labelled.

EXAMPLE

In your response to item A1 you should indicate the standard of task performance that you displayed over the past 12 months by choosing the specific behaviours that best describes the extent to which you meet production or services goals. If, for example, you over the past 12 months only seldom met production or service goals the response option 1 should be chosen. If, however, you consistently exceeded production or service goals over the past 12 months the response option 5 should be chosen. If, for example, over the past 12 months the extent to which you met production or service goals was somewhere between you normally meet production or service goals, but do not exceed goals and you consistently exceeded production or service goals option 4 should be chosen. The response option 6 (Cannot rate/Unwilling to rate) should be used as seldom as possible and only if you feel uncomfortable with the question or if have had insufficient opportunity to observe the specific behavioural aspect the item refers to.

	Definitions	**Well below standard 1**	**Below required standard 2**	**Satisfactory 3**	**Above required standard 4**	**Well above standard 5**	**Cannot Rate/ Unwilling to rate**
A	**TASK PERFORMANCE: The extent to which the employee effectively performs activities that contribute to the organisation's technical core, performs the foundational, substantive or technical tasks that is essential for a specific job effectively, successfully completes role activities prescribed in the job description and achieves personal work objectives.**						
A1	Production or service goals	I seldom meet production or service goals; I find excuses for not meeting goals		I normally meet production or service goals, but do not exceed goals		I exceed production or service goals every time	
		1	2	3	4	5	6

IMPORTANT

- Evaluate your performance on each performance dimension according to its own merits. Please be honest, even if it means giving poor ratings
- The questionnaire is printed on both sides of the paper, please ensure that you answer all the questions

Continue to next page
Generic Performance Questionnaire

GENERIC PERFORMANCE QUESTIONNAIRE

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/ Unwilling to rate 6
A	**TASK PERFORMANCE: The extent to which the employee effectively performs activities that contribute to the organisation's technical core, performs the foundational, substantive or technical tasks that is essential for a specific job effectively, successfully completes role activities prescribed in the job description and achieves personal work objectives.**						
A1	Production or service goals	I seldom meet production or service goals; I find excuses for not meeting goals		I normally meet production or service goals, but do not exceed goals		I exceed production or service goals every time	6
		1	2	3	4	5	
A2	Quantity of work output	The amount of work I deliver is significantly below the required output		Normally I deliver the amount of work required, but no more		I consistently exceed the amount of work required; I always do more than is expected	6
		1	2	3	4	5	
A3	Quality of work output	The quality of work I deliver is substantially below the required standards		Normally I deliver products or services of the required quality		I consistently exceed the quality of work required; consistently exceed quality standards	6
		1	2	3	4	5	
A4	Core task productivity	I achieve significantly less output than most employees with the same resources		I achieve basically the same output than most employees with the same resources		I achieve significantly more output than most employees with the same resources	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/Unwilling to rate 6
A5	Task effectiveness	I perform the core tasks that are essential for the specific job very ineffectively; I use significantly more resources than typically required		I perform the core tasks that are essential for the specific job effectively; I use the amount of resources typically required		I perform the core tasks that are essential for the specific job highly effectively; I use significantly less resources than typically required	6
		1	2	3	4	5	
A6	Task performance reputation for adding value	I have a task performance reputation for undermining the success of the organization or unit		I generally have a satisfactory task performance reputation for contributing to the success of the organization or unit		I have an excellent task performance reputation for contributing to the success of the organization or unit	6
		1	2	3	4	5	
A7	Stick to the task role instruction	I fail to stick to the task roles prescribed by the job description		I generally stick to the task roles prescribed by the job description		I fully stick to the task roles prescribed by the job description	6
		1	2	3	4	5	
A8	Objectives	I don't always achieve my personal work objectives		I normally achieve my personal work objectives		I always achieve my personal work objectives	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/ Unwilling to rate 6
B	**EXERTING EFFORT: The extent to which the employee devotes constant attention towards his work, uses resources like time and care spend in order to be effective on the job, shows willingness to keep working under detrimental conditions and spends the extra effort required for the task.**						
B1	Time	I regularly work less hours than required		I regularly work the required hours, rarely less, seldom more		I regularly work longer hours than required	6
		1	2	3	4	5	
B2	Care	I tend to be negligent; my work needs a lot of correction		I give reasonable attention to detail; but my work often still needs some correction		I give a lot of attention to detail; my work needs almost no correction	6
		1	2	3	4	5	
B3	Perseverance	When circumstances get tough, I give up		I keep going as long as the circumstances are reasonably good		When the circumstances are tough, I keep going	6
		1	2	3	4	5	
B4	Effort	I can be counted on not to exert extra effort if the task would need it		I sometimes would exert extra effort if the task would need it but not always		I can be counted on to exert extra effort if the task would need it	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/Unwilling to rate 6
B5	Commitment	I show a lack of commitment to my work		I am neither uncommitted nor really committed		I show passionate commitment to my work	6
		1	2	3	4	5	
B6	Energy Investment	I invest very little energy in my work		I invest only the energy that is necessary to get the job done		I invest more energy than is necessary in my work	6
		1	2	3	4	5	
B7	Dedication	I demonstrate no dedication to work		I demonstrate some dedication to work		I demonstrate high dedication to work	6
		1	2	3	4	5	
B8	Tenacity	I always give up when facing challenges		I sometimes give up when facing challenges		I never give up when facing challenges	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/ Unwilling to rate 6
C	**ADAPTABILITY: The extent to which the employee adapts and responds effectively in situations where change is unavoidable, manages pressure effectively and copes well with setbacks, shows willingness to change his/her schedules in order to accommodate demands at work.**						
C1	Change	I resist change		I adapt to change		I welcome and embrace change	6
		1	2	3	4	5	
C2	Adaptation	I fail to keep up with most new developments in my field		I stay up to date with most new developments in my field		I initiate new developments in my field	6
		1	2	3	4	5	
C3	Setbacks	I continue with the original plan when initial attempts fail to produce the desired effect		I initially continue with the original plan when initial attempt fails to produce the desire effect but eventually attempts alternative solutions		I seek innovative alternative solutions when initial attempt fails to produce the desire effect	6
		1	2	3	4	5	
C4	Change in plans	I am upset and confused by unexpected change in plans		I am not upset and remain composed by unexpected change in plans		I enjoy the challenges brought by unexpected change in plans	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/Unwilling to rate 6
C5	Work Schedule	I resist changing my schedule in order to accommodate demands at work		I change my schedule in order to accommodate demands at work		I willingly, without bitterness, change my schedule in order to accommodate demands at work	6
		1	2	3	4	5	
C6	Pressure	My performance worsens when I have to work under pressure		I succeed in maintaining performance when I have to work under pressure		My performance excels when I have to work under pressure	6
		1	2	3	4	5	
C7	Prior notice	I dislike it when I am not informed well ahead of time of plans		I do not mind if I only learn about plans at the last moment		I enjoy it if I only learn about plans at the last moment	6
		1	2	3	4	5	
C8	Openness	I insist that things should be done the way they have always been done		I do not insist that things should be done the way they have always been done		I insist that things cannot forever be done the way they have always been done	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/ Unwilling to rate 6
D	**INNOVATING: The extent to which the employee displays creativity, not only in his/her individual job, but also on behalf of the whole organisation, shows openness to new ideas and experiences, handles novel situations and problems with innovation and creativity, thinks broadly and strategically, supports and drives organisational change.**						
D1	Creativity	I consistently display a lack of imagination, originality and inventiveness, not only in my individual job, but also on behalf of the whole organisation		I display some originality, inventiveness and creativeness, not only in my individual job but also on behalf of the whole organisation		I consistently display exceptional originality, inventiveness and creativeness, not only in my individual job but also on behalf of the whole organisation	6
		1	2	3	4	5	
D2	Openness	I consistently resist and attempt to avoid new ideas and experiences		I am open to new ideas and experiences		I consistently search for, investigate and explore new ideas and experiences	6
		1	2	3	4	5	
D3	New problems	I consistently try to fit inappropriate existing solutions to new problems		I sometimes find innovative and creative solutions to new problems		I sometimes find innovative and creative solutions to new problems	6
		1	2	3	4	5	
D4	Change	I almost never suggest ways of improving the way work is done; I am content with the way things are done		I regularly suggest ways of improving the way work is done		I continuously suggest innovative and creative ways of improving the way work is done	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/Unwilling to rate 6
D5	Open-mindedness	I consistently think narrowly, short-term and operationally		I sometimes think broadly, long-term and strategically		I consistently think broadly, long-term and strategically	6
		1	2	3	4	5	
D6	Brainstorm-Ing	I consistently come up with only a limited range of obvious and unimaginative alternatives		I sometimes come up with some unusual but thought-provoking alternatives		I consistently come up with a broad range of unusual but thought-provoking alternatives	6
		1	2	3	4	5	
D7	Exploration	I almost never explore unfamiliar terrain to identify new business opportunities		I occasionally explore unfamiliar terrain to identify new business opportunities		I regularly explore unfamiliar terrain to identify “white space/blue ocean” business opportunities	6
		1	2	3	4	5	
D8	Improvement	I almost never reflect on possible ways of improving the way work is done		I sometimes reflect on possible ways of improving the way work is done		I continuously reflect on possible ways of improving the way work is done	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/ Unwilling to rate 6
E	**LEADERSHIP POTENTIAL: The extent to which the employee spontaneously empowers others, brings out extra performance in other employees, supports peers, helps them with challenges they face, motivates and inspires other employees, models appropriate behaviour, initiates action, provides direction and takes responsibility. The extent to which the employee spontaneously acts as de facto leader without actually occupying a formal leadership position.**						
E1	Empower colleagues	I almost never spontaneously help colleagues to develop their strengths and improve their weaknesses, facilitate the personal growth of colleagues and promote continuous learning		I occasionally spontaneously help colleagues to develop their strengths and improve their weaknesses, facilitate the personal growth of colleagues and promote continuous learning		I consistently spontaneously help colleagues to develop their strengths and improve their weaknesses, facilitate the personal growth of colleagues and promote continuous learning	6
		1	2	3	4	5	
E2	Supports colleagues	I almost never spontaneously show concern for the wellbeing of colleagues and for the ambitions, needs and feelings of others		I occasionally spontaneously show concern for the wellbeing of colleagues and for the ambitions, needs and feelings of others		I consistently spontaneously show concern for the wellbeing of colleagues and for the ambitions, needs and feelings of other	6
		1	2	3	4	5	
E3	Extra performance	I almost never spontaneously motivate colleagues to go the extra mile and to improve their performance		I occasionally spontaneously motivate colleagues to go the extra mile and to improve their performance		I consistently spontaneously motivate colleagues to go the extra mile and to improve their performances	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/Unwilling to rate 6
E4	Inspires	I almost never spontaneously inspire colleagues to buy into a vision for the organisational unit I form part of		I sometimes spontaneously inspire colleagues to buy into a vision for the organisational unit I form part of		I regularly spontaneously inspire colleagues to buy into a coherent vision for the organisational unit I form part of	6
		1	2	3	4	5	
E5	Provides direction	I almost never spontaneously provide direction when colleagues are uncertain on how to proceed and bring clarity when confusion reigns		I sometimes spontaneously provide direction when colleagues are uncertain on how to proceed and bring clarity when confusion reigns		I regularly spontaneously provide direction when colleagues are uncertain on how to proceed and bring clarity when confusion reigns	6
		1	2	3	4	5	
E6	Visioning	I almost never spontaneously communicate any vision for the organisational unit I form part of		I sometimes spontaneously communicate a vision for the organisational unit I form part of		I regularly spontaneously communicate a coherent vision for the organisational unit I form part of	6
		1	2	3	4	5	
E7	Serves as role models	Almost no colleague regards me as a role model worth imitating		I am generally regarded by colleagues as a role model worth imitating		I am almost without exception regarded by colleagues as a role model worth imitating	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/Unwilling to rate 6
E8	Informal leader	I never spontaneously act as an informal leader amongst colleagues and I am not regarded by colleagues as such		I often spontaneously act as an informal leader amongst colleagues and I am generally accepted by colleagues as such		I continuously spontaneously act as an informal leader amongst colleagues and I am unanimously accepted by colleagues as such	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/ Unwilling to rate 6
F	**COMMUNICATION: The degree to which the employee communicates well in writing and orally, networks effectively, successfully persuades and influences others, relates to others in a confident and relaxed manner.**						
F1	Written communicati on	I always produce poorly worded written documents, memorandums and letters		Sometimes I produce sophisticatedly and eloquently worded written documents, memorandums and letters		I consistently produce sophisticatedly and eloquently worded written documents, memorandums and letters	6
		1	2	3	4	5	
F2	Written communicati on	I consistently produce unnecessary complicated, confusing, poorly structured written documents, memorandums and letters		I often produce clear, easily comprehensible, well-structured written documents, memorandums and letters		I consistently produce clear, easily comprehensible, well-structured written documents, memorandums and letters	6
		1	2	3	4	5	
F3	Verbal communicati on	I consistently formulate poorly worded comments, explanations and arguments		I often formulate sophisticatedly and eloquently worded comments, explanations and arguments		I consistently formulate sophisticatedly and eloquently worded comments, explanations and arguments	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/Unwilling to rate 6
F4	Verbal communication	I consistently formulate confusing, poorly structured comments, explanations and arguments		I often formulate clear, easily comprehensible, well-structured comments, explanations and arguments		I consistently formulate clear, easily comprehensible, well-structured comments, explanations and arguments	6
		1	2	3	4	5	
F5	Networking	I have developed and successfully maintained only a small network of work-related contacts		I have developed and successfully maintains a reasonably large network of work-related contacts		I have developed and successfully maintains an extensive network of work-related contacts	6
		1	2	3	4	5	
F6	Networking	I do not use my network of contacts effectively to the advantage of the organisation		I use my network of contacts reasonably effectively to the advantage of the organisation		I use my network of contacts very effectively to the advantage of the organisation	6
		1	2	3	4	5	
F7	Persuasion	I am rather ineffective in persuading and influencing colleagues		I am reasonably effective in persuading and influencing colleagues		I am very effective in persuading and influencing colleagues	6
		1	2	3	4	5	

F8	Body Language	I am seen by almost all of my colleagues as an unapproachable, tense, difficult-to-talk to person		I am seen by most of my colleagues as a friendly, relaxed, easy-to-talk-to person		I am seen by almost all of my colleagues as a friendly, relaxed, easy-to-talk to person	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/ Unwilling to rate 6
G	**INTERPERSONAL RELATIONS: The extent to which the employee relates well with others, interacts on a social level with colleagues and gets along with other employees, displays pro-social behaviours, cooperates and collaborates with colleagues, displays solidarity with colleagues, supports others, shows respect and positive regard for colleagues, acts in a consistent manner with clear personal values that compliment those of the organization.**						
G1	Relationships	I maintain negative relationships with almost all of my colleagues in the organisation		I maintain positive, pleasant relationships with most of my colleagues in the organisation		I maintain positive, friendly relationships with almost all of my colleagues in the organisation	6
		1	2	3	4	5	
G2	Social interaction	I almost never interact on a social level with my colleagues		I sometimes interact on a social level with my colleagues		I regularly interact on a social level with my colleagues	6
		1	2	3	4	5	
G3	Pro-social behaviour	I consistently display anti-social behaviour at work		I generally display pro-social behaviour at work		I always display pro-social behaviour at work	6
		1	2	3	4	5	
G4	Cooperates	I consistently cooperate and collaborate poorly with my colleagues in the organisation		I generally cooperate and collaborate well with my colleagues in the organisation		I consistently cooperate and collaborate well with my colleagues in the organisation	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/Unwilling to rate 6
G5	Respect	I consistently show a lack of respect and lack of positive regard when interacting with my colleagues at work		I generally show respect and positive regard when interacting with my colleagues at work		I consistently show respect and positive regard when interacting with my colleagues at work	6
		1	2	3	4	5	
G6	Solidarity	I consistently display discord with colleagues at work		I generally display unity with colleagues at work		I consistently display unity with colleagues at work	6
		1	2	3	4	5	
G7	Getting along	I get along with almost none of my colleagues in the organisation		I get along with most of my colleagues in the organisation		I get along with almost all of my colleagues in the organisation	6
		1	2	3	4	5	
G8	Values	I consistently fail to behave in a reliable, dependable manner with clear personal values that compliment those of the organisation		I generally behave in a reliable, dependable manner with clear personal values that compliment those of the organisation		I consistently behave in a reliable, dependable manner with clear personal values that compliment those of the organisation	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/ Unwilling to rate 6
H	**MANAGEMENT: The extent to which the employee plans ahead and works in a systematic and organised way, follows directions and procedures, articulates goals for his/her performance, organises workload, monitors progress, helps to solve problems and to overcome crises, effectively coordinates different work roles.**						
H1	Plans ahead	I consistently fail to plan ahead, and I am often caught unprepared		I generally plan ahead, and I am seldom caught unprepared		I consistently plan ahead, and I am never caught unprepared	6
		1	2	3	4	5	
H2	Works systematic-ally	I consistently approach my work in an unsystematic and disorganised manner		I generally approach my work in a systematic and organised manner		I consistently approach my work in a systematic and organised manner	6
		1	2	3	4	5	
H3	Organised work	I consistently fail to effectively organise my work load and consequently struggle to successfully meet all my work responsibilities		I generally effectively organise my work load so as to successfully meet all my work responsibilities		I consistently effectively organise my work load so as to successfully meet all my work responsibilities	6
		1	2	3	4	5	
H4	Follows procedure	I carelessly move away from prescribed work procedures		I generally stick to prescribed work procedures		I diligently stick to prescribed work procedures	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/Unwilling to rate 6
H5	Sets goals	I consistently fail to set any specific, challenging performance goals for myself		I generally set performance goals for myself		I consistently set specific, challenging performance goals for myself	6
		1	2	3	4	5	
H6	Monitors progress	I almost never monitor my progress towards achieving work goals		I generally monitor my progress towards achieving work goals		I consistently monitor my progress towards achieving work goals	6
		1	2	3	4	5	
H7	Coordinate work roles	I consistently fail to coordinate my different work roles		I generally succeed in coordinating my different work roles		I consistently succeed in coordinating my different work roles	6
		1	2	3	4	5	
H8	Problems	I consistently require somebody else to solve problems and crises related to my work		I generally solve problems and crises related to my work myself		I consistently solve problems and crises related to my work myself	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/ Unwilling to rate 6
I	**ANALYSING AND PROBLEM-SOLVING: The extent to which you apply analytical thinking in the job situation, identify the core issues in complex situations and problems, learns and utilises new technology, resolving problems in a logical and systematic way, behaves intelligently, making decisions by choosing the appropriate option from available information.**						
I1	Analytical thinking	I consistently fail to use analytic thinking at work to solve problems, to motivate my position in debates and to identify the appropriate course of action to take		I generally use analytic thinking at work to solve problems, to motivate my position in debates and to identify the appropriate course of action to take		I consistently use analytic thinking at work to solve problems, to motivate my position in debates and to identify the appropriate course of action to take	6
		1	2	3	4	5	
I2	Diagnostic thinking	I consistently attempt to solve problems without first attempting to diagnose the cause of the problem		I generally attempt to solve problems by first attempting to diagnose the cause of the problem		I consistently attempt to solve problems by first attempting to diagnose the cause of the problem	6
		1	2	3	4	5	
I3	Theorising	I almost never use logical theoretical arguments to arrive at solutions to problems		I generally use logical theoretical arguments to arrive at solutions to problems		I consistently use logical theoretical arguments to arrive at solutions to problems	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/Unwilling to rate 6
I4	Core issues	I consistently fail to identify the heart of the matter in complex situations and problems		I generally succeed in identifying the heart of the matter in complex situations and problems		I consistently succeed in identifying the heart of the matter in complex situations and problems	6
		1	2	3	4	5	
I5	Problem solving	I consistently attempt to solve problems at work in an illogical, disorganized way		I generally attempt to solve problems at work in a logical systematic way		I consistently attempt to solve problems at work in a logical systematic way	6
		1	2	3	4	5	
I6	Deductive decision-making	I consistently make decisions by illogically and emotionally choosing an option from available alternatives		I generally make decisions by logically choosing the appropriate option from available alternatives		I consistently make decisions by logically choosing the appropriate option from available alternatives	6
		1	2	3	4	5	
I7	Technology	I never learn and utilise new technology		I occasionally learn and utilise new technology		I continuously learn and utilise new technology	6
		1	2	3	4	5	
I8	Intelligence	I consistently come up with inappropriate solutions to problems		I generally come up with intelligent solutions to problems		I consistently come up with intelligent solutions to problems	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/ Unwilling to rate 6
J	**COUNTERPRODUCTIVE WORK BEHAVIOUR: The extent to which the employee displays behaviour that threatens the well-being of an organization, shows unwillingness to comply with organisational rules, interprets organisational expectations incorrectly, fails to maintain personal discipline, is absent from work, not punctual, steals, misuses drugs, displays confrontational attitudes towards co-workers, supervisors, and work itself, his/her behaviour hinders the accomplishment of organizational goals.**						
J1	Organisational well-being	I frequently display behaviour that threatens the well-being of the organisation		I occasionally display behaviour that promotes the well-being of the organisation		I frequently display behaviour that promotes the well-being of the organisation	6
		1	2	3	4	5	
J2	Organisation-al rules	I tend to disobey organisational rules and ignore procedures		I generally obey organisational rules and procedures		I diligently submit to organisational rules and procedures	6
		1	2	3	4	5	
J3	Personal discipline	I show poor personal discipline		I show reasonably good personal discipline		I show excellent personal discipline	6
		1	2	3	4	5	
J4	Instructions	I intentionally or through carelessness fail to execute lawful instructions		I generally execute lawful instructions		I diligently execute lawful instructions	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/Unwilling to rate 6
J5	Sexual harassment	I tend to treat members of the opposite sex with disrespect: I tend to abuse relationships		I generally treat members of the opposite sex with respect: I generally do not abuse relationships		At all times, I treat members of the opposite sex with respect: I do not abuse relationships with colleagues	6
		1	2	3	4	5	
J6	Theft	I tend to inappropriately use and/or take organisation property for myself		I generally avoid the inappropriate use and theft of organisation property		I carefully avoid the inappropriate use and theft of organisation property	6
		1	2	3	4	5	
J7	Substance abuse	Substance abuse tends to interfere with my performance at work		I generally avoid substance abuse at work		I am never guilty of substance abuse at work	6
		1	2	3	4	5	
J8	Bullying	I tend to bully colleagues at work		I generally avoid bullying colleagues at work		I never bully colleagues at work	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/ Unwilling to rate 6
K	**ORGANISATIONAL CITIZENSHIP BEHAVIOUR: The extent to which the employee displays voluntary behaviour contributing towards the overall effectiveness of the organization, volunteers to carry out task activities that are not formally part of his/her job description, follows organisational rules and procedures, endorses, supports, and defends organisational objectives, shows willingness to go the extra mile, voluntary helps colleagues with work, shows willingness to tolerate inconveniences and impositions of work without complaining, is actively constructively involved in organisational affairs.**						
K1	Helping behaviour	I very seldom help colleagues with work problems unless explicitly instructed to do so		I sometimes, help colleagues with work problems without being instructed to do so		I regularly help colleagues with work problems without being instructed to do so	6
		1	2	3	4	5	
K2	Sportsman-ship	I tend to complain and become negative when faced by unavoidable inconveniences and burdens arising from my work		I tolerate unavoidable inconveniences and burdens arising from my work		I maintain a positive attitude despite unavoidable inconveniences and burdens arising from my work	6
		1	2	3	4	5	
K3	Organisation-al loyalty	I criticise, oppose and attack the organisation in front of outsiders		I refrain from criticising, opposing and attacking the organisation in front of outsiders		I passionately endorse, support and defend the organisation to outsiders	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/Unwilling to rate 6
K4	Civic virtue	I show an unwillingness to actively participate in organisational governance and to look out for the organisations' best interests		I am willing but not really keen to participate in organisational governance and to look out for the organisation's best interests		I show a keen willingness to actively participate in organisational governance and to look out for the organisation's best interests	6
		1	2	3	4	5	
K5	Organisation-al compliance	I regularly fail to submit to organisational rules and procedures		I generally follow organisational rules and procedures		I follow organisational rules and procedures to the letter at all times	6
		1	2	3	4	5	
K6	Beyond call of duty	I only do what is expected of me. I refuse to go the extra mile		I am willing but not really keen to go beyond the call of duty and to go the extra mile		I always show a willingness to go beyond the call of duty and to go the extra mile	6
		1	2	3	4	5	
K7	General OCB	I almost never display voluntary behaviour that is not formally part of my job description that contributes towards the overall effectiveness of the organization		I sometimes display voluntary behaviour that is not formally part of my job description that contributes towards the overall effectiveness of the organization		I regularly display voluntary behaviour that is not formally part of my job description that contributes towards the overall effectiveness of the organization	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/Unwilling to rate 6
K8	Endorsement	I never actively endorse organisational objectives		I sometimes actively endorse organisational objectives		I always actively endorse organisational objectives	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/ Unwilling to rate 6
L	**SELF-DEVELOPMENT: The extent to which the employee takes responsibility for his/her own career development, works on the development of job relevant competency potential and seeks opportunities for self-development and career advancement.**						
L1	Responsibili-ty	I accept no responsibility for my own career development		I accept some responsibility for my own career development		I accept full responsibility for my own career development	6
		1	2	3	4	5	
L2	Opportunity	I allow most opportunities for self-development to pass me by		I utilise some opportunities for self-development but still allow too many valuable opportunities to pass me by		I make use of almost every available opportunity for self-development	6
		1	2	3	4	5	
L3	Development areas	I have no clear picture of the areas in which self-development is required		I have a basic idea of the areas in which self-development is required		I have a comprehensive understanding of the areas in which self-development is required	6
		1	2	3	4	5	
L4	Career objective	I have no clear picture of where my career is heading		I have a vague idea of where my career is heading		I have a clear, well-defined career path for the future	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/Unwilling to rate 6
L5	Career planning	I have no clear plans on how my career goals are to be achieved		I have vague plans on how my career goals are to be achieved		I have clear, well-defined plans on how my career goals are to be achieved	6
		1	2	3	4	5	
L6	Internal control	I passively accept how the organisation dictates that my career should unfold over time		I exercise limited control over the direction in which my career develops over time; I largely allow the organisation to determine matters		I exercise active control over the direction in which my career develops over time; I work in active partnership with the organisation	6
		1	2	3	4	5	
L7	Self-development	I do practically nothing to try to keep up with new developments in my field		I make some attempt to try to keep up with new developments in my field		I work diligently to keep up to date with new developments in my field	6
		1	2	3	4	5	
L8	Perspective	I assume that the organisation will facilitate career success		I vaguely sense that I have to be actively involved in career development to achieve career success		I clearly understand that I have to work in active partnership with the organisation to achieve career success	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/ Unwilling to rate 6
M	**EMPLOYEE GREEN BEHAVIOUR: Scalable actions and behaviours that employees engage in at work that are linked with and contribute to or detract from environmental sustainability.**						
M1	Avoiding harm	I do very little to avoid harm to the environment at work		I only do what is expected from me to avoid harm to the environment at work		I go beyond what is expected from me to avoid harm to the environment at work	6
		1	2	3	4	5	
M2	Conservation	I do practically nothing at work to conserve the environment		I make some attempt at work to conserve the environment		I work diligently at work to conserve the environment	6
		1	2	3	4	5	
M3	Working in a sustainable manner	I accept no responsibility to work in a sustainable manner		I accept some responsibility to work in a sustainable manner		I accept full responsibility to work in a sustainable manner	6
		1	2	3	4	5	
M4	Influencing behaviour	I very seldom influence colleagues at work regarding environmental sustainability		I sometimes influence colleagues at work regarding environmental sustainability		I regularly influence colleagues at work regarding environmental sustainability	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/Unwilling to rate 6
M5	Initiative	I almost never initiate environmental programmes and policies at work		I sometime initiate environmental programmes and policies at work		I regularly initiate environmental programmes and policies at work	6
		1	2	3	4	5	
M6	Recycling	I never make an effort to recycle at work		I sometimes make an effort to recycle at work		I always make an effort to recycle at work	6
		1	2	3	4	5	
M7	Educating	I never educate colleagues regarding environmental sustainability		I occasionally educate colleagues regarding environmental sustainability		I continuously educate colleagues regarding environmental sustainability	6
		1	2	3	4	5	
M8	Innovation	I almost never embrace innovation for sustainability at work		I sometimes embrace innovation for sustainability at work		I continuously embrace innovation for sustainability at work	6
		1	2	3	4	5	

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GOQ Instructions

INSTRUCTIONS

GENERIC OUTCOME QUESTIONNAIRE

INTRODUCTION

Performance is not only defined in terms of the observable behavioural actions that employees perform but also the outcomes that employees achieve through these actions. These outcomes are regarded as relevant because jobs exist to achieve specific outcomes. The outcomes are the result of underlying latent performance dimensions. This questionnaire attempts to assess the level of competence with which non-managerial personnel perform on these behavioural outcome dimensions. Your ratings along with those of other suitably qualified respondents will be combined to form an overall performance rating that will describe your work performance on each of the non-managerial outcome dimensions. That will assist you to come to a better understanding of your performance strengths and weaknesses and to identify avenues to improve performance on those dimensions on which you are currently underperforming.

INSTRUCTIONS

The Generic Outcome Questionnaire [GOQ] consists of 72 items measuring 9 latent outcome dimensions. You have been asked to evaluate yourself. Please read each item carefully and choose the appropriate response option (1-5) that best describes the standard of performance that you displayed over the past 12 months by choosing the specific outcomes referred to in the item that the employee typically achieves over the assessment period by selecting the corresponding scale value. **Please note** that you may make use of all 5 response options including those that have not been labelled.

EXAMPLE

In your response to item N1 you should indicate the quality of outputs that you displayed over the past 12 months by choosing the specific outcome that best describes the extent to which you delivered quality work results. If, for example, over the past 12 months the quality of your work was often questioned the response option 1 should be chosen. If, however, over the past 12 month it was very seldom that the quality of your work was questioned the response option 5 should be chosen. If, for example, over the past 12 months the extent to which you delivered quality work results was somewhere between sometimes the quality of my work is questioned and it is very seldom that the quality of my work is questioned the response option 4 should be chosen. The response option 6 (Cannot rate/Unwilling to rate) should be used as seldom as possible and only if you feel uncomfortable with the question or if have had insufficient opportunity to observe the specific outcome aspect the item refers to.

	Definitions	**Well below standard** **1**	**Below required standard** **2**	**Satisfactory** **3**	**Above required standard** **4**	**Well above standard** **5**	**Cannot Rate**
N	**QUALITY OF OUTPUTS: The degree to which the results of carrying out the job task approaches perfection, in terms of conforming to some set standard or fulfilling the activity's intended purpose**						
N1	Quality of work results	The quality of my work is often questioned		Sometimes the quality of my work is questioned		It is very seldom that the quality of my work is questioned	
		1	2	3	4	5	6

IMPORTANT

- Evaluate your performance on each outcome dimension according to its own merits. Please be honest, even if it means giving poor ratings
- The questionnaire is printed on both sides of the paper, please ensure that you answer all the questions

Continue to next page
Generic Outcome Questionnaire

GENERIC OUTCOME QUESTIONNAIRE

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/ Unwilling to rate 6
N	**QUALITY OF OUTPUTS: The degree to which the results of carrying out the job task approaches perfection, in terms of conforming to some set standard or fulfilling the activity's intended purpose.**						
N1	Quality of work results	The quality of my work is often questioned		Sometimes the quality of my work is questioned		It is very seldom that the quality of my work is questioned	6
		1	2	3	4	5	
N2	Fulfilling intended purpose	I seldom fulfil the intended purpose of my activities		I normally fulfil the intended purpose of my activities		I always fulfil the intended purpose of my activities	6
		1	2	3	4	5	
N3	Achievement of quality standards	I consistently fail to achieve the quality standards required of me		I sometimes achieve the quality of standards required of me		I consistently achieve the quality standards required of me	6
		1	2	3	4	5	
N4	Accomplishment of quality standards	I fail to accomplish the required quality standards of work		I generally accomplish the required quality standards of work		I fully accomplish the required quality standards of work	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/Unwilling to rate 6
N5	Doing work over	I am often required to redone work that was not done properly the first-time round		I sometimes have to redo work that was not done properly the first-time round		I seldom if ever have to redo work that was not done properly the first-time round	6
		1	2	3	4	5	
N6	Mistakes	I often make mistakes at work		I seldom make mistakes at work		I seldom if ever make mistakes at work	6
		1	2	3	4	5	
N7	Supervisory feedback	My supervisor often finds fault with my work output		My supervisor seldom finds fault with my work output		My supervisor seldom if ever finds mistakes in my work output	6
		1	2	3	4	5	
N8	Quality benchmark	The quality of my work output is regarded as in need of improvement		The quality of my work output is regarded to be on par with what is expected of a satisfactory worker		The quality of my work output is regarded as better than those of most of my colleagues	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/ Unwilling to rate 6
O	**QUANTITY OF OUTPUTS: The amount produced, expressed in such terms as dollar value, number of units, or number of completed activity cycles.**						
O1	Produce	I almost never produce the quantity of outputs demanded of me		I generally produce the quantity of outputs demanded of me		I consistently produce the quantity of outputs demanded of me	6
		1	2	3	4	5	
O2	Attainment of quantity standards	I consistently attain the quantity of outputs expected from me		I generally attain the quantity of outputs expected of me		I consistently attain the quantity of outputs expected of me	6
		1	2	3	4	5	
O3	Performance standards	I frequently fail to achieve the set performance standards in terms of quantity of output required		I from time to time fail to meet the performance standards set in terms of quantity		I almost always meet the performance standards set in terms of quantity of output	6
		1	2	3	4	5	
O4	Assistance	I frequently have to be helped to get the work done that is expected of me		I sometimes need assistance to get the work expected of me completed		I seldom if ever need assistance to get the work expected of me completed	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/Unwilling to rate 6
O5	Performance appraisal	During performance appraisal feedback sessions, I have been frequently criticised for the quantity of my work output		During performance appraisal feedback sessions, I have been occasionally criticised for the quantity of my work output		During performance appraisal feedback sessions, I have been very seldom if ever criticised for the quantity of my work output	6
		1	2	3	4	5	
O6	Performance targets	I almost never achieve performance targets that have set specific quantity expectations		I occasionally achieve performance targets that have set specific quantity expectations		I almost always achieve performance targets that have set specific quantity expectations	6
		1	2	3	4	5	
O7	Backlog	I frequently have backlogs that I need to catch up on		I occasionally have backlogs that I need to catch up on		I almost never have backlogs that I need to catch up on	6
		1	2	3	4	5	
O8	Criticism	I regularly get criticized for the quantity of my outputs		I sometimes get criticized for the quantity of my outputs		I never get criticized for the quantity of my outputs	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/ Unwilling to rate 6
P	**TIMELINESS: The degree to which an activity is completed, or a result produced, at the earliest time desirable from standpoints of both coordinating with the outputs of others and maximising the time available for other activities**						
P1	On time	I never complete my outputs on time		I occasionally complete my outputs on time		I continuously complete my outputs on time	6
		1	2	3	4	5	
P2	Timeliness	My work is typically completed at the last moment		My projects are typically completed with a little bit of time to spare but not very much		My work is typically completed with lots of time to spare	6
		1	2	3	4	5	
P3	Delay	I frequently cause delays in the completion of work in my work unit		I occasionally cause delays in the completion of work in my work unit		I seldom if ever cause delays in the completion of work in my work unit	6
		1	2	3	4	5	
P4	Performance appraisal	During performance appraisal time management is often raised as a development area		During performance appraisal time management is occasionally raised as a development area		During performance appraisal time management is seldom if ever raised as a development area	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/Unwilling to rate 6
P5	Co-worker frustration	My co-workers are frequently frustrated because I am late in completing my work		My co-workers are occasionally frustrated because I am late in completing my work		My co-workers are seldom if ever frustrated with me because I am late with my work	6
		1	2	3	4	5	
P6	Holding up work	I frequently hold my co-workers back because I am slow in completing a task		I occasionally hold my co-workers back because I am slow in completing a task		I seldom if ever hold my co-workers back because I am slow in completing a task	6
		1	2	3	4	5	
P7	Reminders	I frequently have to be reminded to complete a task		I occasionally have to be reminded to complete a task		I seldom if ever have to be reminded to complete a task	6
		1	2	3	4	5	
P8	Delays	I frequently cause delays in the completion of tasks and projects		I occasionally cause delays in the completion of tasks and projects		I seldom if ever cause delays in the completion of tasks and projects	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/ Unwilling to rate 6
Q	**COST-EFFECTIVENESS: The degree to which the use of the organisation's resources (e.g., human, monetary, technological, material) is maximised in the sense of getting the highest gain or reduction in loss from each unit or instance of use of a resource.**						
Q1	Efficient	I always use resources in the least efficient way		I sometimes use resources in the most efficient way		I consistently use resources in the most efficient way	6
		1	2	3	4	5	
Q2	Maximise	I never try to maximize my organisation's resources		I often try to maximize my organisation's resources		I consistently try to maximize my organisation's resources	6
		1	2	3	4	5	
Q3	Best use of	I do not make the best of the resources available to me		I normally make the best use of the resources available to me		I always make the best use of the resources available to me	6
		1	2	3	4	5	
Q4	Fruitful	I do not use resources in a fruitful manner		I sometimes use resources in a fruitful manner		I continuously use resources in a fruitful manner	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/Unwilling to rate 6
Q5	Economical	I am consistently uneconomical when using resources		I am generally economical when using resources		I am always economical when using resources	6
		1	2	3	4	5	
Q6	Effective	I consistently fail to make effective use available of resources		I normally make effective use of available resources		I consistently make effective use of available resources	6
		1	2	3	4	5	
Q7	Wasteful	I am always wasteful with the resources at my disposal		I am sometimes wasteful with the resources at my disposal		I am never wasteful with the resources at my disposal	6
		1	2	3	4	5	
Q8	Profligate	I am always recklessly wasteful with resources		Sometimes I am recklessly wasteful with resources		I am never recklessly wasteful with resources	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/ Unwilling to rate 6
R	**NEED FOR SUPERVISION: The degree to which an employee carries out his/her job functions without either having to request supervisory assistance or requiring supervisory intervention to prevent an adverse outcome.**						
R1	Direction	I always need direction when completing tasks		I sometimes need direction when completing tasks		I never need direction when completing tasks	6
		1	2	3	4	5	
R2	Control	I never assume full control when completing tasks		I sometimes assume full control when completing tasks		I always assume full control when completing tasks	6
		1	2	3	4	5	
R3	Guidance	I consistently need guidance to achieve results		I sometimes need guidance to produce results		I do not need guidance to produce results	6
		1	2	3	4	5	
R4	Manage	I consistently need to be managed to complete my job tasks		I generally don't need to be managed to complete my job tasks		I consistently complete my job tasks without management	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/Unwilling to rate 6
R5	Initiative	I seldom use my own initiative when completing my job functions		I sometimes use my own initiative when completing my job functions		I always use my own initiative when completing my job functions	6
		1	2	3	4	5	
R6	Oversight	I always need oversight from a superior when completing my job tasks		I sometimes need oversight from a superior when completing my job tasks		I never need oversight from a superior to complete my job tasks	6
		1	2	3	4	5	
R7	Regulate	I always need to be regulated to perform my job function		I sometimes need to be regulated to perform my job function		I do not need to be regulated in order to perform my job function	6
		1	2	3	4	5	
R8	Intervene	I always need intervention from a superior to carry out my job functions		I generally need intervention from superior to carry out my job functions		I never need intervention from my superiors to carry out my job functions	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/ Unwilling to rate 6
S	**INTERPERSONAL IMPACT: The degree to which an employee promotes feelings of self-esteem, harmony, trust, goodwill, and cooperativeness among co-workers and subordinates.**						
S1	Social impact	I don't always have a positive social impact on my colleagues		I generally have a positive social impact on my colleagues		I always have a positive social impact on my colleagues	6
		1	2	3	4	5	
S2	Influence	I am not always a constructive interpersonal influence on my colleagues		I am normally a constructive interpersonal influence on my colleagues		I am always a constructive interpersonal influence on my colleagues	6
		1	2	3	4	5	
S3	Work group atmosphere	I am partly responsible for the negative atmosphere in my work group		I do not really influence the atmosphere in my work group		I am partly responsible for the positive atmosphere in my work group	6
		1	2	3	4	5	
S4	Trouble maker	I frequently cause trouble in my work group		I do occasionally cause trouble in my work group		I seldom if ever cause trouble in my work group	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/Unwilling to rate 6
S5	Team spirit	I am partly responsible for the negative team spirit in my work group		I do not really influence the team spirit in my work group		I am partly responsible for the positive team spirit in my work group	6
		1	2	3	4	5	
S6	Promote	I regularly do not promote positive interpersonal interactions at work		I sometimes promote positive interpersonal interactions at work		I regularly promote positive interpersonal interactions at work	6
		1	2	3	4	5	
S7	Encourage	I never encourage positive interpersonal interactions at work		I sometimes encourage positive interpersonal interactions at work		I always encourage positive interpersonal interactions at work	6
		1	2	3	4	5	
S8	Trust	I am partly responsible for the low level of interpersonal trust that exists in our work group		I do not really affect the level of interpersonal trust that exists in our work group		I am partly responsible for the high level of interpersonal trust that exists in our work group	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/ Unwilling to rate 6
T	**CUSTOMER SATISFACTION: The degree to which the product or service meets the expectations of your customers. The term customer not only refers to external consumers but also to individuals internal to the organisation that use the service or product produced by the employee being rated.**						
T1	Customer experience	Most of the time customers do not enjoy their experience with me		Generally, customers enjoy their experience with me		Most of the time customers enjoy their experience with me	6
		1	2	3	4	5	
T2	Fulfilment of customers' needs	I almost never fulfil my customers' needs		I regularly fulfil my customers' needs		I consistently fulfil my customers' needs	6
		1	2	3	4	5	
T3	Service	Customers are never satisfied with my service/product		Customers are normally satisfied with my service/product		Customers are always satisfied with my service/product	6
		1	2	3	4	5	
T4	Meeting expectations	I consistently do not meet customers' expectations		I sometimes meet customers’ expectations		I consistently meet customers’ expectations	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/Unwilling to rate 6
T5	Customer satisfaction	My customers almost always are unhappy about my service or product offering		My customers occasionally are unhappy about my service or product offering		My customers almost always are happy about my service or product offering	6
		1	2	3	4	5	
T6	Customer confidence	I consistently break down customer confidence		I occasionally build customer confidence		I consistently build customer confidence	6
		1	2	3	4	5	
T7	Create	I almost never create value for customers		I sometimes create value for customers		I always create value for customers	6
		1	2	3	4	5	
T8	Mistakes	I always make mistakes when helping customers		I sometimes make mistakes when helping customers		I never make mistakes when helping customers	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/ Unwilling to rate 6
U	**ENVIRONMENTAL IMPACT: The impact on the environment by the employee via the creation of a product or the delivery of a service**						
U1	Footprint	I never attempt to minimise my environmental footprint when delivering goods or services		I sometimes attempt to minimise my environmental footprint when delivering products or services		I always attempt to minimise my environmental footprint when delivering products or services	6
		1	2	3	4	5	
U2	Impact	I never attempt to minimise my impact on the environment when doing my job		I normally attempt to minimise my impact on the environment when doing my job		I always attempt to minimise my impact on the environment when doing my job	6
		1	2	3	4	5	
U3	Conserving	I almost never attempt to minimise waste with the aim of preserving resources		I sometimes attempt to minimise waste with the aim of preserving resources		I always attempt to minimise waste with the aim of preserving resources	6
		1	2	3	4	5	
U4	Monitoring environment-al impact	I almost never monitor the impact that the manner in which I perform my work has on the environment		I sometimes monitor the impact that the manner in which I perform my work has on the environment		I always monitor the impact that the manner in which I perform my work has on the environment	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/Unwilling to rate 6
U5	Sustainability	I do not attempt to change and adapt the manner in which I produce products and services to enhance sustainability		I regularly attempt to change and adapt the manner in which I produce products and services to enhance sustainability		I always attempt to change and adapt the manner in which I produce products and services to enhance sustainability	6
		1	2	3	4	5	
U6	Harm	I almost never attempt to reduce the negative impact of my activities on the environment		I sometimes attempt to reduce the negative impact of my activities on the environment		I always attempt to reduce the negative impact of my activities on the environment	6
		1	2	3	4	5	
U7	Influencing others	I almost never attempt to influence the green behaviour of my colleagues		I sometimes attempt to influence the green behaviour of my colleagues		I always attempt to influence the green behaviour of my colleagues	6
		1	2	3	4	5	
U8	Lobbying and activism	I almost never urge my colleagues to display green behaviour at work		I sometimes urge my colleagues to display green behaviour at work		I always urge my colleagues to display green behaviour at work	6
		1	2	3	4	5	

	Definitions	Well below standard 1	Below required standard 2	Satisfactory 3	Above required standard 4	Well above standard 5	Cannot rate/ Unwilling to rate 6
V	**MARKET REPUTATION: The extent to which an employee is perceived by co-workers, superiors and customers in terms of the quality and quantity of his/her work, his/her contribution to the overall competitiveness of the organisation as extraordinary and held in high esteem.**						
V1	Quality and quantity of work	Co-workers, superiors and customers are never impressed by the quality and quantity of my work		Co-workers, superiors and customers are normally impressed by the quality and quantity of my work		Co-workers, superiors and customers are always impressed by the quality and quantity of my work	6
		1	2	3	4	5	
V2	Market reputation: Co-worker	When my colleagues are asked to think of an excellent worker, they almost never refer to me		When my colleagues are asked to think of an excellent worker, they occasionally refer to me		When my colleagues are asked to think of an excellent worker, they almost always refer to me	6
		1	2	3	4	5	
V3	Market reputation: Customers	Customers seldom if ever seek out my services because of word of mouth testimony or because of satisfactory personal experience		Some customers occasionally seek out my services because of word of mouth testimony or because of satisfactory personal experience		Customers regularly seek out my services because of word of mouth testimony or because of satisfactory personal experience	6
		1	2	3	4	5	
V4	Value-add	My co-workers never feel I add value to the team		My co-workers occasionally feel I add value to the team		My co-workers always feel I add value to the team.	6
		1	2	3	4	5	

	Definitions	**Well below standard** **1**	**Below required standard** **2**	**Satisfactory** **3**	**Above required standard** **4**	**Well above standard** **5**	**Cannot rate/Unwilling to rate** **6**
V5	Trust	My superiors never expect me to deliver excellent work		My superiors generally expect me to deliver excellent work		My superiors always expect me to deliver excellent work	6
		1	2	3	4	5	
V6	Faith	My co-workers and superior never have faith in me to deliver when it counts		My co-workers and superior normally have faith in me to deliver when it counts		My co-workers and superior always have faith in me to deliver when it counts	6
		1	2	3	4	5	
V7	Market standing	Co-workers, superiors and customers do not regard me as a high performer		Co-workers, superiors and customers might regard me as a high performer		Co-workers, superiors and customers regard me as a high performer	6
		1	2	3	4	5	
V8	Status	I am not seen as someone who delivers high quality work		I am might be seen as someone who delivers high quality work		I am seen as someone who delivers high quality work	6
		1	2	3	4	5	

APPENDIX B

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jou kennisvennoot • your knowledge partner

INSTITUTIONAL PERMISSION TO PARTICIPATE IN RESEARCH

THE DEVELOPMENT AND EVALUATION OF A GENERIC INDIVIDUAL NON-MANAGERIAL PERFORMANCE MEASURE

To whom it may concern

Letter requesting permission for a research study to be conducted within your organisation.

The purpose of this letter is to kindly ask your organisation to partake in a research study conducted by Philip Botes, a master's student in Industrial Psychology at Stellenbosch University. The purpose of this research study is to develop a generic South African performance measure that could be used to obtain information on non-managerial, individual performance and to validate the performance measure. Such a generic performance measure would allow the development of a comprehensive non-managerial performance model.

Developing and testing comprehensive generic performance models will provide practitioners with credible information on the determinants of performance and how they influence decision making and will provide a sound foundation to build future performance theory. We hereby request permission to conduct our research within your organisation. The Generic Performance Questionnaire and the Generic Outcome Questionnaire will be administered for the purpose of the study.

If your organisation would agree to participate in the research, a pen-and-paper version of the questionnaire will be distributed to the employees. After the employees have completed the questionnaires the questionnaires will be thrown into a box that will be collected by Philip Botes. The questionnaire will take approximately 40 minutes to complete. Participants can choose whether to be in this study or not. If they volunteer to be in this study, they may withdraw at any time without consequences of any kind. Participants are not waiving any legal claims, rights or remedies because of your participation in this research study.

Neither the organisation, nor participants will receive any payment for participating in this study. Participants in the study will however be eligible to enter in a lucky draw in order to increase the response rate. Participants will be eligible for a R 3000.00 cash prize once they have completed the entire questionnaire. On the last page of questionnaire there will be an information slip where employees can share their cell phone number in order to be eligible for the lucky draw prize. The information slip will be separated from the questionnaire once the questionnaire has been inspected. The responses to the two questionnaires cannot be linked. One individual will be randomly selected from those that completed the second questionnaire. The winner will be contacted via an SMS message. There are no foreseeable risks or discomforts associated with completing this study. This study will only require employees' time and energy.

Any information that is obtained in connection with this study and that can be identified with participants will remain confidential and will be disclosed only with their permission or as required by law. Confidentiality will be maintained by means of restricting access to data to the researchers (Philip Botes and Professor Callie Theron). The data will be stored on a password-protected computer. Only aggregate statistics of the sample will be reported. The identity of the participants will never be revealed. The identity of the participating organisation will also not be revealed.

If you are willing to assist with our research please reply to either Philip Botes (philip@psymetric.co.za), Professor Callie Theron of the Department of Industrial Psychology of Stellenbosch University (ccth@sun.ac.za).

Kind regards,
Philip Botes & Prof Callie Theron

I _____________________________ [name of organisational representative] hereby give institutional permission for Philip Botes and Prof Callie Theron to conduct their research study at _____________________________ [name of organisation] in accordance with the research proposal that was submitted. If the research will substantially deviate from the undertaking given in the research proposal the undersigned will be informed.

Signature: ______________________________ Date: ____________________________

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Developing and testing comprehensive generic performance models will provide practitioners with credible information on the determinants of performance and how they influence decision making and will provide a sound foundation to build future performance theory. We hereby request permission to conduct our research within your organisation. The Generic Performance Questionnaire and the Generic Outcome Questionnaire will be administered for the purpose of the study, via the Stellenbosch University web-based e-Survey service.

If your organisation would agree to participate in the research, I will forward you an email with a link to the online questionnaire. I will then kindly ask you to please forward it to as many non-managerial employees in your organisation as possible. To be clear, a non-managerial job refers to any position that has no formal managerial responsibilities towards subordinates. The questionnaire will take approximately 40 minutes to complete. Participants can choose whether to be in this study or not. If they volunteer to be in this study, they may withdraw at any time without consequences of any kind. Participants are not waiving any legal claims, rights or remedies because of your participation in this research study.

Neither the organisation, nor participants will receive any payment for participating in this study. Participants in the study will however be eligible to enter in a lucky draw in order to increase the response rate. Participants will be eligible for a R 3000.00 cash prize once they have completed the entire survey. At the end of the survey you will be given the option to click on an electronic link that will take you to a second, independent survey that will ask for your cell phone number. Responses to the two surveys cannot be linked. One individual will be randomly selected from those that completed the second survey. The winner will be contacted via an SMS message. There are no foreseeable risks or discomforts associated with completing this study. This study will only require employees' time and energy.

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Signature: ________________________________ Date: ______________________________