THE DEVELOPMENT AND EMPIRICAL EVALUTION OF A COMPREHENSIVE LEADERSHIP - UNIT PERFORMANCE STRUCTURAL MODEL

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Thesis presented in partial fulfilment of the requirements for the degree of Master of Commerce in the Faculty of Economic and Management Sciences at Stellenbosch University

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March 2013

DECLARATION

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ABSTRACT

Organisations cannot exist without humans. The behaviour of the working man is not a random event and specific factors influence employees to excel. Not only is the behaviour of individual employees influenced by these factors, but the behaviour of a collective work unit as well. This study focuses on the impact of specific leadership competencies on the performance of the collective work unit within an organisation.

A leader exerts pressure on a unit to perform. What leadership competencies lead to successful work unit performance? To answer this question in a valid and credible manner, the study focuses on the development of a structural model to indicate the relationship between leadership competencies and work unit performance.

The leadership-for-performance framework designed by Spangenberg and Theron (2004) aspires to explicate the structural relationship existing between leader competencies and the dimensions of organisational unit performance. The Performance Index (PI) and the Leadership Behavioural Inventory (LBI) comprise the leadership-for-performance range of measures. The PI was developed as a comprehensive criterion measure of unit performance for which the unit leader could be held responsible. The basic PI structural model has been developed to explain the manner in which the various latent leadership dimensions measured by the LBI affect the eight unit performance latent variables that are assessed by the PI. As part of ongoing research of the leadership-for-performance range of measures designed by Spangenberg and Theron (2004), this study takes the initial steps towards establishing a comprehensive leadership-work unit performance structural model.

The literature review aids in developing a logical argument that culminates in a complex hypothesis about the way work unit performance is influenced by leadership dimensions.

The research methodology is then discussed. The results indicate that the proposed structural model fits the data quite well. Although the majority of the structural relationships between the unit performance dimensions received support, almost no support was found for the postulated structural relationships between the second-order leadership competencies and the unit performance dimensions.

Additionally, suggestions for future research are made by indicating how the model can be elaborated and improved.

OPSOMMING

Organisasies kan nie sonder mense bestaan nie. Die gedrag van werknemers in ‘n organisasie is nie ‘n toevallige gebeurtenis nie. Spesifieke faktore beïnvloed werknemers om te presteer. Nie net die gedrag van individuele werknemers word beïnvloed deur hierdie faktore nie, maar ook die gedrag van ‘n kollektiewe werkseenheid. Hierdie studie fokus op die invloed wat spesifieke leierbevoegdhede het op die prestasie van die kollektiewe werkseenheid binne ‘n organisasie.

‘n Leier oefen druk uit op sy werkseenheid om te presteer. Watter leiersbevoegdhede lei tot suksesvolle werkseenheidprestasie? Om hierdie vraag geldig en geloofwaardig te beantwoord, is die studie gerig op die ontwikkeling van ‘n strukturele model wat die verwantskap tussen leierskapgedrag en werkseenheidprestasie verduidelik.

Die leierskap-vir-prestasie raamwerk ontwerp deur Spangenberg en Theron (2004), streef daarna om die strukturele verwantskap wat tussen leierbevoegdhede en die dimensies van organisatoriese eenheid prestasie bestaan, te verklaar. Die leierskap-vir-prestasie-reeks bestaan uit die The Performance Index (PI) en die Leadership Behavioural Inventory (LBI). Die PI is ontwikkel as 'n omvattende maatstaf van eenheid-prestasie waarvoor die leier van die eenheid verantwoordelik gehou kon word. Die basiese PI strukturele model is ontwikkel om die wyse waarop die verskillende latente leierskapdimensies, gemeet deur die LBI, invloed uitoefen op die agt eenheid-prestasie latente veranderlikes, wat deur die PI geassesseer word, te verduidelik. As deel van deurlopende navorsing van die leierskap-vir-prestasie reeks, soos ontwerp deur Spangenberg en Theron (2004), neem hierdie studie die eerste stap in die ontwikkeling van 'n omvattende leierskap-werkeenheidsprestasie strukturele model.

Deur middel van ‘n literatuurstudie word ‘n logiese argument ontwikkel wat kulmineer in ‘n komplekse hipotese oor die wyse waarop werkseenheidprestasie deur die leierskapdimensies beïnvloed word.

Die navorsingsmetodologie word bespreek. Die resultate dui daarop dat die voorgestelde strukturele model die data redelik goed pas. Ofskoon die meerderheid van die strukturele verwantskappe tussen die dimensies van eenheidsprestasie steun ontvang word bykans geen steun gevind vir die gepostuleerde strukturele verwantskappe tussen die tweede-orde leierbevoegdhede en die dimensies van eenheidsprestasie nie.

Aanbevelings vir verdere navorsing word bespreek, asook die beperkinge van hierdie studie.

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CHAPTER 1

INTRODUCTION

1.1 Background

Organisations in the 21st Century face major changes and challenges in order to sustain profitability and uphold a competitive advantage. Increasing domestic as well as foreign competition is having a great impact on organisational effectiveness. Considering that an organisation is part of a larger system, namely the environment, through time the organisation acquires processes and returns resources to the environment. The ultimate criterion of organisational effectiveness is sustainable growth and performance. Survival of the organisation is, therefore, the long-term criterion of effectiveness.

Organisations have come to exist for a definite purpose, which is to combine and transform scarce factors of production into products and services with maximum economic utility. Organisations exist as part of a larger system from which they obtain resources that they process and return to the larger system. Over the short-term they can be considered successful if they succeed in attaining the highest possible output of need satisfying products and/or services with the lowest possible input of production factors. Over the long-term organisations can be considered successful if they succeed not only to survive, but to show consistent economic growth. To maintain such economic growth, organisations have to keep finding and exploiting white space opportunities not currently exploited by their competitors. By maintaining such growth, an organisation gains a competitive advantage and prevents economic stagnation.

The extent of success with which organisations create value is largely dependent on humans who are the carriers of the production factor: labour. Human actions are grouped together and co-ordinated to form an organisation. Combining other production factors on their own, without the human effort would not constitute an organisation. For this reason, successful organisations are seeking the best employees. More so than any of the other factors of production, it is primarily the individuals who work within the organisation that ultimately determine organisational success. Due to competition and changes, it has become increasingly important for organisational managers to partner with Human Resource (HR) professionals to share in decision-making and accountability for organising the work to be performed in a manner that contributes to the core business of the organisation (Brewster, Carey, Grobler, Holland & Warnich, 2008). The role that HR plays in gaining a competitive advantage for an organisation is empirically well documented (Kesler, 1995). It adds value by increasing the work performance of employees via an array of integrated and coherent HR interventions.

The HR function within an organisation normally focuses on organisational processes and structures and mainly focuses on individual performance. Most research on workplace effectiveness has historically focused on performance outcomes at the individual employee level and comparatively less is known about work unit performance and its antecedents (Gelade & Ivery, 2003). Although HR management interventions typically tend to focus on monitoring and improving individual employee work performance, it is however, important to also acknowledge the efficiency of teams and groups (units) within a company. Organisations are formed to accomplish goals, which would be impossible if everyone acted individually (Jones, 2001).

Although individual effectiveness is undoubtedly an essential prerequisite for superior work unit performance, organisational work unit objectives (and ultimately overarching organisational objectives) will only be achieved if the individual employees comprising a unit can integrate their individual work efforts into effective performance of the collective (Spangenberg & Theron, 2003). Performance levels which organisational work units reach are not similar to the performance levels individual employees can reach. One way to clarify the importance of work units is through synergy. Even if all individuals in a team or unit perform optimally, the unit’s overall performance will not necessarily be high. High organisational unit performance cannot be guaranteed purely by enhancing individual employee performance. In addition to HR processes and structures aimed at monitoring and improving individualemployee work performance, dedicated HR processes and structures are required, aimed at monitoring and improving organisational unit performance. Thus, unit performance plays an important role in determining the effectiveness of an organisation. Teamwork is one the means used by organisations to increase productivity and is increasingly becoming an integral part of organisational life (Barrett, 1987; Bettenhausen, 1991; Henning, Theron & Spangenberg, 2004). A business unit is widely considered an important unit of analysis in the field of strategic management (Hambrick, 1980). Despite this, only a limited number of studies have looked explicitly at the determinants of superior performance at the unit level (Bass, Avolio, Jung & Berson, 2003; Spangenberg & Theron, 2002). An organisational or work unit can be defined as a permanent or semi-permanent entity which operates within an organisation which is nested in a public, private or not-for-profit organisation.

The behaviour of the working man is an extremely complex phenomenon (Theron, 2009a). Performance levels (of both individuals as well as work units) are the result of the lawful working of complex nomological network of latent variables characterising the individual and the context in which the behaviour occurs. The HR function within an organisation needs to have a valid understanding of the nature of how these latent variables combine to determine the performance of the individual employee and how they affect unit performance. This will make it possible to increase performance of individuals and organisational units in a goal-directed and rational manner. The ability to rationally and intentionally improve the performance of an organisational unit depends on the extent to which the identity of the latent variables comprising the nomological network are known, as well as the manner in which they combine to affect the various performance dimensions.

The challenge is thus to develop an integrated organisational work unit competency model. The concept of competency modelling is controversial in the Industrial Psychology fraternity (Schippmann *et al*., 2000). Nonetheless the competency model concept can serve as powerful conceptual framework. Saville & Holdsworth (2001) proposed a conceptual model of performance at work, which captures the relationships between competency potential, competency requirements, competencies and outcomes in a manner which allows for the integration and alignment of the spectrum of human resource interventions. According to Saville & Holdsworth (2001, p. 6) the Performance@Work model represents:

> ...a model of performance at work that defines the relationship between competency potential, competency requirements and competencies themselves."Competencies" are defines as desired behaviours that support the attainment of organisational objectives. "Competency potential" is seen to derive from individual dispositions and attainments, and "competency requirements" involve both facilitators of and barriers to effective performance in the workplace. The framework points to ways in which people and work settings interact, and has implications for how performance in the workplace can be managed.

If these three concepts are combined with the concept of structural equation modelling, a powerful interpretation of a competency model emerges. Currently this concept seems to be used only to explain individual work performance. This concept should, however, in principle also be applicable and meaningful in explaining the performance of work units. Organisational work units can be described in terms of specific characteristics (competency potential, eg. cohesion) that allow them to display specific collective behaviours (competencies, e.g. production) and through which they achieve specific outcomes (e.g. market standing).

Spangenberg and Theron (2004) developed a general, standardised unit performance measure called the PI (Performance Index), which encompasses the unit performance dimensions for which the unit leader could be held responsible. Based on the literature covering organisational effectiveness and financial and non-financial performance measures, Spangenberg and Theron (2004) compiled a baseline structure for a model of work unit performance effectiveness. The internal structure of the PI was investigated by Henning, Theron and Spangenberg (2004). The Henning *et al*. (2004) study suggests hypotheses on the inter-relationships between the eight unit performance latent variables. Confirmatory factor analysis was performed and the results indicated acceptable measurement model fit and satisfactory factor loadings of item parcels on the latent performance dimensions. The proposed structural model of the PI (Henning *et al*., 2004) was also found to have good fit and these initial findings suggest that the eight dimensions of the PI model should be seen to influence each other.

Part of the answer as to why organisational units differ in terms of success lies in differences in the states of the dimensions comprising unit performance and the manner in which these dimensions continually affect each other. To ensure that organisational units successfully achieve the objectives that are assigned to them, a leader needs to be appointed to, through his/her leadership actions/behaviours, ensure that the unit performs satisfactory. Leaders are critical to the success or failure of ventures, for without leaders, there will be no direction given, no motivation, no one to imbue a sense of commitment and passion (Bartram, 2002). While leaders spend much of their time dealing with people on a one-on-one basis, that interest actually derives from the fact that they are ultimately responsible for controlling and improving the performance of the unit in which the individuals operate. Leaders do not achieve results themselves (Kaiser, Hogan & Craig, 2008). A leader is there to achieve unit goals through the performance of the individual members of a unit. Stated differently, leaders influence organisational outcomes through other people (Hollander, 1992; Kaiser *et al*., 2008; Lord & Brown, 2004).

The extent to which unit leaders achieve the unit goals for which they are held accountable will depend on what they do and how well they do it. The effect is, however, indirect. The leaders' actions and behaviours influence the characteristics of the unit and through that the behaviour of the unit to ultimately achieve the unit goals. Without guidance of some sort of the leader within the work unit, individual members will find it a more challenging task for a unit to succeed in the way it is supposed to.

This research is based on the hypothesis that a specific structural relationship exist between the characteristics of a unit leader, his leadership behaviours, and the performance of the organisational unit that he is held responsible for. Organisational units exist to achieve specific objectives. Unit leaders are appointed to achieve specific unit objectives through specific leadership outcomes. Unit objectives would be expressed in terms of desired target levels on the dimensions comprising unit performance. Leadership outcomes refer to states characterising people, processes and structures necessary to achieve the desired target levels on the dimensions comprising unit performance[1]. Specific leadership behaviours (leadership competencies) are required to achieve these outcomes. A complex nomological network of leader-centred characteristics (i.e., competency potential, for example personality, values, motives, cognitive abilities, interests, attitudes and knowledge), some of which are relatively easily malleable (attainments) whilst others are more difficult to modify (dispositions), which in turn determines the level of competence achieved on the leadership competencies. Moreover, it could be argued that leadership competency potential latent variables need not necessarily determine the leadership competencies directly. The impact of critical leadership characteristics on leadership competencies could in some instances be mediated by specific generic, non-leadership competencies. Moreover these generic non-leadership competencies need not necessarily only affect leadership success via their direct impact on the leadership competencies. In some instances the generic non-leadership competencies could affect leadership success in that they moderate the effect of leadership competencies on specific leadership outcome latent variables. Emotional intelligence competencies could possibly operate in this manner. A leader therefore does not display leadership competencies [eg transformational leadership] because of his emotional intelligence, but rather he achieves success with his leadership competencies [transformational leadership] provided that the manner in which he presents his words and deeds are chosen in an emotionally intelligent manner.

A three-domain Performance@Leadership competency model could thus be assumed, analogous to the Performance@Work model originally proposed by Saville & Holdsworth (2000; 2001). In this case however, the competency domain should be differentiated into leadership competencies and generic, non-leadership competencies. The basic structure of the Performance@Leadership competency model is presented in Figure 1. Although not depicted as such, each of the domains constitute a nomological network of richly interconnected latent variables which in turn are structurally linked to each other. A penetrating insight into leadership would be achieved if this comprehensive leadership structural model could be explicated.

[1]The distinction between the impact of the leader on the motivational parameters [expectancy theory) of the individual follower, and the impact of the leader on the performance of a collective is an important theme that needs to be elaborated.

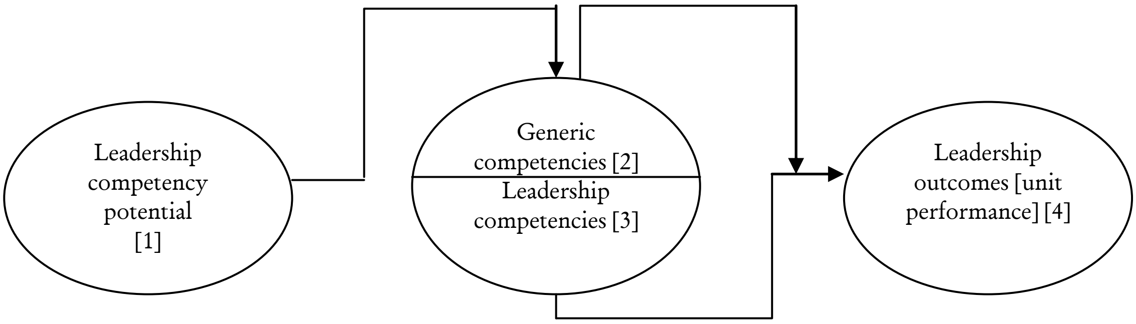

Figure 1.1. Performance@Leadership competency model

Leadership is one of the most researched aspects of organisational life. Today, as organisations struggle to remain competitive in the face of the increasing competition, the emphasis is on the leader's role in influencing performance, both in his/her subordinates and in his/her work unit as a whole. Organisations have to meet the challenge of sustained competitiveness and profitability in the context of considerable global and domestic competition. Therefore organisations increasingly focus on the extent to which leaders are able to positively influence the performance of their individual followers and work units (Bass *et al*., 2003), beyond merely seeking the best workers.

As work unit performance is increasingly recognised for its vital role in organisation performance, so has the need grown to effectively measure work unit performance.

1.2 The Need for a Structural Model

High unit performance within an organisation is essential for the organisation to succeed. It would be of great significance to establish relevant constructs which influence unit performance and ultimately manipulate them to increase unit performance.

The level of performance achieved by any given organisational unit is not a random event, but rather systematically determined by an intricate nomological network of latent variables. HR interventions aimed at improving work unit performance (as is the case with individual employee performance) depends on the extent to which the latent variables of the nomological network are known, as well as the manner in which they combine to affect the various performance dimensions (Theron & Spangenberg, 2005).

Previous research (Bass *et al*., 2003; Spangenberg & Theron, 2002) has shown leadership as an important construct to influence unit performance. Leadership is one of the latent variables in the nomological network that affect organisational unit performance (Bass *et al*., 2003; Bunderson & Sutcliffe, 2003; House 1998; Kolb, 1996; Yukl, 2002). Leadership characteristics and behaviour most probably play a vital role in an explanatory model of unit performance (Theron & Spangenberg, 2005). Leaders are held accountable for the performance of organisational units they manage. One of the means used by organisations to increase productivity is teamwork, facilitated by effective leadership (Barrett, 1987; Bettenhausen, 1991; Galagan, 1988; Hoerr, 1989). Thus, a leader's effectiveness is measured by the performance of his or her work unit (Kolb, 1996).

According to House (1988), changes in managerial effectiveness were directly related to changes in organisational work unit effectiveness. Given the assumed pivotal role of leadership in organisational unit performance, the nature of this presumed relationship should be captured in a comprehensive leadership-unit performance structural model that would explain the manner in which the various latent leadership dimensions, mediated by influence processes, affect the endogenous unit performance latent variables. Rational and purposeful attempts to improve organisational unit performance can only succeed if the following three elements are accurately understood: firstly the manner in which leadership competencies affect unit performance, secondly the latent variables that underpin the leadership competencies, and lastly the manner in which these competency potential variables combine. The development and empirical testing of a comprehensive leader-organisational unit performance competency model (Saville & Holdsworth, 2001) is therefore required.

It is highly unlikely that a single explanatory research study will result in an accurate understanding of the comprehensive nomological network of latent variables that define the phenomenon of interest. By developing a formal model of the structural relations that govern the phenomenon of interest, and by conducting successive research studies which elaborate such a model, a deeper understanding of the psychological processes which underly the manner in which leadership affects work unit performance may be obtained. The call for greater continuity in, and integration of successive research studies is not new. Thirty years ago Gordon, Kleiman and Hanie (1978, p. 901) argued the importance of cumulative research studies in which researchers expand and elaborate on the research of their predecessors.

Rather than abandoning the Spangenberg and Theron (2002) model and starting afresh with the development of a new model, the foregoing argument suggests that a more prudent option would be to elaborate the existing model.

1.3 Research Objectives

Given the assumed pivotal role of leadership in organisational unit performance, the nature of this presumed relationship should be captured in a comprehensive leadership-unit performance structural model that would explain the manner in which the various latent leadership dimensions, mediated by influence processes, affect the endogenous unit performance latent variables. Given the introductory argument unfolded above, the specific objectives of this research are to:

- Develop a leadership–organisational unit performance structural model that depicts the manner in which the latent leadership competencies affect the latent organisational unit performance dimensions;
- Test the model's absolute fit;
- Evaluate the significance of the hypothesised paths of the model;
- Modify the structural model if necessary; and
- Compare the fit of the revised structural model to that of the original model.

The validity of the measurement and structural models underlying the Perfomance Index (PI) in conjunction with the Leadership Behavioural Inventory (LBI), as evidenced by Henning *et al*. (2004), Spangenberg and Theron (2004), and

Spangenberg and Theron (2002), opened the possibility to explicate and evaluate such a comprehensive leadership-unit performance structural model.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter endeavours to provide a comprehensive, systematic and reasoned argument with logical and theoretical justification for the proposed structural model; a model that explains the manner in which leadership competencies affect unit performance. An empirically evaluation of the fit of the structural model would (although not in any definite sense) reflect the justifiability of the proposed model. This however requires the development of constitutive definitions for all major constructs contained in the model, as well as the theoretical arguments needed to justify the proposed path influences between constructs.

Since the research objective is to develop and test a structural model that explains the variance in organisational unit performance, the connotative meaning of the unit performance construct requires upfront clarification. Organisational unit performance, like conceptualisations of individual employee performance, is a multidimensional construct comprising an array of latent unit performance dimensions. Conceptualisation of the organisational unit performance construct requires that the identity of these dimensions should be established.

2.2 Conceptualising and Measurement of Organisational Unit Performance

An organisational or work unit can be defined as a permanent or semi-permanent entity which operates within an organisation which is nested in a public, private or not-for-profit organisation. Organisational units are man-made and exist with a definite reason and have a specific purpose. It has specific, identifiable and measurable performance goals for which it is held accountable by higher management structures. The work unit can vary in size from small (i.e. a leader which at least three followers) to large, consisting of a large staff complement (Spangenberg & Theron, 2004). The unambiguous purpose of existence is either a service that satisfies different needs of society or the production of a specific product (or component thereof). It is the responsibility of the organisational unit to combine and transform scarce production factors into services and products with maximum economic utility. Organisational units try to use the lowest possible input of production factors and attain the highest possible output of products/services in order to satisfy needs. Porter (as cited in Jermias & Gani, 2005) identifies two generic ways in which a business unit can gain a sustainable competitive advantage: low cost and product differentiation. The former implies the need to incur the lowest cost in an industry by using efficient scale facilities or vigorous cost reductions. The latter focuses on satisfying the customers' needs in terms of product features and customer services. This however, does not imply that the business unit ignores quality, services or costs.

The evaluation of organisational units occurs in terms of the efficiency with which they produce specific products or services (or parts thereof) with the minimum factors of production and in terms of the extent to which they satisfy their consumer's quality and quantity expectations (Henning, 2002). It has become increasingly evident that performance measurement systems which provide relevant, timely, complete and accurate information gives organisations the ability to more readily monitor and reposition their operations in fast-paced, competitive environments (Jensen & Sage, 2000). "Effective management depends on the effective measurement of performance and results," (Kanji, 2002, p. 715). The performance measure is used to record the progress towards achieving a goal.

2.2.1 Traditional Performance Measures

Organisational units exist with a specific purpose and were mostly evaluated in terms of the efficiency with which they fulfil the objective for which they exist as well as the extent to which they satisfy their client's quality expectations (Theron & Spangenberg, 2005).

Traditionally, financial measures were used to evaluate organisational unit performance, such as sales turnover, debt, profit and return on investment (ROI). These may, however, not be adequate in the turbulent environment of today. Financial measures sometimes lack explicative and predictive power as they have been criticized to reflect the consequences of decisions, sometimes well after the decision was made (Kanji, 2002). Financial measures thus have a backward-looking focus. Furthermore, traditional measures encourage a more short-term perspective because of the lack of strategic focus and because it does not focus on core management processes (rather it focuses on the individual or specific function).

Jermias and Gani (2005) used more traditional measures for business-unit performance such as return on investment, cash flow from operations, cost control, sales volume, market share, market development and personnel development. Other ways of measuring performance is performance-to-plan (actual profitability relative to targeted profitability) and profit-per-unit (actual profitability per units sold) (Bunderson & Sutcliffe, 2003). Performance-to-plan is used to evaluate and reward business unit performance. It captures an important aspect of economic efficiency – the extent to which *ex ante* objectives are realized in *ex post facto* results. Furthermore, the profitability target is based on an evaluation of historic and projected market conditions, thus it takes differences in business unit context into account. Performance-to-plan is sensitive to any biases that might be introduced into the target-setting process (Bunderson & Sutcliffe, 2003). Profit-per-unit simply evaluates the extent to which the business unit generates profits from what is sold. This is seen as a useful measure of business unit performance and has shown to correlate very highly (r = .95) with return on sales (Merchant as cited in Bunderson & Sutcliffe, 2003).

In measuring organisational unit performance, it would be insufficient to investigate only the amount of gross profit or loss. It is necessary to clarify the driving forces behind success or failure. When choosing or implementing a performance measure, it is important to understand organisational excellence, which potentially leads to the success of a business in the future. Financial measures do not improve customer satisfaction, quality, employee motivation and cycle time. According to Kanji (2002,

p. 717), "one needs a performance measurement that goes beyond presenting financial figures and provides the drivers of future performance".

Primary measures of performance tend to focus on activities specified by the organisation's objectives, mission and goals, which are often difficult to assess completely (Green, Madjidi, Dudley & Gehlem, 2001). The more traditional measuring systems therefore seem somewhat limited, including only inflexible financial measures which is not sufficient for a comprehensive evaluation of performance in a 21st century organisation.

There are many different models used to measure organisational effectiveness, each with their own distinct advantages and disadvantages. Perhaps the most common measurement is the general "boss's" perception of how well the organisation or the business unit is performing. This however, is a subjective view which lacks credibility.

Another well-know method of measuring performance is Kaplan and Norton's concept of the Balanced Scorecard (Kaplan & Norton, 2007). This measure goes beyond the traditional measure of financial performance. Used to predict future financial performance, rather than stating what already happened, it measures performance from three additional perceptions i.e. those of customers, internal business processes and learning and growth. The Balanced Scorecard approach therefore track financial results as well as monitor progress towards expanding the capabilities and acquiring the intangible assets needed for future growth (Kaplan & Norton, 2007). It is utilized as a means of integrating different functional areas and decisions into linked processes (Purcell, Kinnie, Swart, Rayton & Hutchison, 2009). The scorecard is useful to communicate corporate and unit objectives to the teams performing the work.

The Balanced Scorecard is fairly complex and costly to develop as it must be tailored to each units' goals and strategies. The need exist for a more generic, standardised measure by which to compare different leaders' behaviours to their work unit's performance, and improve leader effectiveness and ultimately unit performance (Dunbar-Isaacson, 2006). Furthermore, as a measurement tool the Balanced Scorecard does not lend itself to empirically test the envisaged structural model.

Organisations use a wide variety of measures to evaluate different aspects of performance. In the case of unit performance, and the impact of leadership thereof, it would be wise use a generic, standardised tool. According to Hersey and Blanchard (1988), concern must not only be given to the outcome of a given leader's attempt to influence the performance of a business unit, but rather the effectiveness of the unit over a period of time. Three types of variables – causal, intervening, and end result variables – are useful when understanding effectiveness over time. *Causal variables* are independent variables that can be altered by management or the organisation. Examples are leadership strategies, and policies and structure of an organisation. *Intervening variables* represent the current condition of the internal state of an organisation. The *end result* reflects the dependent variables revealing the organisation's achievements.

Overall, performance measurement research highlights the need for "mixed" or integrated measures in evaluating business unit performance (Higgs, 2007). According to Spangenberg and Theron (2002), literature describes two main approaches to organisational performance and effectiveness, namely the goal approach and the systems approach.

The goal model focuses on outcomes of the organisation – the more closely an organisation's outputs meet its goals, the more effective it is considered to be. Organisational effectiveness is therefore measured in terms of financial measures of performance, or outcomes, such as profitability, ROI, market share and return on assets (Etzioni, 1964).

Weaknesses in the goal model have lead to the development of systems models of organisational effectiveness. Systems models focus on the means to achieve organisational objectives, rather than the end results themselves (Miles, 1980). Nicholson and Brenner's (1994) dimensions of perceived organisational performance are based on a systems model. This model can predict organisational survival and growth. It comprises four elements, namely wealth, markets, adaptability and climate that describe the management process as the linkage between elements, forming a cycle of actions and outcomes.

According to Gibson, Ivancevich and Donnelly (1991) the time-dimension model defines organisational effectiveness criteria over the short term, intermediate term and long term. In this model, efficiency comprises the ratio of outputs to inputs.

2.2.2 The Performance Index of Spangenberg and Theron

Based on the foregoing discussion covering organisational effectiveness, Spangenberg and Theron (2002) compiled a base-line structure for a model of work unit performance effectiveness. None of the aforementioned performance measures covered the unit performance domain comprehensively enough to successfully serve the purpose of a work unit criterion measure (Spangenberg & Theron, 2002). A measure was required that would be applicable across various units within a single organisation, and across different organisations and industries (Spangenberg & Theron, 2002).

Spangenberg and Theron (2004) then developed the general, standardised unit performance measure called the Performance Index (PI). The PI was built on a comprehensive model of work unit performance effectiveness. This was based on literature targeting both financial and non-financial performance measures of organisational effectiveness (Spangenberg & Theron, 2004). The resulting PI model is a synthesis of Nicholson and Brenner's (1994) systems approach, Conger and Kanungo's leadership outcomes (Conger & Kanungo, 1998), and Gibson, Ivancevich and Donnelly's (1991) time-dimension model of organisational performance.

The purpose of the development was to diagnose the health and effectiveness of organisational work units as well as to serve as a validation criterion for research purposes. The questionnaire measures eight independent dimensions by means of 56 items on a five point Likert scale (Spangenberg & Theron, 2004).

The model focuses on unit performance dimensions for which a leader is responsible. It is used to identify where remedial interventions are required and expands on the Unit Performance Questionnaire (Cockerill, Shroder and Hunt, cited in Spangenberg and Theron, 2004, p. 19). The eight organisational unit performance dimensions, which according to Theron, Spangenberg and Henning (2004) constitute unit performance, are listed and defined in Table 2.1.

Table 2.1.

Brief summaries of the PI unit performance dimensions

1. Production and efficiency	Refers to quantitative outputs such as meeting goals, quantity, quality and cost-effectiveness, and task performance.
2. Core people processes	Reflect organisational effectiveness criteria such as goals and work plans, communication, organisational interaction, conflict management, productive clashing of ideas, integrity and uniqueness of the individual or group, learning through feedback and rewarding performance.
3. Work unit climate	Refers to the psychological environment of the unit, and gives an overall assessment of the integration, commitment and cohesion of the unit. It includes working atmosphere, teamwork, work group cohesion, agreement on core values and consensus regarding the vision, achievement-related attitudes and behaviours and commitment to the unit.
4. Employee satisfaction	Considers individual's satisfaction with the task and work context, empowerment, and career progress, as well as with outcomes of leadership, e.g. trust in and respect for the leader and acceptance of the leader's influence.
5. Adaptability	Reflects the flexibility of the unit's management and administrative systems, core processes and structures, capability to develop new products/services and versatility of staff and technology. It reflects the capacity of the unit to respond appropriately and expeditiously to change.
6. 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.
7. Market share/scope/ standing	Includes market share (if applicable), competitiveness and market-directed diversity of products or services, customer satisfaction and reputation for adding value to the organisation.
8. Future growth	Serves as an overall index of projected future performance and includes profits and market share (if applicable), capital investment, staff levels and expansion of the unit.

(Theron, Spangenberg and Henning, 2004, p. 36)

The Performance Index questionnaire was tested on a sample of 60 units, comprising 257 respondents (non-probability sample of unit managers) on a 360-degree assessment basis. Analysis included item and dimensionality as well as confirmatory factory analysis. The results indicated satisfactory measurement model fit and acceptable factor loadings of the item parcels on the latent unit performance dimensions (Henning *et al.*, 2004). The technical detail of the findings will be discussed in the methodology section (paragraph 3.5).

As a comprehensive criterion measure of unit performance, the PI model is intended to explain the manner in which the various latent leadership dimensions measured by the LBI affect the eight unit performance latent variables that are assessed by the PI (Spangenberg & Theron, 2002). Henning *et al*. (2004) argued that any attempt to explain variance on organisational unit performance should acknowledge the argument presented earlier that specific causal relations exist between leading and lagging indicators of unit performance. In terms of this argument specific causal relations should therefore exist between the latent performance dimensions listed in Table 2.1.

Henning *et al*. (2004) argued that explicating these causal linkages existing between the performance dimensions should be the first step in the development of a comprehensive leadership-unit performance structural model. Henning *et al*. (2004) subsequently proposed the complex hypothesis on the internal structure of the organisational unit performance construct as measured by the PI depicted in Figure 2.1.

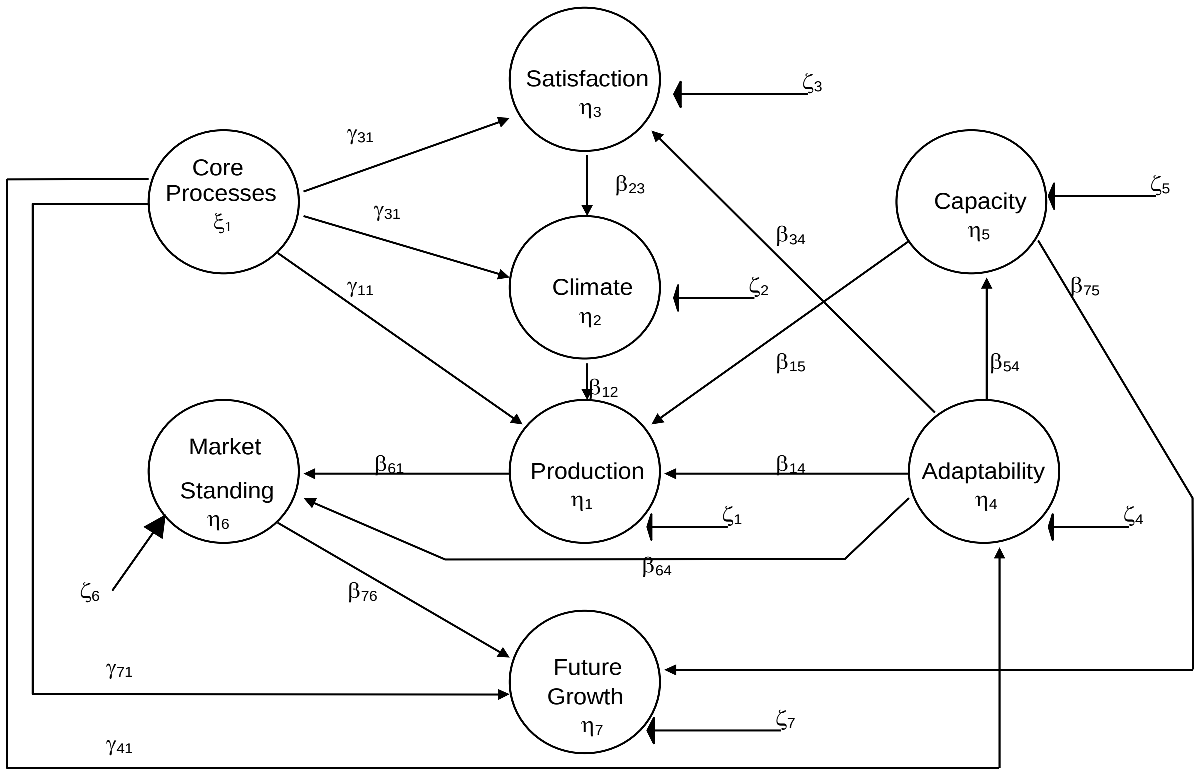

Figure 2.1. PI structural model. The internal structure of the unit performance construct as measured by the Performance Index (PI) by Henning, R., Spangenberg, H., & Theron, C.,

2004. *SA Journal of Industrial Psychology*, 30 (2), 29.Copyright 2004 by Aosis Open Journals.

The internal structure of the PI was investigated by Henning *et al*. (2004). The proposed structural model of the PI was found to have good fit. Support was obtained for 13 of the 16 statistical path hypotheses. These initial findings provide support for the position that the eight dimensions of the PI model should be seen to influence each other. The *ex post facto* nature of the research, however, precluded the drawing of definite causal inferences from any of the significant path coefficients.

Some unexpected findings were produced as the results failed to find support for the hypotheses that there are linkages between *Capacity* and *Production & Efficiency*, and between *Adaptability* and *Production & Efficiency*. The study in addition suggested that an additional path be included in the original model which represents the influence of *Market Standing* on the *Wealth of Resources* (or *Capacity*) to which the unit has access to. Empirical support was found for the additional path.

The Henning *et al.* (2004) study lastly also suggested that the *Satisfaction* latent variable and the *Market Standing* latent variable could be meaningfully split into two more specific latent variables each. Based on the Henning *et al*. (2004) findings Theron, Henning, and Spangenberg (2004) proposed an elaborated structural model on the internal structure of the unit performance construct. The elaborated PI structural model is shown in Figure 2.2.

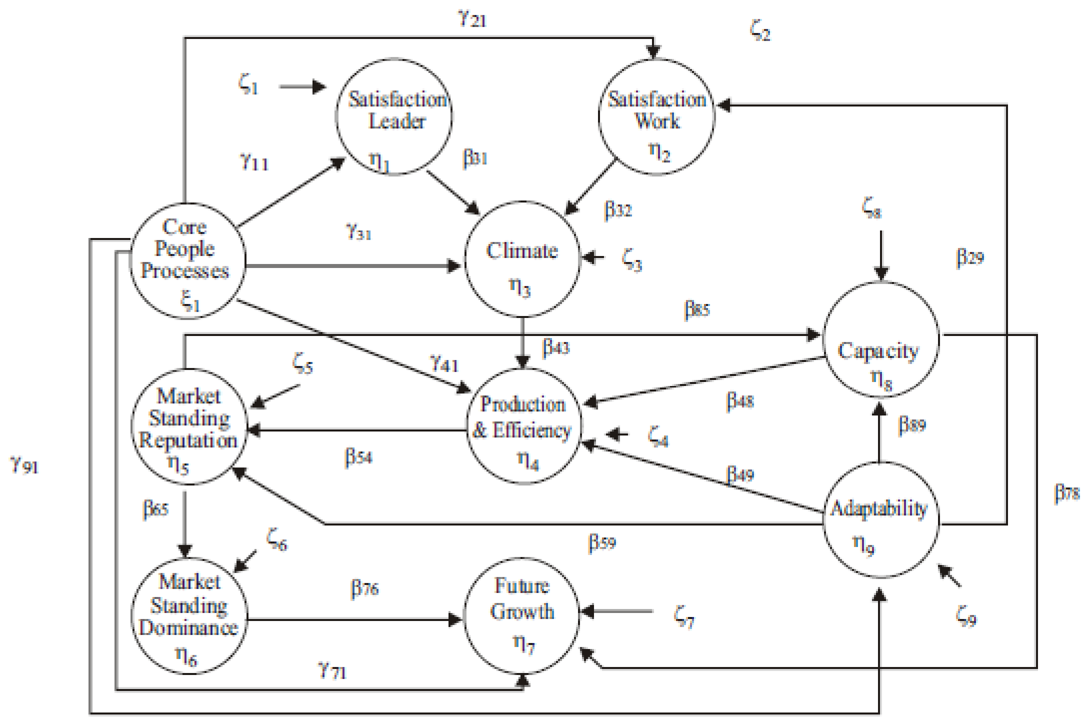

Figure 2.2. Elaborated PI structural model.An elaboration of the internal structure of the unit performance construct as measured by the performance index (PI) by Theron, C., Spangenberg, H., & Henning, R., 2004. *Management Dynamics, 12*(2), 39. Copyright 2004 by Southern Africa Institute for Management Scientists.

Theron *et al*. (2004) found empirical support for the elaborated model. The close fit null hypothesis was not rejected (p>.05). Support was again found for the additional path. Both the original and the elaborated PI model have acceptable model fit. The unexpected findings obtained by Henning *et al*. (2004) were echoed in the findings of Theron *et al*. (2004). This indicates the need for further investigation whether additional alterations to the PI model proposed by Henning *et al.* (2004) are required. The current research on the internal structure of the PI (Henning *et al.*, 2004; Theron *et al*., 2004), suggest that the basic PI structural model possibly might have to be refined. Dunbar, Theron and Spangenberg (2011) cross-validated the PI measurement model as a first stage in investigating the structural invariance of the basic PI structural model (Henning *et al*., 2004). If structural invariance would be demonstrated and the insignificant paths described above would be reaffirmed it would necessitate a refinement of the basic PI structural model. This would include considering the possibility that interaction effects might exist between the PI latent variables *Climate*, *Adaptability*, *Capacity, Core people processes* and *Production and efficiency.*

The responsibility for the performance of an organisational unit on these eight performance dimensions eventually lies with the leadership of that unit. “Leadership in this sense constitute a complex process expressing itself in an array of inter-dependent behavioural actions and driven by an intricate nomological network of situational and person-centred latent variables” (Spangenberg & Theron, 2004, p. 27). Given the perceived fundamental leadership role in organisational unit performance, the nature of the relationship should be captured in a comprehensive structural model. This model can aid to explain the manner in which the various latent leadership dimensions affect the endogenous unit performance latent variables. This line of reasoning, however, begs the question how leadership should be conceptualised in the model. More specifically the question arises on the nature of the leadership competencies that should be utilised in the structural model to explain the impact of leadership on unit performance.

2.3 Leadership Defined

Every discussion of leadership depends on certain assumptions. Leadership involves influencing individuals to willingly contribute to the good of the group. It also requires coordinating and guiding the group to achieve its goals and lastly, goals vary by organisation. Most organisations are in competition with other organisations for scarce resources, and this is the appropriate context for understanding group performance (Kraft, Engelbrecht & Theron, 2004).

For Kotter (1990a, 1990b), the leadership process involves a) developing a vision for the organization; b) aligning people with that vision through communication; and c) motivating people to action through empowerment and through basic need fulfilment. Leaders are responsible for controlling and improving the performance of the unit in which individuals operate. This has become more important in the dynamic work environments of today. The term “business unit leader” is used to describe a leader heading a unit with a specific focus. “Business unit” is not the only term used to describe a business-specific subunit of a corporation; “division,” or “strategic business unit” has also been used in the literature (Watson & Wooldridge, 2005).

One of the earlier definitions of leadership (Kouzes & Pozner, 1987) states that “leadership is the art of mobilizing others to want to struggle for shared aspirations” (p. 30). Other writers take a more technical definition of leadership in where they agree that leadership is a process of influencing the activities of an individual or a group in efforts toward goal achievement in a given situation. From this definition, it follows that the process of leadership is a function of the *leader*, the *follower* and other *situational variables* (Hersey & Blanchard, 1988, p. 89).

$$L = f\ (l, f,s)$$

The leadership@work competency model components provide a fruitful structure within which one can order leadership variables. Leadership can be defined in terms of traits, behaviours, interaction patterns, role relationships, occupation of position and influences. Because of the extreme variety in job descriptions, any overall theory of leadership has to categorize these specific behaviours into more general categories. Two studies started on this path. The Ohio State and Michigan studies are the earliest studies to look at leadership (Makin & Cox, 2004). They concluded two broad and independent categories for the behaviour of leaders; consideration (defined as the degree of friendship, warmth, trust and respect shown by the supervisor to the subordinates) and initiating structure (the degree to which the supervisor defines his own role as well as those of followers) (Makin & Cox, 2004).

Most definitions of leadership reflect the assumption that leadership involves a process whereby an individual exerts influence over other people to guide, structure, and direct activities in a group or organisation. The critical roles of leaders within organisations have been studied by many (Kanter, 1997; Rhinesmith, 1996; Spears, 1995). Extensive literature exists indicating the differences between leadership and management (Bennis & Goldsmith, 1997; Cotter, 2002; Kotter, 1990a; Yukl, 2002). Leadership is seen as a proactive activity within the organisation (Bartram, Robertson & Callinan, 2002).

2.4 Leadership Theories

There are various types of leadership theories, such as trait theories, contingency leadership theories andbehavioural theories. The objective of this section is not to provide an exhaustive review of the available literature on these theories. The objective of this section is to evaluate the usefulness of the various theoretical models in explaining unit performance. The objective of this section is therefore to decide and motivate on the appropriate interpretation of leadership for the purpose of achieving the stated research objective.

2.4.1 Trait Theories

Leadership theories provide a basis for the understanding of different integrative concepts. According to the trait approach to leadership, key characteristics of successful leaders can be identified and isolated. It assumes that the capacity of leadership is inherent. According to this theory, leaders are born, not made. This leadership approach is not considered appropriate to pursue the objective of this study as leadership traits are more distal determinants of unit performance.

The perspective of the trait theories should ultimately be acknowledged in a comprehensive leadership-organisational unit performance structural model. From the perspective of competency modelling, it is argued that outcomes are achieved through specific behavioural competencies. The level of competence achieved on these competencies is not a random event. Rather the level of competence is determined by a complex nomological network of person characteristics, context characteristics and the interaction between the two. These leader characteristics ultimately belong in a comprehensive leadership-organisational unit performance structural model. The leadership competency potential domain of the model will play a vital and indispensible role in the identification of leadership potential. Since the impact of leader characteristics on unit performance is mediated by leadership competencies in terms of this argument it seems more prudent to start the development of the model by focussing on the leadership competencies rather than leader characteristics.

Attempts to explain leadership effectiveness in terms of specific leadership characteristics has thus far achieved rather limited success (Bolden, Gosling, Marturano & Dennison, 2003). Recent attempts to explain leadership effectiveness has generally turned away from a focus on the characteristics of the leader. Earlier it was argued that the leadership behaviour of leaders is complexly determined, by a nomological network of latent variables characterising the leader and the context in which they operate. The nature of the complexity could possibly account for the relative lack of success achieved by the trait theories of leadership. The structural network of influences underlying employee behaviour is complex in that a large number of leader characteristics combine to determine the level of competence a leader achieves on the leadership competencies. These leader characteristics are causally richly interconnected. Due to the rich interconnectedness of the competency potential latent variables the explanation of leadership effectiveness does not reside in any specific location in the network but is rather spread over the whole of the network (Cilliers, 1998). A trait perspective on leadership effectiveness is more likely achieve success if it formally acknowledges that leadership behaviour is complexly determined.

2.4.2 Contingency Leadership Theory

Contingency theories of leadership focus on particular variables related to the environment that might determine which particular style of leadership is best suited for the situation. This leadership model was originally developed by Fiedler (1996). His theory postulated the relationship between the leader’s behaviour and personality with situational variables (House & Aditya, 1997). Contingency theory interprets leadership styles as sets of leadership behaviours that cannot be (easily) influenced or modified.

According to Fiedler (1996), leaders have the ability to be taught to identify their own leadership style as well as the most favourable condition for their leadership technique. The theory contains three variables; the least preferred co-worker (LPC), situational favourability and outcome criteria of group performance (Steers, Porter & Bigley, 1996).

The least peferred co-worker (LPC) scale was created to measure an individual's leadership orientation. The LPC questionnaire is directed to determining the kind of co-worker a leader would like to work with. It is indirectly aimed to reflect upon the leader's own style of operations. A high score in LPC indicates a "people orientated" style while a low score indicates "task orientated" style. The LPC is based on the assumption that a task-orientated leader perceives their least preferred co-workers more negatively than relationship-orientated leaders.

Although this theory can be used to create leadership profiles in an organisation, it has endures much criticism, such as conflicting empirical findings and its inability to provide reason for leadership effectiveness in various situations (House & Aditya, 1997). The LPC scale is also controversial; it is difficult to understand how evaluation of a co-worker can reflect upon the leader's own leadership styles.

2.4.2.1 Tri-Dimensional Leader Effectiveness Model

This model developed by Hersey and Blanchard (1988) use concepts similar to those of the Ohio States studies (Makin & Cox, 2004). The terms *task behaviour* and *relationship behaviour* is similar to *Consideration and Initiating Structure*. Task behaviour relates to the extent to which a leader organizes and defines the roles of the work unit for which he/she is responsible. Relationship roles represent the extent to which leaders are likely to maintain personal relationships between themselves and their work unit by opening channels of communication. The model has four basic leader behaviour quadrants: high relationship, low task; high task, high relationship; high task, low relationship; and low task, low relationship. According to Hersey and Blanchard (1988), these four styles depict the different leadership styles. A leadership style can be defined as the behaviour pattern that the leader exhibits when attempting to influence the activities of others as perceived by the influenced. It involves some combination of task behaviour and relationship behaviour.

Hersey and Blanchard (1988) added the *effectiveness* dimension to this two-dimensional model. The aim is to integrate the concept of leader style with situational demands of a specific environment. If the leadership style increases productivity of the work unit, which is appropriate for a given situation, it is labelled *effective*; if the leadership style does not increase work unit productivity, it is labelled *ineffective* (Hersey & Blanchard, 1988, p. 117).

2.4.3 Behavioural Theories

The behavioural theories focus on leadership competencies rather than on leadership competency potential. A leadership competency should be interpreted as the abstract common theme in a bundle of behaviours that constitutes leadership success (Theron & Spangenberg, 2005). The leadership competencies are considered important because they are assumed to systematically affect individual and unit performance. A variety of different theoretical positions on the nature of the critical competencies can be identified.

2.4.3.1 Komaki's Behavioural Leadership Theory

According to the behavioural approach to leadership, researchers such as Komaki (as cited in Makin & Cox, 2004), believe that leader behaviour is a function of its consequences. Whether the behaviour will continue is largely influenced by the consequences that follow the behaviour. Behaviour is also influenced by the antecedents that precede it. These cues initiate behaviour. The elements – *antecedents*, *monitoring* and *consequence*s, are unique to the behavioural theory and are used to analyse leadership. It is of value in understanding and explaining the complex working of leadership and its effect on unit performance.

Antecedents are often subtle and understated, but at the core of work-related behaviours may be explicit and formally stated. Individuals form a relationship between cues and the behaviours that is required: e.g. 'Take *a*, do *b* with it, and place it in *c*.' Antecedents are the rules, regulations and procedures which specify what needs to be done when a particular cue is encountered. Monitoring is a data collection exercise which involves performance-related information. The three common methods of monitoring are work-sampling, self-report and secondary sources (Makin & Cox, 2004). Within the work context, direct observations and production data is mostly used. Consequences can be as an effective reinforcement of punishment for preceding behaviour. Leaders use feedback and recognition as reinforcement.

Komaki's findings (as cited in Makin & Cox, 2004), differentiates between good leaders and the 'not so good' leaders in the way the good leaders *monitor*. According to Komaki, leaders must ask before they tell when communicating to their business unit. Interaction within the business is essential. This also refers to the early research done on leadership, such as the Ohio State and Michigan studies. The leader needs to relate to people but concentrate on performance as well; leaders should both be person and task orientated.

This approach to leadership will not be suitable for the particular study as a more comprehensive and in depth leadership perspective is needed to ensure significant results.

2.4.3.2 Transactional and Transformational Leadership

The study by Bass *et al*. (2003), examined how transactional, contingent reward and transformational leadership dimensions correlates with unit potency and cohesion, and how each predicts unit performance operating in challenging and uncertain conditions. The study concluded that both active transactional and transformational leadership is needed to be successful in the performance context.

Transactional leadership builds the foundation for relationships between leaders and followers. It is used to specify expectations, clarify responsibilities, negotiate contracts and providing recognition and rewards for achieving expected performance (Bass *et al*., 2003; Colquitt, Lepine & Wesson, 2009). This is a dominant approach to motivating employees in organisations and research suggests that it can be effective.

Transformational leadership (Bass, 1985; Bass *et al*., 2003; Burns, 1978; Coquitt *et al*., 2009; Ticky & Devanna, 1990) describes how leaders persuade followers to set aside selfish pursuits and involves inspiring followers to commit to a shared vision, challenging followers to think in ways in which they are not accustomed to thinking and provide high moral standards which guide followers' performance. Transformational leaders can empower employees; enable them to influence outcomes of decisions that affect them; and have the ability to motivate their followers to participate in an equitable relationship (Kraft, Engelbrecht & Theron, 2004).

Interestingly enough, the Bass *et al*. (2003) study is in contrast with previous research in a sense that this study found both transactional and transformational leadership dimensions equally predicts performance. Bass et al. were of opinion that transformational leadership has a stronger effect on performance than transactional leadership. A possible explanation for the findings include the complexity of tasks taken on by these leaders requires clarity concerning responsibilities for achieving specific targets and goals.

Within the South African context, the concept of trust is of great importance in work relationships (Kraft, Engelbrecht & Theron, 2004). The socio-political history created a social environment that is characterized by extreme mistrust between people in South Africa (Engelbrecht & Cloete, 2000). Transformational leaders empower people to exert extra effort for the collective group and gradually elicit higher order needs from subordinates. They formulate and communicate extraordinary visions. For them to get followers to become committed to their visions, they have to instil trust in their subordinates (Bass & Avolio, 1998).

Transformational leaders enable employees to influence outcomes of decisions that affect them. Beyond that, transformational leaders motivate their followers to be participants in an equitable relationship. Both these factors are likely to promote procedural justice, because procedural justice incorporates the extent to which a person has a voice in the decision making process (Kraft *et al*., 2004, p.2). The study done by Kraft *et al*. (2004) indicated that interactional justice, a sub-component of procedural justice, seems to play a greater role in the relationship between transformational leadership and trust. Interactional justice rather than the procedure seems to elicit perceptions of fairness in subordinates

2.4.3.3 The Great Eight

The Great Eight (Bartram, 2005) represents a model of performance in the workplace that defines eights broad competency factors. This model has emerged from factor analyses and multidimensional scaling analyses of self and manager ratings of workplace performance. The Great Eight can be seen as a generic competency framework. A competency can be defined as a set of behaviours that are instrumental in the delivery of desired results or outcomes (Bartram *et al*., 2002, p.7). The factors have been labelled the Great Eight because they appear to occupy a position within the work performance domain similar to the Big Five personality predictor domain (Bartram, 2005).

The Eight Competency domain titles are defined as follows (Bartram, 2005, p. 1187):

1. Leading and Deciding: Takes control and exercises leadership. Initiates action, gives direction, and takes responsibility.
2. Supporting and Cooperating: Supports others and shows respect and positive regard for them in social situations. Puts people first, working effectively with individuals and teams, clients, and staff. Behaves consistently with clear personal values that complement those of the organisation.
3. Interacting and Presenting: Communicates and networks effectively. Successfully persuades and influences others. Relates to others in a confident, relaxed manner.
4. Analyzing and Interpreting: Shows evidence of clear analytical thinking. Gets to the heart of complex problems and issues. Applies own expertise effectively. Quickly takes on new technology. Communicates well in writing.
5. Creating and Conceptualizing: Works well in situations requiring openness to new ideas and experiences. Seeks out learning opportunities.Handles situations and problems with innovation and creativity. Thinks broadly and strategically. Supports and drives organisational change.
6. Organizing and Executing: Plans ahead and works in a systematic and organized way. Follows directions and procedures. Focuses on customer satisfaction and delivers a quality service or product to the agreed standards.
7. Adapting and Coping: Adapts and responds well to change. Manages pressure effectively and copes well with setbacks.
8. Enterprising and Performing: Focuses on results and achieving personal work objectives. Works best when work is related closely to results and the impact of personal efforts is obvious. Shows an understanding of business, commerce, and finance. Seeks opportunities for self-development and career advancement.

2.4.3.4 Leadership Behaviour Inventory

Worldwide there are many leadership questionnaires available for companies to assess leadership qualities in terms of transformation and change within organisational frameworks. The need for a leadership instrument that satisfies the need of leaders and managers in the South African context has been expressed repeatedly since the establishment of the Centre for Leadership Studies (Southern Africa) at the Graduate School of Business, University of Stellenbosch, in 1994 (Spangenberg & Theron, 2002).

Bass (1985) developed an instrument to measure transactional and transformational leader behaviour. The instrument would be used to investigate the nature of the relationship between these leader behaviours, and other relevant variables hypothesised to be affected by the quality of leadership like work unit effectiveness and follower satisfaction. The instrument, named the Multifactor Leadership Questionnaire (MLQ) was conceptually developed and empirically validated to reflect the complementary dimensions of transactional and transformational leadership with subscales to further differentiate leader behaviour (Solomon, 2006).

Studies were conducted in order to review whether the Multifactor Leadership Questionnaire (MLQ) factor structure could be replicated in South Africa (Ackermann, Schepers, Lessing & Dannhauser, 2000). Although their results confirmed the three leadership distinctions of Bass (1985), a unique South African instrument was needed (Ackermann *et al*., 2000). Spangenberg and Theron (2002) developed the Leadership Behavioural Inventory (LBI) which is a comprehensive leadership questionnaire that serves to identify latent leadership dimensions on which a leader under performs. The instrument was developed to assess an array of capabilities required by leaders and managers alike. The spectrum of behaviours considered relevant by the LBI spans both management and leadership. The aim of the questionnaire is to assess the behaviours required to lead change and transformation, while at the same time managing organisational unit performance effectively. It was imperative to develop an instrument that encompassed the challenges leaders in South Africa faced (Spangenberg & Theron, 2002).

It was also felt that the instrument should meet the following requirements: it should assess stages of leadership and it should measure the full range of behaviours required for change and performance (Spangenberg & Theron, 2002). Focusing on aspects of charismatic, transformational and vision behavioural types, the developers explicated relevant behavioural dimensions.

The LBI was based on research by House (1995) and his distinction between management, supervision and leadership. Theron and Spangenberg (2005) argued that leadership should be interpreted in a comprehensive manner and that it should include all three aspects identified by House (1995). House (1995) defines *management* as the behaviour of a person in a position of formal authority that results in compliance of organisational members with their normal role or position requirements. He further defines *supervisory leadership* as behaviour intended to provide guidance, support and corrective feedback for the day to day activities of work unit members. House (1995) describes general *leadership* as the behaviour of individuals that gives purpose, meaning and guidance to collectives by articulating a collective vision that appeals to ideological values, motives and self-perceptions of followers resulting in the infusion of values into organisations and work and making significant personal sacrifices in the interest of a collective vision.

The LBI Performance@Leadership competency model interprets leadership as a complex, continuous process expressing itself in an extensive array of interdependent behavioural actions and driven by an intricate nomological network of person-centered and situational latent variables (Theron & Spangenberg, 2005). The process essentially entails four sequentially linked phases: a) the assessment of the internal and external environment of the unit; b) the development of an appropriate yet challenging vision for the unit; c) the preparation of the unit for the implementation of the vision; d) the bold yet honest implementation by continually monitoring and fine-tuning prerequisites for unit success in terms of the vision.

From the perspective of a leadership model underlying the LBI, a total of 24 distinct leadership dimensions can be distinguished within this broad procedural structure, constituting the abstract themes common to bundles of leadership behavioural actions.

The first-order latent leadership dimensions measured by the LBI and their definitions (Theron & Spangenberg, 2005, p. 36) are shown in Table 2.2.

Table 2.2.

Model of the Leadership Behaviour Inventory (LBI) and definitions of the first-order dimensions

Assessment of the internal and external environment of the unit **(Environmental orientation)** Awareness external environment (Awex) Identifies and interprets external developments that may affect unit performance Understands the business and positioning of the organisation Awareness internal environment (Awin) Interprets internal dynamics and identifies weaknesses that may affect unit performance
Development and selling of an environmentally appropriate yet challenging vision for the unit. **(vision Formulation and Sharing)** Developing challenging vision (Visi) Develops a vision that gives people a sense of purpose, is customer-focused and advances diversity of people Building trust (Trus) Builds confidence in the unit and visibly supports the mission and values of the unit Articulating vision and enlisting followers (Arti) Articulates a vision for the future that provides direction, excites followers and that inspires commitment in followers. Conceptualizing strategy (Stra) Builds strategies and plans based on thorough problem analysis and broad-based fact-finding. Considers consequences of decisions.
Preparation of the unit for the implementation of the vision **(Preparing the organisation for implementing the vision)** Enabling the leader: personal growth (Risk) Identifies challenging opportunities for self-development and is committed to continuous learning. Risks new ways of doing things. Enabling the leader: self-discovery and –management (Lead) Has got good insight into own capabilities, weaknesses and behaviour and manages him/herself well. Empowering followers (Foll) Facilitates the personal growth of followers and creates a “hassle” free environment that provides ownership of work.

Optimizing structures and systems (Syst)

Adapts structures, processes and procedures to support implementation of strategy in a changing environment.

Building culture (Cult)

Develops a culture of openness that facilitates employee diversity and participation and is directed at high performance.

Implementation of the vision

(Implementing the Vision)

Influencing the external environment (Infl)

Builds the image of the organisation and practices good citizenship.

Honesty and integrity (Hono)

Considers ethnical implications of decisions, assures agreed upon values are adhered to and deals honestly with all stakeholders.

Decisiveness and hardiness (Deci)

Acts decisively and makes tough decisions. Performs effectively under stress and reacts positively to change and uncertainty.

Challenging current reality (Valu)

Challenges current thinking, reconsiders current practices and improves work methods

Facilitating learning (Lear)

Encourages followers to express their ideas and feelings and develops full understanding for their problems. Promotes continuous learning.

Interpersonal skills (Mana)

Effectively handles interpersonal and group relations.

Showing concern for others (Trea)

Shows concern for the aspirations, needs and feelings of others.

Inspiring people (Insp)

Raises the aspirations, confidence and motivation of followers. Conveys the message convincingly.

Facilitating interdepartmental co-ordination (Coor)

Facilitates interdepartmental co-ordination and helps people to see the big picture.

Acting entrepreneurial (Acti)

Develops new ideas, seizes opportunities and initiates projects for the benefit of the unit.

Developing and implementing performance plans (Plan)

Ensures that employee and unit goals and plans support organisational strategy and that employees know what is expected of them.

Reviewing performance (Revi)

Provides followers with feedback about unit performance as well as with specific feedback about their own performance.

Reward performance (Rewa)

Acknowledge positive employee performance and behaviour, celebrates success.

The 24 distinct leadership dimensions comprising the leadership model underlying the original LBI, provide a fruitful conceptualisation of leadership for the purpose of explaining organisational unit performance. The LBI leadership model is regarded as appropriate for the purpose of this research because it defines leadership in terms of leadership competencies rather than leadership competency potential and because of its extensive interpretation of the leadership competency domain.

The original LBI was revised by reducing the number of dimensions from 24 to 20 by collapsing some of the leadership dimensions, by re-assigning a number of items to latent leadership dimensions and by reducing the number of phrases in the underlying leadership model (Spangenberg & Theron, 2011b). Spangenberg and Theron (2011a, pp. 51-52) explain the changes to the LBI as follows in the Technical Manual of the revised instrument:

> Reducing the inventory from four to three stages was achieved by merging Phases one and two of the LBI, i.e. **Environmental orientation** and **Vision formulation and sharing** to become **Creating vision and strategy** (now Phase 1 in the LBI-2 model). At the same time two dimensions that formed part of **Vision formulation and sharing** (*Building trust, and Articulating vision* and *enlisting followers)* were moved to Phase 3 of the new model, namely **Implementing the vision and strategy**. Initially *Building Trust* was considered essential for getting participants commitment for the vision. However one may also argue that it is considered generic and applicable right through the entire leadership process. *Articulating the vision* now rightfully comprises the opening dimension of **Implementing the vision and strategy**.
>
> The number of LBI dimensions was reduced to twenty by splitting up some dimensions and consolidating others. No items were culled and items from split up dimensions were moved to LBI-2 dimensions where they seemed to fit best. The most significant changes were the following:
>
> *Building trust* was removed from **Vision formulation and sharing** in the LBI (Phase 2), and consolidated with LBI dimension *Acting honestly and with integrity* to form a new major dimension in the LBI-2 with 8 items, and called *Building trust and demonstrating integrity* ***(*Phase 3*)*.**
>
> The LBI dimension *Building culture* was split up, with two work-related items moved to LBI-2 dimension *Optimising process and structures.* Thereby, this important dimension that forms part of **Preparing for implementing the vision (Phase 2)** in the new model was strengthened. Two remaining interpersonal items were moved to *Showing concern for others, and displaying sound interpersonal skills.*
>
> The splitting up of LBI Dimension *Challenging current reality* led to the transfer of questioning and probing items to *Acting Entrepreneurial* in the new model.

- The dimension *Facilitating learning* in the LBI was split up, with items relating to understanding the needs of people moved to *Showing concern for others,* and *Displaying sound interpersonal skills.*

In the process of splitting up of dimensions, one of the most important LBI-2 leadership dimensions i.e. *Empowering followers,* was strengthened by receiving items from deleted LBI dimensions *Building culture, Challenging current reality* and *Facilitating learning.*

The revised assessment is called the LBI-2. The items in the original LBI were, however not altered substantially. Language improvements were made to selected items without changing the substantive meaning of the items.

The first-order latent leadership dimensions measured by the LBI2 and their definitions (Spangenberg & Theron, 2011a, pp. 4-6) are shown in Table 2.3.

Table 2.3.

Model of the Leadership Behaviour Inventory (LBI) 2 and definitions of the first-order dimensions

1 ASSESSMENT OF THE INTERNAL AND EXTERNAL ENVIRONMENT OF THE UNIT
1.1 ANALYSING AND INTERPRETING THE ENVIRONMENT
1.1.1 Monitoring the external environment
Identifies and interprets external developments that may affect unit performance. Understands the business and positioning of the unit.
1.1.2 Monitoring the internal environment
Interprets internal dynamics and identifies weaknesses that may affect unit performance.
1.2 FORMULATING THE VISION AND STRATEGY
1.2.1 Developing a challenging vision
Develops a vision that gives people a sense of purpose, is customer-focused and advances diversity of people.
1.2.2 Conceptualizing strategy
Builds strategies based on thorough problem analysis and broad-based fact-finding. Considers consequences of decisions.
1.2.3 Developing performance plans
Ensures that employee and sectional/departmental goals and plans support unit strategy and that employees know what is expected of them.

2. PREPARING THE UNIT FOR IMPLEMENTING THE VISION AND STRATEGY

2.1 PREPARING THE LEADER AND FOLLOWERS

2.1.1 Leader self-discovery, reflection and self-awareness

Has good insight into his/her own capabilities, weaknesses and behaviour and manages him/herself well.

2.1.2 Leader personal growth and development

Identifies challenging opportunities for self-development and is committed to continuous learning. Is willing to try new ways of doing things.

2.1.3 Empowering followers

Facilitates the learning and personal growth of followers by building out and utilizing their skills in a "hassle"-free, learning-oriented work environment.

2.2 PREPARING THE UNIT

2.2.1 Optimising processes and structures

Adapts production and people structures, processes and systems to support implementation of strategy in a changing environment.

3. IMPLEMENTING THE VISION AND STRATEGY

3.1 SHARING THE VISION AND INSPIRING FOLLOWERS

3.1.1 Articulating the vision

Articulates a vision for the future that provides direction, excites followers and inspires commitment in followers

3.1.2 Inspiring and motivating followers

Raises the aspirations, confidence and motivation of followers. Conveys important information convincingly.

3.2 LEADING WITH INTEGRITY AND COURAGE

3.2.1 Building trust and demonstrating integrity

Builds trust in the unit, assures agreed upon values are adhered to, considers ethical implications of decisions, and deals honestly with all stakeholders.

3.2.2 Demonstrating decisiveness and hardiness

Acts decisively and makes tough decisions. Performs effectively under stress and reacts positively to change and uncertainty.

3.2.3 Acting entrepreneurial

Develops new ideas, seizes opportunities, and initiates projects for the benefit of the unit.

3.3 LEADING WITH COMPASSION

3.3.1 Showing concern for others

Shows understanding and concern for the aspirations, needs and feelings of others.

3.3.2 Displaying sound interpersonal skills

Effectively handles interpersonal and group relations. Proactively solves conflicts.

3.4 LEADING ACROSS BOUNDARIES

3.4.1 Facilitating interdepartmental co-ordination

Facilitates interdepartmental co-ordination and helps people to see the wider picture.

3.4.2 Influencing across external boundaries

Builds the image of the unit and practices socially responsible citizenship.

3.5 REVIEWING AND REWARDING PERFORMANCE

3.5.1 Reviewing performance

Provides followers with feedback about unit performance as well as with specific feedback about their own performance.

3.5.2 Acknowledging and celebrating performance

Acknowledges positive employee performance and behaviour; celebrates success.

(Spangenberg & Theron, 2011a)

2.4.3.5 LBI Second Order Leadership Model

As can be observed from the preceding literature review, leadership theory spans across a vast amount of time and has several differing standpoints. Behaviour, environment and innate capabilities all play a role, depending on the approach of the theorist. The LBI focuses on leadership competencies and is founded on an in-depth interpretation of the leadership construct (Theron & Spangenberg, 2005).

As stated by Theron *et al*. (2004), in order to create a leadership-unit performance structural model, it is necessary to first explicate the second-order factor structure of the LBI. As stated earlier, the LBI comprises of 96 first-order items (24 dimensions with four items under each). The authors found in their study that correlations exist between the latent leadership dimensions (Theron & Spangenberg, 2005). They indicated that the explanation could be found in one or more second-order latent variables. There could be common themes between the first-order dimensions, thus resulting in the correlations amongst them (Theron & Spangenberg, 2005). It was viewed as potentially useful to create second-order factor structures around these commonly themed first-order factor structures. Theron and Spangenberg (2005) points out that it would be straightforward to make use of the four phase headings already available in describing the first-order latent variables as the second-order factors. It would, however be erroneous to assume all the factors under each of these overarching headings should be viewed as having some sort of correlation due to proximity of chronology. The four phases are useful simply to summarise the leadership process (Theron & Spangeberg, 2005). It is therefore necessary to find a more appropriatestructure for the first-order dimensions.

The second-order leadership latent variables on the LBI are leadership competencies, differing from their first-order counterparts in terms of the width of their behavioural scope. A second-order leadership latent variable should thus be interpreted as the abstract common theme shared by the abstract common themes in a number of bundles of behaviour, each of which constitutes leadership success, because they each impact on individual or unit performance (Theron & Spangenberg, 2005, p. 38). They are broader, general constructs, and do not explain all the variances found between the first-order variables.

In their search for an appropriate second-order factor structure for the LBI, Theron and Spangenberg (2005) considered two second-order leadership models proposed by House (1995) and by Avolio, Bass and Jung (1999). They, however, decided to create a unique second-order factor structure for the LBI based on a conceptual analysis of leadership.

They utilised the distinction between rational-analytical and affective-interactive behavioural categorisations in House's (1995) description of leadership, and incorporated it in the second-order leadership model. In addition they argued that rational-analytical and affective-interactive leadership behaviours are directed either at individuals or at the unit as a collective or at the leader him/herself. Combining the focus of the behaviour (unit, individual or him/herself) with the distinction in the essential nature of the behaviour (rational-analytical versus affective-interactive behaviour), resulted in the following five second-order leadership competencies (Theron & Spangenberg, 2005, p. 15):

- Rational-analytical unit related behaviours
- Affective-interactive unit related behaviours
- Rational-analytical inter-individual related behaviours
- Affective-interactive inter-individual related behaviours
- Intra-personal behaviour

The manner in which the 24[2] first-order leadership factors measured by the LBI map onto the five second-order leadership factors is presented in Table 2.4.

Table 2.4.

The second-order factor structure of the LBI

1. Organisational / unit: rational – analytical (Unitrat) 1.1 Awareness external environment (Awex) 1.2 Awareness internal environment (Awin) 1.3 Developing a challenging vision (Visi) 1.4 Conceptualizing strategy (Stra) 1.5 Optimizing structures and systems (Syst) 1.6 Developing and implementing performance plans (Plan)(3/4) 1.7 Reviewing performance (Revi)(1/4)
2. Organisational / unit: affective-interactive (Unitaff) 2.1 Articulating the vision and enlisting followers (Arti) 2.2 Influencing the external environment (Infl) 2.3 Facilitating interdepartmental co-ordination (Coor) 2.4 Building culture (Cult)
3. Team / interpersonal: rational – analytical (Indivrat) 3.1 Challenging current reality (Valu) 3.2 Developing and implementing performance plans (Plan)(1/4) 3.3 Reviewing performance (Revi)(3/4) 3.4 Rewarding Performance (Rewa)
4. Team / interpersonal: affective-interactive (Indivaff) 4.1 Building trust (Trus) 4.2Empowering followers (Foll) 4.3 Facilitating learning (Lear) 4.4 Displaying sound interpersonal skills (Mana) 4.5 Showing concern for others (Trea) 4.6 Inspiring people (Insp)
5. Intra-personal (Intraper) 5.1 Enabling the leader: self-discovery and –management (Lead) 5.2 Enabling the leader: personal growth (Risk) 5.3 Acting honestly and with integrity (Hono) 5.4 Demonstrating decisiveness and hardiness (Deci) 5.5 Acting entrepreneurial (Acti)

(Theron and Spangenberg, 2005)

[2] Table 2.4 lists 26 leadership first-order factors. Two of these, however, load on two second-order factors.

Rational-analytic unit related leadership behaviours involves the gathering and analysing of information on conditions in the external and internal environment that potentially hold implications for unit performance. It is about developing a clear vision on the future state and functioning of the unit, conceptualising strategy on the manner in which the vision can be realised, developing unit processes and structures required to implement the strategy, developing and implementing performance plans for unit members based on the strategy and managing performance of unit members in accordance with the performance plans. *Rational-analytic unit related leadership behaviours* are therefore leader behaviours focused on the collective that primarily involve cognitive processes.

Affective-interactive unit related behaviours attempt to excite the hearts and minds of the members of the unit and to buy into the leader's vision for the unit. The behaviours try to influence and persuade stakeholders in the external environment to react favourably towards the unit, building cordial relations between the unit and other organisational units on which the unit is dependent and building a high-performance culture in the unit (Theron & Spangenberg, 2005). *Affective-interactive unit related behaviours* aretherefore leader behaviours focused on the collective that primarily involve affective processes.

Rational-analytical inter-individual related behaviours attempt to make individual followers think critically about current realities and how they currently do things, to assist followers to plan, monitor and modify their performance and to reward excellent performance when it occurs. *Rational-analytical inter-individual related behaviours* aretherefore leader behaviours focused on the individual unit member that primarily involve cognitive processes (Theron & Spangenberg, 2005).

Affective-interactive inter-individual related behaviours are behaviours that attempt to get unit members to trust in their own competence; to feel that they are involved in meaningful work that has significant impact; to structurally empower the follower; to trust the leader of the unit and where he/she is taking the unit and to get along with each other. *Affective-interactive inter-individual related behaviours* are therefore leader behaviours focused on the individual unit member that primarily involve affective processes (Theron & Spangenberg, 2005).

Intra-personal behaviours are behaviours in which the leader does not evade difficult tasks and decisions but faces them head-on for the sake of the unit, behaviours in which the leader demonstrates his/her willingness to take risks for the benefit of the unit, behaviours in which the leader demonstrates consistency in thoughts, words and deeds and in thoughts, words and deeds over time, behaviours that allow the leader to honestly face feedback, to develop accurate and penetrating self-awareness and to grow as a person. *Intra-personal behaviours* are therefore leader behaviours focused on the leader him-/herself that involve both cognitive and affective processes (Theron & Spangenberg, 2005).

2.5 Developing a Structural Model

Organisations are complex systems in which leadership is only one of several significant influences (Jaques & Clement, 1991; Katz & Kahn, 1978). Leaders do not directly control work unit outcomes because unpredictable dynamics can determine outcomes in complex systems (Marion & Uhl-Bien, 2001), and external forces sometimes overwhelm intentions and effort (Kaiser, Hogan & Craig, 2008). Nonetheless, leaders can create conditions that are more or less conducive to work unit effectiveness (Hackman, 2002). Schneider (1987) described this as providing a context for performance – the circumstances that influence the ability of followers to contribute to organisational goals. In this view, the links between leadership and organisational outcomes are complicated but real (Kaiser *et al.,* 2008). The complexity arises because the links are mediated by other aspects of the system – the performance of followers; the unit they compose; and the organisation in which they are embedded (Kaiser *et al*., 2008).

The literature study unfolded above provides an overview of existing research concerning unit performance measures and ultimately provides information about the generic PI. Secondly, leadership was defined and different leadership theories were evaluated. Leadership dimensions were then identified which have a possibility of influencing work unit performance. Given the perceived pivotal role of leadership in organisational unit performance, the aim of this study is to capture the nature of the presumed relationship in a comprehensive leadership-unit performance structural model which will explain the manner in which the various latent leadership dimensions affect the endogenous unit performance latent variables.

Organisational units are manmade phenomena and exist for a definite reason and a specific purpose. The purpose of existence is either the production of a specific product (or component thereof) or service (or component thereof) that satisfies the multitude of needs of society. Organisational units exist to serve the purpose of adding value to the organisation as a whole, as well as to society. This can be seen through measures like return on investment (ROI) of the work-unit. As with the dynamic economy, technology plays an important role in increasing output with the minimum input. Organisational units are evaluated in terms of the efficiency with which they produce their specific product or service with the minimum factors of production to achieve maximum economic utility. In order for units to achieve this, they need clear guidance from some sort of leader who shows analytic thinking ability and that can behave innovatively when it comes to complex problems and issues. A leader who is open to experiences can have the ability to drive the unit to add the most value to society. To do this they need a wealth of resources and adaptable structures and processes. A leader who quickly takes on new technology would be an advantage. A leader with such competencies may as well utilise the minimum factors of production and create the maximum economic outcome. This will aid in task performance as well as ensure quantitative outputs. A leader who is aware of the internal and external environments, and who has the ability to easily pick up shifts in the various business environments will have the ability to effectively respond and direct the unit to ensure effective production. By doing so, the leader can earn the respect of the unit. A direct positive causal linkage is thus proposed between the second-order leadership factor *Organisational/Unit: Rational Analytical*and the PI dimension *Adaptability.*

Another indispensable requirement for high unit production efficiency is resources. Resources are the primary input used by individuals to produce a specific outcome and can be either tangible such as financial resources, physical assets and materials used or can also reflect the internal strength of a unit, quality or diversity of staff. As organisations that operate in similar industries are in competition for resources, leaders need to be aware of the internal and external environments regarding scarce resources. Leaders need to develop plans to ensure resources are used to the maximum utility. Systems and structures need to be optimized to ensure the capacity of the unit leads to efficient production. A direct positive casual linkage is thus hypothesised between the second-order leadership factor *Organisational/Unit: Rational Analytical* and the unit performance dimension *Capacity*.

To ensure maximum capacity, it is vital that the leader of a unit to keep with reality and challenge existing operations to ensure efficiency. The leader should provide followers with feedback about the performance of the unit as well as with specific feedback about their own performance. A leader should acknowledge positive employee performance and behaviour, as this too affects the capacity of the unit. The rational-analytical inter-individual related behaviours, with its emphasis on performance management, might affect the PI dimension *Capacity* positively. A positive causal linkage is thus hypothesised between the second-order leadership factor *Team/Interpersonal: Rational Analytical* and the unit performance dimension *Capacity*.

In order for organisations to stay competitive and to gain market share, it is important to continuously improve work methods and styles to ensure maximum output with minimum input. It is the responsibility of the leader to articulate a vision for the future that provides direction, inspires commitment in followers and develop a culture of openness. If the leader builds the image of the organisation and practice good citizenship, it lays a foundation for interaction and integrity for the unit. Positive causal linkages are hypothesised between the second-order leadership factor *Organisational/Unit: Affect-interactive* and the unit performance dimension *Core People Processes* and between the second-order leadership factor *Team/Interpersonal: Affect-interactive* and the unit performance dimension *Core People Processes*.

A leader of a work unit or organisation, unlike a manager, needs to instil a shared vision in his/her followers. A leader should not act for him-/herself, but rather in accordance to a common organisational goal. It is vital for a leader to identify challenging opportunities for self-development and be able to manage him/herself well, and stay true to the organisational values. Adapting to challenging situations can be stressful and demanding, which indicates a person is needed who can manage pressure or conflict effectively, make difficult decisions and react positively to change and uncertainty. A positive causal linkage is hypothesised between the second-order leadership factor *Intra-personal* and the second-order leadership factors *Organisational/Unit: Rational Analytical* and *Team/Interpersonal: Rational Analytical.*

The foregoing argument culminates in the Leadership-Unit Performance Structural Model depicted in Figure 2.3

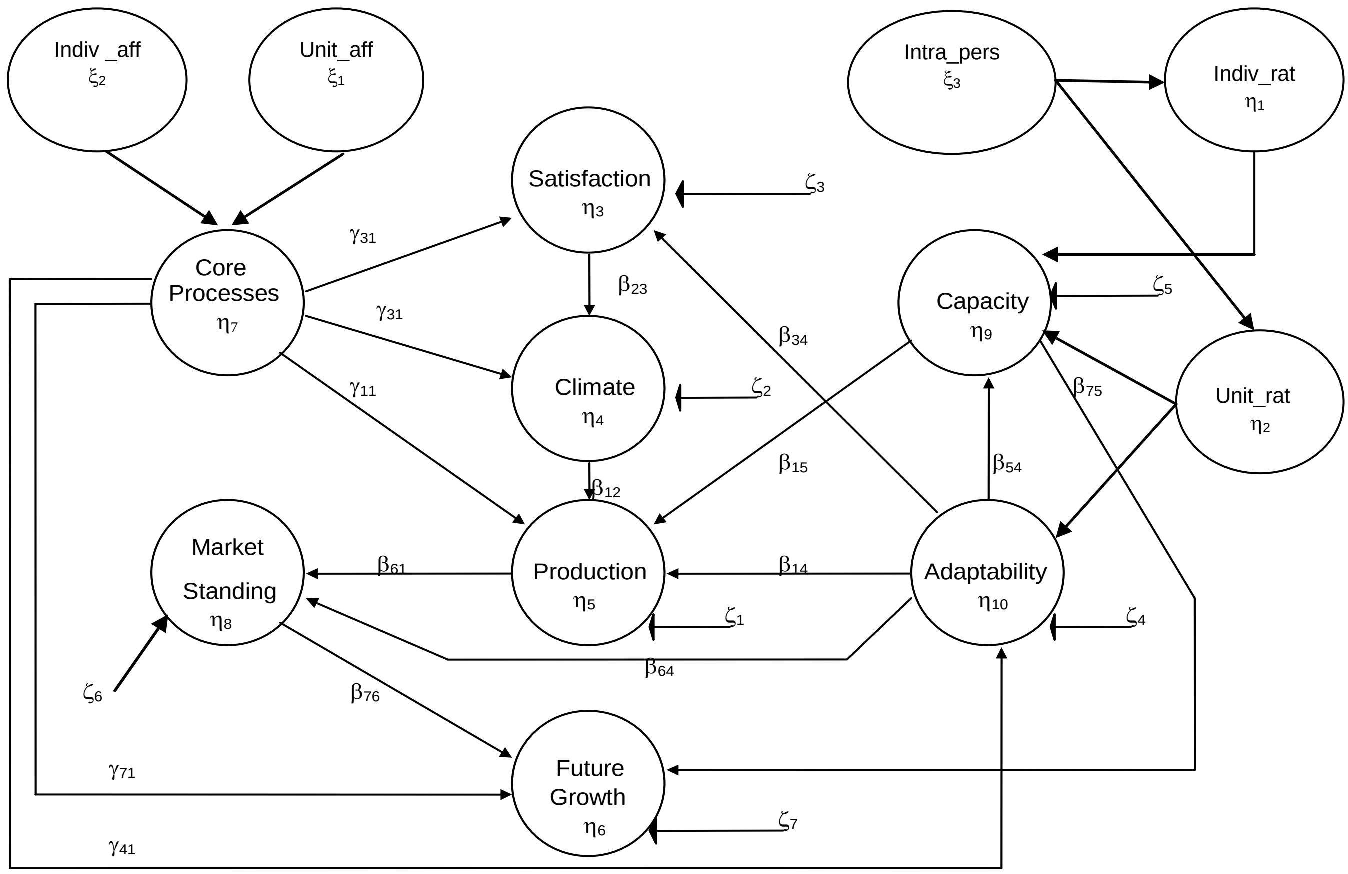

Figure 2.3. The proposed comprehensive Leadership-Unit Performance Structural Model

2.6 Summary

Organisations exist for a specific purpose and thus try to maximize the input from its employees in order to produce the best product or service. Without employees, an organisation would not survive. Employees need some sort of direction given by leaders to work towards a common goal. Literature established that leaders have the ability to positivily influence individual workers as well as work units (Bass et al, 2003).

The literature study focuses on the work unit performance measurement dimensions of the Performance Index (PI) which has been established as reliable to build the structural model. Leadership theories have been analysed and relevant leadership competencies identified. The list is not exclusive. Specific leadership latent variables that could cause variance in work-unit performance have been established.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

Research methodology serves the epistemic ideal of science. Science is committed to an "epistemic imperative" (Babbie & Mouton, 2001, p.8) to search for valid explanations. Explanations can be considered permissible (or valid) to the extent that the explanation closely fits the available data (Babbie & Mouton, 2001).

Research methodology serves the epistemic ideal through two characteristics of the scientific method, namely objectivity and rationality. Objectivity refers to a conscious, explicit focus on the reduction of error. The scientific method of inquiry requires careful reflection at various critical points in the process where the epistemic ideal is potentially threatened and that the appropriate steps be taken at these points to maximize the likelihood of valid findings (Babbie & Mouton, 2001). Science is rational in the sense that it provides an opportunity for subject matter experts, academics and theorists, to critically evaluate research findings and the validity of the proposed contribution to the body of knowledge by evaluating the methodological rigour of the process that was used to arrive at the conclusion (Babbie & Mouton, 2001). An important prerequisite to facilitate this process is that an accurate description and a thorough motivation be provided of the methodological choices that were made at the various critical points in the method where the epistemic ideal is potentially threatened. A comprehensive account of how the methodology was approached allows knowledgeable peers to identify methodological flaws and to point out the implication of these for the validity of the conclusion.

Unit performance is not a random walk, but the result of a complex nomological network of latent variables characterising the organisational unit and the context in which it operates in. Leaders have a responsibility for their units in which their actions must drive the unit to perform successfully.

The review of pertinent literature presented in Chapter 2 serves as the foundation for the research design and methodology presented in this chapter. The primary objective of the research was to generate a combined leadership-organisational unit performance structural model that provides a valid explanation of the manner in which leadership competencies affect unit performance. The literature study systematically unfolded an argument on the presumed influence of leadership on performance that culminated in a theoretical model which is depicted in Figure 2.1 and Figure 2.3. The first model depicts the structural relationships assumed to exist between the eight latent unit performance variables of the PI without considering the linkages with the leadership competencies. The second version of the model (Figure 2.3) elaborates on the hypothesised relationships existing between the unit performance dimensions by also portraying the specific structural relationships assumed to exist between the unit performance dimensions and leadership competencies.

The expanded model introduces the additional latent variables and consequently the basic model is not nestled in the expanded model in a manner which would allow one to statistically evaluate the merits of adding additional paths to the model. The ideal would be to achieve close fit of the expanded model.

The present chapter is meant to describe the methodology applied in order to pursue the objectives of this research and to arrive at valid and credible conclusions (Babbie & Mouton, 2001). A description of the research design, the statistical hypotheses, the analysis techniques, the sample and the measuring instruments to be utilized in the empirical testing of the aforementioned models will be subsequently presented.

3.2 Substantive Research Hypotheses

There are a variety of research design strategies available to assist in providing answers to an empirical research problem. To best understand the appropriate approach, it is essential to look at the purpose of this study.

The objective of this study is to develop a combined and comprehensive leadership-organisational unit performance structural model indicating the influence of leadership competencies on work-unit performance as conceptualised by the PI (Spangenberg & Theron, 2002). The theoretical argument presented in the literature study resulted in the inclusion of the LBI second-order factors unit rational analytic, unit affective-interactive, interpersonal rational analytic, interpersonal affective-interactive and intra-personal. The resultant elaborated structural model was depicted in Figure 2.3.

The overarching substantive hypothesis (hypothesis 1) of this study is that the structural model depicted in Figure 2.3 provides a valid account of the manner in which leadership dimensions influence work unit performance. The overarching substantive research hypothesis can be dissected into the following 19 more detailed, path-specific substantive research hypotheses.

Hypothesis 2: *Unit Rational Analytical Competence* (η_2) of the leader has a positive linear effect on *Adaptability* (η_{10}).

Hypothesis 3: *Unit Rational Analytical Competence* (η_2) of the leader has a positive linear effect on *Capacity* (η_9).

Hypothesis 4: *Interpersonal rational analytical competence* (η_1) of the leader has a positive linear effect on *Capacity* (η_9).

Hypothesis 5: *Interpersonal affective competence* (ξ_2) of the leader has a positive linear effect on *Core People Processes* (η_7).

Hypothesis 6: *Unit Affective Interactive Leader Competence* (ξ_1) has a positive linear effect on *Core People Processes* (η_7).

Hypothesis 7: *Intra personal leader competences* (ξ_3) have a positive effect on *Unit Rational Analytical Competence* (η_2)

Hypothesis 8: *Intra personal leader competences* (ξ_3) have a positive effect on *Interpersonal Rational Analytical Competence* (η_1).

Hypothesis 9: A significant positive causal relationship exists between *Production* (η_5) and *Market standing* (η_8).

Hypothesis 10: A significant positive causal relationship exists between *Climate* (η_4) and *Production* (η_5).

Hypothesis 11: A significant positive causal relationship exists between *Satisfaction* (η_3) and *Climate* (η_4).

Hypothesis 12: A significant positive causal relationship exists between *Adaptability* (η_{10}) and *Satisfaction* (η_3).

Hypothesis 13: A significant positive causal relationship exists between *Adaptability* (η_{10}) and *Capacity* (η_9).

Hypothesis 14: A significant positivecausal relationship exists between *Adaptability* (η_{10}) and *Market standing* (η_8).

Hypothesis 15: A significant positive causal relationship exists between *Capacity* (η_9) and *Production* (η_5).

Hypothesis 16: A significant positive causal relationship exists between *Capacity* (η_9) and *Future growth* (η_6).

Hypothesis 17: A significant positive causal relationship exists between *Market standing* (η_8) and *Future growth* (η_6).

Hypothesis 18: A significant positive causal relationship exists between *Core people processes* (η_7) and *Production* (η_5).

Hypothesis 19: A significant positive causal relationship exists between *Core people processes* (η_7) and *Climate* (η_4).

Hypothesis 20: A significant positive causal relationship exists between *Core people processes* (η_7) and *Satisfaction* (η_3).

Hypothesis 21: A significant positive causal relationship exists between *Adaptability* (η_{10}) and *Production* (η_5).

Hypothesis 22: A significant positive causal relationship exists between *Core People Processes* (η_7) and *Future Growth* (η_6).

Hypothesis 23: A significant positive causal relationship exists between *Core People Processes* (η_7) and *Adaptability* (η_{10}).

3.3 Research Design

To empirically investigate the overarching substantive hypothesis, as well as the array of path-specific, direct-effect substantive research hypotheses, a strategy is needed that will provide unambiguous, empirical evidence in terms of which to evaluate the operational hypothesis.

The overarching substantive research hypotheses formulated under paragraph 3.2 make specific claims with regard to the leadership-unit performance structural model. The leadership-work unit performance structural model as depicted in Figure 2.3 hypothesises specific structural relations between the various latent variables contained in the model.

The research design is a plan on how one intends to empirically test the overarching substantive research hypothesis (Kerlinger & Lee, 2000). This plan is set up to firstly, procure answers to the research question and secondly, to control variance (Kerlinger, 1973). The research design is a guideline or blueprint of how the researcher intended to test the substantive research hypotheses (Babbie & Mouton, 2001).

Which design will best suit the intended research is mainly dictated by the research problem and the type of evidence required to address the problem. The function of the research design is to attempt to ensure empirical evidence that can be interpreted unambiguously for or against the hypothesis being tested.

The research initiating question asks why variance in unit performance exists and what role leaders of units play in determining the level of performance that their units achieve. The theoretical structural model derived from the literature study as depicted in Figure 2.3 constitutes an attempt to answer the research initiating question. The structural model hypothesizes specific structural relationships between the various leadership and unit performance latent variables contained in the model. The validity of the hypothesised relationships was investigated empirically. The research design sets up a framework that will regulate the manner in which the validity of the hypothesised relations among variables will be examined. The ideal of a research design is to try to ensure empirical evidence that can be interpreted unambiguously for or against the stated hypotheses. Through the control of variance in the measure of the endogenous latent variables, the research design can achieve this. Ideally, one would want maximize systematic variance, minimize error variance and control systematic non-relevant variance in order to increase the likelihood that H_{0i}[3] will be rejected during statistical hypothesis testing (Kerlinger, 1973; Kerlinger & Lee, 2000). Because of the complexity of the structural model, minimizing the error variance was achieved to some degree.

For this research, an *ex post facto* correlation design was used to test the overarching substantive research hypothesis. According to Kerlinger and Lee (2000), *ex post facto* correlation research is a systematic empirical inquiry in which the researcher does not have direct control of independent variables as their manifestations have already occurred or because they inherently cannot be manipulated. Random assignment and experimental manipulation are not possible in

[3] The null hypotheses referred to here are the path coefficient null hypotheses

ex post facto research. The aim is to discover what happens to one variable when the other variables change. According to Kerlinger and Lee (2000), inferences about the hypothesised relation existing between the latent variables ξ and η are made from concomitant variation in independent and dependent variables.

When structural equation modelling is used as statistical analysis technique the overarching and specific substantive research hypotheses are tested directly rather than operational hypotheses as is the case with conventional statistical analysis techniques. Operational measures of the latent variables are nonetheless required to test the overarching and path-specific research hypotheses directly. Correlation research examines the relationship of two or more variables that have not been manipulated, to establish the extent to which they co-vary (Emlyn, 2006). In terms of the logic of the *ex post facto* correlation design the researcher obtains measures on the observed variables[4] and calculates the observed covariance matrix (Kerlinger & Lee, 2000). Estimates for structural model parameters must be obtained in an iterative fashion with the purpose of reproducing the observed covariance matrix as accurately as possible (Diamantopoulos & Siguaw, 2000; Theron, 2009).

If the fitted model fails to accurately reproduce the observed covariance matrix (Kelloway, 1998), the conclusion would inevitably follow that the elaborated leadership-unit performance structural model does not provide an acceptable explanation of the observed covariance matrix. It then follows that the structural relationships hypothesised by the model do not provide an accurate portrayal of the leadership influence on unit performance. If the covariance matrix derived from the estimated structural and measurement model however closely agrees with the observed covariance matrix, it would not imply that the dynamics postulated by the structural model necessarily produced the observed covariance matrix. A high degree of fit between the observed and estimated covariance matrices would only imply that the influences portrayed in the structural model provide one plausible explanation for the observed covariance matrix (Moyo, 2009).

[4] In fitting the structural model linear composites of individual items will be used to represent latent variables.

Research in the social science more often than not does not lend itself to experimentation; a certain degree of controlled inquiry may be possible, but experimentation is not. This is the value of implementing an *ex post facto* design. Manipulation of latent variables for this study is not possible and therefore an *ex post facto* correlation design will be used to supply sufficient unambiguous empirical information on the model fit.

There are, unfortunately some limitations with regards to the use of this type of research design. With a correlation design, causality cannot be inferred (Babbie & Mouton, 2001); thus one cannot with any degree of certainty make causal inferences from the results, causing the risk of improper interpretation. When compared to experimental designs, *ex post facto* research lacks control and erroneous interpretations may result due to the possibility of more than one explanation for the obtained difference or correlation (Kerlinger & Lee, 2000). Although not true for this study, it is especially risky when there are no clearly formulated hypotheses. Secondly, the internal validity of this type of research design is low (Babbie & Mouton). Kerlinger and Lee (2000) further states that it has the inability to manipulate the independent variables and lack the power to randomise.

The argument presented throughout the literature study resulted in a series of hypotheses that reflect the manner in which leadership dimensions are expected to influence unit performance. The *ex post facto* nature of the research design, however, will preclude the drawing of causal inferences from significant path coefficients.

3.4 Statistical Hypotheses

The formats in which the statistical hypotheses are formulated depend on the logic underlying the proposed research design as well as the nature of the envisaged statistical analyses. The proposed comprehensive leadership-unit performance structural model contains a number of endogenous latent variables and the model proposes causal paths between these endogenous latent variables. The only possibility of testing the proposed structural model as an integrated, complex hypothesis is structural equation modelling. The use of multiple regression to test the proposed paths will require that the model be dissected into as many sub-models as there are endogenous latent variables. Dissecting the model will invariably result in a loss of meaning. The explanation as to why work units vary in terms of performance is not located in any specific point in the structural model, but is rather contained in the whole network of relationships between latent variables.

The notational system used in the formulation of the hypotheses follows the structural equation modelling convention associated with LISREL (Jöreskog & Sörbom, 1996b, Du Toit & Du Toit, 2001).

In accordance with the proposed relationships among the latent variables as depicted in Figure 2.3, statistical hypotheses were formulated. The ideal of this type of research would be to find exact fit, implying a model that perfectly explains the covariance between the indicator variables in the population. The overarching substantive research hypothesis states that the structural model depicted in Figure 3.2 provides a valid account for the manner in which leadership dimensions affects work unit performance. If the overarching substantive research hypothesis would be interpreted to mean that the structural model provides a perfect account of the manner in which leadership dimensions mediate the effect of work unit performance, the substantive research hypothesis translates into the following exact fit null hypothesis:

$$H_{01a}\text{:RMSEA} = 0$$

$$H_{a1a}\text{:RMSEA} > 0$$

Exact fit is highly improbable in that structural models are typically only approximations of reality and, therefore, rarely exactly fit in the population. The error of approximation is taken into account by the close fit null hypothesis and is therefore more realistic (Diamantopoulos & Sigauw, 2000). If the error, due to approximation in the population, is equal or less than .05 the model can be said to fit closely (Diamantopoulos & Sigauw, 2000). If the overarching substantive research hypothesis would be interpreted to mean that the structural model provides an approximate account of the manner in which leadership competencies mediate the effect of unit performance, the substantive research hypothesis translates in the following close fit null hypothesis:

$$H_{01b}\text{:RMSEA} \leq 0{,}05$$

$$H_{a1b}\text{:RMSEA} > 0{,}05$$

Theoverarching substantive research hypothesis was dissected into more detailed, path-specific substantive research hypotheses. These detailed research hypotheses translate into the following path coefficient statistical hypotheses:

Hypothesis 2: *Unit Rational Analytical Competence* (η_2) of the leader has a positive linear effect on *Adaptability* (η_{10}).

H_{02}: $\beta_{10,2} = 0$

H_{a2}: $\beta_{10,2} > 0$

Hypothesis 3: *Unit Rational Analytical Competence* (η_2) of the leader has a positive linear effect on *Capacity* (η_9).

H_{03}: $\beta_{92} = 0$

H_{a3}: $\beta_{92} > 0$

Hypothesis 4: *Interpersonal rational analytical competence* (η_1) of the leader has a positive linear effect on *Capacity* (η_9).

H_{04}: $\beta_{91} = 0$

H_{a4}: $\beta_{91} > 0$

Hypothesis 5: *Interpersonal affective competence* (ξ_2) of the leader has a positive linear effect on *Core People Processes* (η_7).

H_{05}: $\gamma_{72} = 0$

H_{a5}: $\gamma_{72} > 0$

Hypothesis 6: *Unit Affective Interactive Leader Competence* (ξ_1) has a positive linear effect on *Core People Processes* (η_7).

H_{06}: $\gamma_{71} = 0$

H_{a6}: $\gamma_{71} > 0$

Hypothesis 7: *Intra personal leader competence* (ξ_3) has a positive effect on *Unit Rational Analytical Competence* (η_2).

H_{07}: $\gamma_{23} = 0$

H_{a7}: $\gamma_{23} > 0$

Hypothesis 8:

Intra personal leader competence (ξ_3) has a positive effect on *Interpersonal Rational Analytical Competence* (η_1).

H_{08}: $\gamma_{13} = 0$

H_{a8}: $\gamma_{13} > 0$

Hypothesis 9: A significant positive causal relationship exists between *Production* (η_5) and *Market standing* (η_8).

H_{09}: $\beta_{85} = 0$

H_{a9}: $\beta_{85} > 0$

Hypothesis 10: A significant positive causal relationship exists between *Climate* (η_4) and *Production* (η_5).

H_{010}: $\beta_{54} = 0$

H_{a10}: $\beta_{54} > 0$

Hypothesis 11: A significant positive causal relationship exists between *Satisfaction* (η_3) and *Climate* (η_4).

H_{011}: $\beta_{43} = 0$

H_{a11}: $\beta_{43} > 0$

Hypothesis 12: A significant positive causal relationship exists between *Adaptability* (η_{10}) and *Satisfaction* (η_3).

H_{012}: $\beta_{3,10} = 0$

H_{a12}: $\beta_{3,10} > 0$

Hypothesis 13: A significant positive causal relationship exists between *Adaptability* (η_{10}) and *Capacity* (η_9).

H_{013}: $\beta_{9,10} = 0$

H_{a13}: $\beta_{9,10} > 0$

Hypothesis 14: A significant positivecausal relationship exists between *Adaptability* (η_{10}) and *Market standing* (η_8).

H_{014}: $\beta_{8,10} = 0$

H_{a14}: $\beta_{8,10} > 0$

Hypothesis 15: A significant positive causal relationship exists between *Capacity* (η_9) and *Production* (η_5).

H_{015}: $\beta_{59} = 0$

H_{a15}: $\beta_{59} > 0$

Hypothesis 16: A significant positive causal relationship exists between *Capacity* (η_9) and *Future growth* (η_6).

H_{016}: $\beta_{69} = 0$

H_{a16}: $\beta_{69} > 0$

Hypothesis 17: A significant positive causal relationship exists between *Market standing* (η_8) and *Future growth* (η_6).

H_{017}: $\beta_{68} = 0$

H_{a17}: $\beta_{68} > 0$

Hypothesis 18: A significant positive causal relationship exists between *Core people processes* (η_7) and *Production* (η_5).

H_{018}: $\beta_{57} = 0$

H_{a18}: $\beta_{57} > 0$

Hypothesis 19: A significant positive causal relationship exists between *Core people processes* (η_7) and *Climate* (η_4).

H_{019}: $\beta_{47} = 0$

H_{a19}: $\beta_{47} > 0$

Hypothesis 20: A significant positive causal relationship exists between *Core people processes* (η_7) and *Satisfaction* (η_3).

H_{020}: $\beta_{37} = 0$

H_{a20}: $\beta_{37} > 0$

Hypothesis 21: A significant positive causal relationship exists between *Adaptability* (η_{10}) and *Production* (η_5).

H_{021}: $\beta_{510} = 0$

H_{a21}: $\beta_{510} > 0$

Hypothesis 22: A significant positive causal relationship exists between *Core people processes* (η_7) and *Future Growth* (η_6).

H_{022}: $\beta_{510} = 0$

H_{a22}: $\beta_{510} > 0$

Hypothesis 23: A significant positive causal relationship exists between *Core people processes* (η_7) and *Adaptability* (η_{10}).

H_{023}: $\beta_{107} = 0$

H_{a23}: $\beta_{107} > 0$

3.5 Measurement Instruments

To evaluate the fit of the comprehensive leadership-work unit performance structural model depicted in Figure 3.2, in accordance with the directives of the *ex post facto* correlation design, the latent variables comprising the model had to be operationalised.

Measures of various exogenous and endogenous variables comprising the model are needed to obtain empirical proof that the relationship hypothesised by the leadership-unit performance structural model provides a credible explanation for differences observed in unit performance. To deduce valid and credible conclusions of the ability of the proposed learning potential structural model to explain variance in work unit performance, evidence is needed that the manifest indicators are indeed valid and reliable measures of the latent variables they are linked to.

Part of the evidence needed to establish the psychometric integrity of the indicator variables, used to operationalise the latent variables comprising the proposed leadership-work unit performance structural model, is presented below. Research evidence in the literature on the reliability and validity of the selected measuring instruments is presented to justify the choice of existing measuring instruments.

3.5.1 The Performance Index

Spangenberg and Theron (2004) developed the Performance Index (PI). It is a generic and standardised unit performance measure that encompasses the unit performance dimensions for which a leader could be held responsible. All available data on the PI were analysed by Dunbar, Theron and Spangenberg (2011). Two samples were randomly created from the existing PI data archive maintained from 2004 until 2008 by Psychology at Work[5] from the University of Stellenbosch Business School. The data archive arose from the commercial use of the PI. The existing PI data archive contains 1789 completed questionnaires.

Item analysis was conducted on each of the two samples after imputing missing values. Each of the eight PI sub-scales were item analysed independently through the PASW Reliability Procedure (PASW 18 for Windows, 2010). A summary of

[5]Psychology@Work is a human resource management consultancy that was at the time contracted by the Graduate School of Business to administer and score the LBI and PI.

results of the item analyses for Sample A and Sample B are shown in Table 3.1 (Dunbar, Theron & Spangenberg, 2011).

Table 3.1.

Reliability of PI sub-scales for random samples after imputation of missing values

		Sample A (n_A=816)			Sample B (n_B=817)		
Scale	Number of items	Alpha	Mean	Variance	Alpha	Mean	Variance
Product	5	.829	18.866	10.133	.815	18.977	8.846
Core people	9	.872	31.901	36.962	.858	31.908	34.081
Climate	7	.902	25.205	25.724	.901	25.493	25.373
Satisfaction	9	.911	30.358	39.636	.903	31.017	38.581
Adaptability	7	.866	23.899	22.059	.851	24.051	20.811
Capacity	7	.826	23.409	19.130	.791	23.632	17.198
Market standing	7	.862	24.352	21.238	.832	24.439	19.059
Future growth	5	.803	16.794	10.401	.771	16.864	9.560

(Dunbar *et al*., 2011)

To confirm the uni-dimensionality of each sub-scale Dunbar *et al*. (2011) performed unrestricted principal axis factor analysis with oblique rotation on each of the eight PI sub-scales individually for each sample. The results of the principal axis factor analysis are summarised in Table 3.2 for the two samples.

Table 3.2.

Principal axis factor analyses of PI sub-scale measures for random samples after imputation of missing values

Sample A

Sub-scale	KMO	% Variance explained	Number of factors with eigenvalues>1	Min factor loading	Max factor loading	% residual r>.05
Product	.848	49.951	1	.648	.760	0
Core people	.924	43.891	1	.502	.725	11
Climate	.903	57.058	1	.720	.804	33
		Factor 1:55.270		.529	.925	
Satisfaction	.920	Factor 2:8.219	2	.477	.810	0
		Single forced factor: 54.361		.525	.845	72
Adaptability	.880	48.479	1	.560	.762	52
Capacity	.879	41.831	1	.460	.771	28
Market standing	.863	47.962	1	.632	.769	47
Future growth	.763	46.335	1	.586	.755	80

Sample B

Sub-scale	KMO	% Variance explained	Number of factors with eigenvalues>1	Min factor loading	Max factor loading	% residual r>.05
Product	.833	47.458	1	.604	.777	10
Core people	.921	40.867	1	.496	.709	5
Climate	.897	56.666	1	.702	.799	52
Satisfaction	.918	Factor 1:53.467 Factor 2:8.817 Single forced factor: 52.563	2	.628 .436 .468	.901 .810 .845	 0 61
Adaptability	.870	45.876	1	.538	.770	33
Capacity	.841	Factor 1: 38.031 Factor 2: 6.463 Single forced factor: 37.185	2	.648 .661 .445	.787 .669 .752	 0 42
Market standing	.845	42.252	1	.585	.758	38
Future growth	.765	41.503	1	.544	.712	70

(Dunbar *et al*., 2011)

LISREL 8.8 (Du Toit & Du Toit, 2001) was used to fit the PI single-group measurement model independently to each of the two samples. The results of the confirmatory factor analysis on the two samples are shown in Table 3.3.

Table 3.3.

Single-group measurement model fit statistics

Model	Df	S-B χ^2	RMSEA	CFI	Γ_1	Mc	Decision on model fit
Sample A	1456	4059.450 (p=.0)	.0468 (p=.999)	.983	.897609	.202503	Reject exact fit null hypothesis. Do not reject close fit null hypothesis
Sample B	1456	4245.767 (p=.0)	.0485 (p=.932)	.982	.89118	.180956	Reject exact fit null hypothesis. Do not reject close fit null hypothesis

(Dunbar *et al*., 2011)

The results reported in Table 3.1, Table 3.2 and Table 3.3 indicate that the PI can be considered a reliable and valid measure of the organisational unit performance as constitutively defined by the PI (see Table 2.1).

The PI is a 360° instrument and thus work units ideally have to be rated by the unit leaders, superiors, peers and subordinates. The PI consists of 56 questions covering the eight latent variables. A 5-point Likert scale is used to obtain ratings. Verbal anchors are on scale points 5, 3, and 1.

Two item parcels were calculated for each of the latent performance dimensions. This was done by taking the mean of the even and uneven numbered items to form two composite indicator variables for each of the eight latent organisational unit performance dimensions in the structural model.

3.5.2 Leadership Behaviour Inventory

Version 1 of the Leadership Behavioural Inventory (LBI) was used to assess the leadership competencies. From a practical perspective the 96-item LBI is a relatively long questionnaire compared to other highly regarded, well researched inventories such as the MLQ (Bass & Avolio, 1998) and the LPI (Kouzes & Posner, 1987). The advantage of the LBI, however, is that its extensive coverage and transformation processes would in most leadership assessment situations render the use of additional 360° instruments unnecessary. The LBI was used as a single assessment tool.

The LBI was not developed to identify leadership potential amongst individuals currently not in a leadership position. The LBI measures leadership competencies in individuals currently occupying leadership positions and currently fulfilling leadership roles (Theron & Spangenberg, 2005).

Each of the twenty-four LBI sub-scales were item analysed through the SPSS Reliability Procedure (SPSS, 1990) to identify and eliminate items not contributing to an internally consistent description of the leadership facet in question. Relatively high item homogeneity was found for each sub-scale, as indicated by the Cronbach alpha (lowest of .774). This is regarded as acceptable although not altogether satisfactory.

LISREL 8.88 (Du Toit & Du Toit, 2001; Jöreskog *et al*., 2000) was used to perform confirmatory first-order factor analyses on the LBI1 to determine the fit of a measurement model in which the individual items were used to represent the latent first-order leadership dimensions. For the purpose of the confirmatory factor analysis the validation sample was randomly split into two samples so as to circumvent the problem of excessive statistical power. For both samples the null hypothesis of exact model fit was rejected (p<.05). For both groups the null hypothesis of close fit was not rejected; RMSEA values of .048 and .053 were obtained for sample 1 and sample 2 respectively. The remainder of the fit indices also indicated reasonably good model fit. All factor loadings were statistically significant in both samples. Squared multiple correlations for the individual items were satisfactory in both samples (Spangenberg & Theron, 2011a).

Two item parcels were calculated for each of the second-order leadership factors by taking the mean of the even and uneven numbered items in the subscales of the first-order leadership factors that load on each second-order factor to form two composite indicator variables for each of the five latent second-order leadership competencies in the structural model.

3.6 Sample

“The bigger the sample size the better” is a general rule for all research studies. The extent to which observations can, or may be generalised, to the target population is a function of the number of subjects in the chosen sample, as well as the representativeness of the sample, while the power of inferential statistics tests also depends on sample size (De Goede & Theron, 2010). One of the reasons for using a large sample is the implication it has for error, i.e. how much the sample deviates from the population. The larger the sample size, the smaller the error, and therefore the more accurate the calculation of statistics (Kerlinger, 1973).

The unit of analysis in this study is the organisational work unit[6]. The target population implied by the research initiating question is a vast one. All organisational units in South Africa that satisfy the Spangenberg and Theron (2004) definition of an organisational unit are units of analysis in the target population. Spangenberg and Theron (2004, p. 20) defines an organisational work unit as:

> A permanent or semi-permanent organisational entity, nested in a public, private or not-for-profit organisation with specific, identifiable and measurable performance goals for which it

[6]The unit of analysis also could have been defined as the organizational work unit leader. The focus in this study, however, falls on the unit. The research objective is to explain variance in unit performance. The nature of the leadership that stands at the helm of the unit is hypothesized to be a unit characteristic that affects its performance.

is held accountable by higher management structures. The size of a work unit may vary from small, i.e. a leader and at least three followers to large, comprising a large staff complement.

Given the nature and magnitude of the target population it is clearly not possible or practical to obtain measurements from every organisational work unit in the target population (N). A more viable option would be to focus on a representative sample (n) of the target population. The extent to which observations can be generalized to the target population is a function of the number of subjects in the chosen sample and the representativeness of the sample. The ideal would be for the sampling and target population to coincide. The objective should be to try and minimize the gap between the target and sampling populations (Theron, 2009). The ultimate purpose of sampling is to select a set of elements from a population in such a way that descriptions of those elements accurately portray the parameters of the total population from which the elements are selected (Babbie & Mouton, 2001, p. 175).

Sample sizes of at least 200 observations are seemingly satisfactory for most SEM applications (Kelloway, 1998; MacCallum, Browne & Sugawa, 1996).

A consideration to take into account when deciding on the appropriate sample size is the statistical power associated with the test of the hypothesis of close fit. The power of inferential statistical tests depends on the sample size. Statistical power refers to the conditional probability of rejecting the null hypothesis of close fit given that it is false (P[reject H_0: RMSEA$\leq$.05|H_0 false]), (De Goede, 2004). This refers to the probability of rejecting an incorrect model. The importance of conducting a power analysis stems from the critical role sample size plays in the decision making process in model testing (Diamantopoulos & Siguaw, 2000). When the statistical power of the test of close fit is too low it means that even if the model fit is actually mediocre there is a real risk that the close fit null hypothesis will still not be rejected.

Although not rejecting the close fit null hypothesis generally should be considered a favourable outcome, under conditions of low power this outcome does not provide very compelling evidence on the validity of the model. Too high statistical power on the other hand means that any attempt to obtain formal empirical proof for the validity of the model would be very difficult to obtain. Even a small deviation from close fit would result in a rejection of the close fit null hypothesis. MacCallum, Browne and Sugawara (1996) developed power tables that can be consulted to determine the sample size required to set the statistical power of the test of close fit to .80. According to these tables a sample of 296 observations would be required to ensure statistical power of .80 when testing the exact fit hypothesis for a model with 36 degrees of freedom, if the probability of a Type I error is testing the null hypothesis of exact fit is fixed at .05 i.e., [P(reject H_0: RMSEA=0|RMSEA=.05)].

The tables further indicate that a sample size of 274 subjects is required to ensure a ,80 probability of not rejecting an incorrect model with 36 degrees of freedom, if the probability of a Type I error in testing the null hypothesis of close fit is fixed at .05 (MacCullum *et al*., 1996) [i.e., P(reject H_0: RMSEA=.05|RMSEA=.08)].

An issue that should be considered when deciding on the appropriate sample size is the ratio of sample size to the number of parameters to be estimated. A minimum requirement is that the number of observations in the sample exceeds the number of freed parameters that have to be estimated. Bentler and Chou (cited in Kelloway, 1998, p. 20) recommend that the ratio of number of observations to the number of freed model parameter should fall in the interval 5:1 and 10:1. The proposed structural model and the proposed procedure for operationalising the latent variables would in terms of the Bentler and Chou guideline (cited in Kelloway, 1998) require a sample of 420-840 organisational work units to provide a credible test of the comprehensive model in which 99 freed measurement and structural model parameters have to be estimated. The power tables mentioned above were consequently used to derive sample size estimates for the test of close fit, given the effect sizes assumed above, a significance level (α) of 0,05, a power level of .80 and degrees of freedom (v) of (½[(p+q][p+q+1]-t)=666-99=567.

Another aspect that needs to be taken into account when deciding on the appropriate sample size is practical and logistical considerations like cost, availability of suitable respondents and the willingness of the employer to commit large numbers of employees to the research.

The nature of the target population leaves little option but to utilize a non-probability sampling procedure for this study. The use of this type of sampling procedure precludes the unqualified generalization of the findings to the target population. This would not be regarded as overly serious as the objective of this study is to corroborate the hypothesised relationship between specific leadership dimensions and the specific dimensions of unit performance, and not to describe the target population in terms of leadership and unit performance.

To be included in this research, work units had to meet the requirements of a work unit as defined in the introduction of this paper. In addition the unit managerhad tobe in their current position for at least six months. The researcher approached an organisation within the banking sector and ultimately conducted two 360-degree assessments on both branch managers and their work-unit. The sample organisation has a diverse workforce with multiple branches in South Africa. Branch managers completed the LBI2 and those branch managers' followers completed the PI. The data collection, however, did not succeed as far too few questionnaires were completed. Also, there were not enough corresponding LBI2 and PI questionnaires per branch manager completed. The primary reasons for the failure of the data collection exercise at the organisation within the banking sector seem to have been the sheer magnitude of the operation in conjunction with the fact that the organisation did not initiate the data collection exercise on its own initiative. The data collection operation therefore lacked grassroots level support.

Due to logistical and financial reasons, archive LBI [rather than the LBI2] as well as PI data from Psychology at Work was used to test the structural model instead. The archival database maintained by Psychology at Work did not contain any biographical information. Although it is undesirable to use data with no biographical information, the anonymity of the observations precluded any possibility of collecting biographical information *post hoc*.

The archival data set obtained from Psychology at Work contained 327 observations. The observations were multi-rater assessments of 356 leaders on the LBI and of their units on the PI. The original data set was aggregated at the item level for each leader/unit. The data set that was therefore used to evaluate the fit the hypothesised leadership-unit performance structural model depicted in Figure 2.3 consisted of 356 observations.

3.7 Missing Values

The issue of missing values needed to be addressed before the data could be analysed. The method used depended on the number of missing values as well as the nature of the data. Multivariate data sets more often than not contain missing values, which may result from non-responses, absenteeism etc. (Mels, 2003).

The likelihood of missing values is reduced when instruments are administered electronically in a manner that insists that respondents respond to each item. The instruments nonetheless make provision for the response alternative “unable to observe”. These responses were coded as user-defined missing values. The presence of such missing values was assessed and appropriately treated before the data was analysed. To date, no clear guidelines exist regarding what constitutes a large amount of missing data, although Kline (1999) suggests that they should not exceed 10% of the total data.

The manner in which missing values was treated depended on the number of missing values, whether the indicator variable distribution follows a multivariate normal distribution and the nature of the missing value mechanism. Various options exist to treat the problem of missing values. Multiple imputations were used to solve the missing value problem in this study. The choice of procedure is motivated in Section 4.2.

3.8 Statistical Analysis

Item analysis, dimensionality analysis by means of exploratory factor analysis and structural equation modelling (SEM) was used to analyse the questionnaire data and to test the proposed leadership-unit performance structural model depicted in Figure 2.3.

3.8.1 Item Analysis

The various subscales comprising the PI and LBI that were used to operationalise the latent variables comprising the structural model depicted in Figure 2.3 were developed to measure specific dimensions of two constructs each carrying a specific constitutive definition. Items have been developed to reflect the standing of leaders and organisational units on these specific latent variables. The items were developed to function as stimulus sets to which respondents react with behavioural responses that are relatively uncontaminated behavioural manifestations of the specific leadership or organisational unit performance latent variable. If these design intentions were successful in the development of the PI and the LBI it should reflect in a number of item statistics.

Item analysis was consequently conducted to determine the extent to which the items comprising the PI and LBI serve their intended purpose. The objective of item analysis was to identify items that do not successfully reflect the intended latent variable[7]. Poor items are items that are insensitive and do not discriminate between different states of the latent variable they are meant to reflect and items that do not, respond in synchronised manner along with the other items of a subscale to differences in the level of the latent variable across units of analysis. Items that do not contribute to an internally consistent description of the sub-scales of the measuring instruments were earmarked for possible deletion. Item analysis was conducted on each of the PI subscales and on the twenty-four subscales of the LBI. Items were not deleted based on any single item statistic. A basket of evidence was considered before taking a decision on the removal of any item. The basket of evidence included amongst others the following classical measurement theory item statistics: the item-total correlation, the squared multiple correlation, the change in subscale reliability when the item is deleted, the change in subscale variance if the item is deleted, the inter-item correlations, the item mean and the item standard deviation (Murphy & Davidshofer, 2005). Deletion of items, however, only applied to the formation of indicator variables for the purpose of testing the leadership-unit

[7]Neither the item analyses nor the exploratory factor analyses of the various scales provide sufficient evidence to permit a conclusive verdict on the construct validity of the PI or the LBI. To obtain more conclusive evidence on the construct validity of the two instruments the measurement models mapping the items on the latent variables will have to be elaborated into fully fledged structural models that reflect the constitutive definitions' stance on the manner in which the two constructs are embedded in larger nomological networks of latent variables.

performance structural model and will not apply to the general use of the instruments.

SPSS version 19 (SPSS, 2011) was used to perform the item analyses.

3.8.2 Dimensionality analysis via exploratory factor analysis

The architecture of each of the PI and LBI subscales used to operationalise the latent variables comprising the leadership-unit performance structural model reflects the intention to construct essentially one-dimensional sets of items. The items comprising the various PI and LBI subscales were designed to operate as stimulus sets to which respondents will react with behaviour that is primarily a manifestation of a specific uni-dimensional latent leadership or unit performance dimension. The manner in which respondents react to each item is however never only dependent on the latent leadership or unit performance dimension they were tasked to reflect but also on a number of other systematic but non-relevant latent variables and random error influences (Ghiselli, Campbell & Zedeck, 1981). The systematic error does, however not correlate across items of a subscale. The assumption therefore is that only the relevant latent leadership or unit performance dimensions are common sources of systematic variance. This implies that if the latent variable of interest would be statistically controlled, the partial correlation between items would approach zero (Hulin, Drasgow & Parson, 1983). The design intention with the development of the PI and LBI in addition was to obtain items that load relatively strongly on the specific underlying latent variable the subscale aspires to measure.

Exploratory factor analysis was performed on each of the subscales of the PI and the LBI. This was used to examine the assumption that each subscale is essentially uni-dimensional in the sense described above and to examine the assumption that the items comprising the subscale provide relatively uncontaminated measures of latent variable of interest. Principal axis factor analysis was used as extraction technique (Tabachnick & Fidell, 2001) and that, in the case of factor fission, the extracted solution was rotated to an oblique solution. Principal axis factoring (PAF) is preferred over principal component factor analysis (PCA). PAF only analyses common variance shared between the items comprising a subscale whereas PCA analyses all the variance (Tabachnick & Fidell, 2001). The assumption that the extracted factors necessarily will be uncorrelated seems a too unrealistic assumption to make. The loading of items on factors will be considered satisfactory if λ_{ij}> 0,50. Hair *et al*.(2006) recommend in the context of confirmatory factor analysis that factor loadings should be considered satisfactory if λ_{ij}> ,71. The Hair *et al*. (2006) critical cut-off value is regarded as overly strict in the case of individual items but will be utilised when interpreting the factor loadings of the item parcels in the measurement model fitted prior to the evaluation of the fit of the structural model.

SPSS version 19 (SPSS, 2011) was used to perform the dimensionality analyses.

3.8.3 Testing the LBI second-order factor structure on the LBI 2

A second-order leadership structure has been proposed for the LBI. The validity of the proposed second-order structure has been empirically tested and has been received empirical support (Theron & Spangenberg, 2005). The second-order factors have been used to develop the leadership-unit performance structural model depicted in Figure 2.3. The original intention was to use the LBI 2 rather than the original LBI in this study. That would have begged the question whether the five factor second-order leadership structure described in Table 2.3 also applies to the LBI 2?

The second-order factor structure proposed by Theron and Spangenberg (2005) was not empirically tested in this study. Neither was the first-order measurement models of the PI and the LBI subjected to empirical test.

3.8.4 Structural Equation Modelling

3.8.4.1 Variable type

The measurement level on which the indicator variables used to operationalise the latent variables in the structural model determine the appropriate moment matrix to analyse and the appropriate estimation technique to use to estimate freed model parameters. Two linear composites of individual items have been formed to represent each of the latent unit performance dimensions when evaluating the fit of the structural model. In the case of the second-order leadership factors two linear composites of individual items have been formed from the items of the subscales measuring the first-order LBI factors that load onto the second-order factor. This simplifies the task of fitting the structural model, reduces the size of the sample that is required to fit the model and results in more reliable indicator variables (Nunnally, 1978).

There are, however, indications in the literature that solutions in confirmatory factor analysis tend to improve with increasing number of indicators per factor (Marsh, Hau, Balla and Grayson, 1998). The size of the sample that would have been required to allow credible parameter estimates[8] if the individual items would have been used as indicator variables lead to the decision to rather use item parcels than individual items to represent the latent variables when fitting the structural model. Based on this decision the assumption is made that the indicator variables are continuance variables, measured on an interval level (Jöreskog & Sörbom, 1996b; Mels, 2003). Maximum likelihood estimation was therefore used to obtain estimates. The covariance matrix was analysed with LISREL 8.8 (Du Toit & du Toit, 2001; Mels, 2003).

3.8.4.2 Multivariate normality

The maximum likelihood estimation technique is rooted in the assumption that the indicator variables used to operationalise the latent variables in the structural model follow a multivariate normal distribution. The null hypothesis that this assumption is satisfied was subsequently formally tested in PRELIS. It was decided that if the null hypothesis of multivariate normality is rejected, normalisation would be attempted (Jöreskog & Sörbom, 1996a). The success of the attempt at normalising the data was evaluated by testing the null hypothesis that the normalised indicator variable distribution follows a multivariate normal distribution. It was further decided that if the

[8]An increase in the number of indicator variables increases the number of factor loading and error variance parameters that have to be estimated.

null hypothesis of multivariate normality is still rejected, robust maximum likelihood estimation would be used (Mels, 2003).

3.8.4.3 Confirmatory factor analysis

The substantive research hypotheses are tested by fitting the comprehensive LISREL model. The comprehensive LISREL model comprises a structural model describing the nature of the hypothesised relationships between the latent variables, an endogenous measurement model and an exogenous measurement model. The latter two measurement models describe the nature of the hypothesised relationships between the latent variables and the indicator variables tasked to represent them (in this case item parcels). Structural model fit indices can only be interpreted unambiguously for or against the fitted structural model if it can be shown that the indicator variables used to operationalise the latent variables when fitting the structural model successfully reflected the latent variables they were assigned to represent. The fit of the measurement models used to operationalise the structural model therefore needs to be evaluated prior to fitting the structural model. Rather than fitting the endogenous and exogenous measurement models as separate models the two models have been combined and fitted as a single exogenous measurement model.

The covariance matrix was analysed when fitting the measurement model. Estimates of the freed measurement model parameters were derived via maximum likelihood estimation. This occurs if the multivariate normality assumption is satisfied (before or after normalization). It was decided that if normalisation were to fail to achieve multivariate normality in the indicator variable distribution robust maximum likelihood estimation would be used to estimate the freed measurement model parameters. LISREL 8.8 (Du Toit & Du Toit, 2001) was decided to be used to perform the confirmatory factor analysis.

When evaluating the fit of the measurement model the hypothesis being evaluated is that the measurement model provides a valid description of the process that brought about the observed covariance matrix (Hair *et al*., 2006). If the measurement hypothesis istaken to mean that the measurement model perfectly captures the manner in which the latent variables manifest themselves in the indicator variables, the measurement hypothesis translates into the following exact fit null hypothesis:

H_{021a}:RMSEA = 0

H_{a21a}:RMSEA > 0

If the measurement hypothesis is, however, interpreted to mean that the measurement model only provides an approximate description of the process that produced the observed covariance matrix, the measurement hypothesis translates into the following close fit null hypothesis:

H_{021b}:RMSEA≤ 0,05

H_{a21b}:RMSEA> 0,05

It was decided that if H_{021b} fails to be rejected or if at least reasonable measurement model fit is obtained, H_{0p}: $\lambda_{ij} = 0$; p = 22, 33, …, 47[9]; i = 1, 2, …, 26; j = 1, 2, …, 13 will be tested for the freed factor loadings against H_{ap}: $\lambda_{ij} > 0$; p = 22, 33, …, 47; I = 1, 2, …, 26; j = 1, 2, …, 13.

3.8.4.4 Interpretation of measurement model fit and parameter estimates

Measurement model fit was interpreted by inspecting the full spectrum of fit statistics printed by LISREL (Diamantopoulos & Siguaw, 2000). The magnitude and distribution of the standardised residuals and the magnitude of the model modification indices calculated for the $\Lambda^X$and Θ_ε matrices were in addition examined to arrive at a verdict on the goodness of the fit of the measurement model. Large modification index values indicated measurement model parameters that, if set free, would significantly improve the fit of the model. Large number of large and significant modification index values comment negatively on fit of the model in as far as it suggests that numerous possibilities exist to improve the fit of the model proposed

[9]There are 26factor loadings freed in the 26 x 13Λ^X factor loading matrix.

by the researcher. Inspection of the model modification indices for the aforementioned matrices here do not serve the purpose of revising the model but rather of commenting on the fit of the model.

It was decided that factor loading estimates will be regarded asacceptable if the completely standardised factor loading estimates are equal to or exceed .71 (Hair *et al*., 2006). If item parcels satisfy this criterion it implies that at least 50% of the variance in the indicator variables can be explained by the latent variables they were assigned to represent.

3.8.4.5 Fitting of the structural model

If H_{021b} fails to be rejected or if at least reasonable measurement model fit is obtained; if H_{022} – H_{047} are rejected; and if the completely standardised factor loading are sufficiently large, the fit of the structural model will be evaluated by testing H_{01a} and H_{01b}. Estimates were obtained for the freed structural model parameters by analysing the covariance matrix. Maximum likelihood estimation will be used if the multivariate normality assumption is satisfied (before or after normalization). If normalization would fail to satisfy the assumption that the indicator variable distribution follows multivariate normal distribution robust maximum likelihood estimation willbe used. LISREL 8.8 (Du Toit & Du Toit, 2001) was used to fit the comprehensive model.

3.8.4.6 Interpretation of structural model fit and parameter estimates

The comprehensive LISREL model fit was evaluated by inspecting the full spectrum of fit indices printed in the output provided by LISREL (Diamantopoulos & Siguaw, 2000). The magnitude and distribution of the standardised residuals and the magnitude of model modification indices calculated for the Γ, $\mathbf{B}$ and Ψ matrices were also used to arrive at a verdict on the fit of the comprehensive model. Large modification index values indicate structural model parameters that, if set free, would improve the fit of the model. If a large number of large and significant modification index values exist in the Γ, $\mathbf{B}$ and Ψ matrices it suggests that numerous possibilities exist to improve the fit of the model proposed by the researcher. If there are numerous ways in which the fit of the existing model can be improved by altering the structural model it comments negatively of the fit of the current model. Inspection of the model modification indices at this stage primarily served the purpose of commenting on the model fit. Inspection of the model modification calculated for the $\mathbf{\Gamma}$ and $\mathbf{B}$ matrices has, however, later been used to explore possible modifications to the current structural model if such modifications made substantive theoretical sense.

If H_{02b} is not rejected and close model fit is obtained, or if at least reasonable structural model fit is obtained, H_{02} – H_{020} will be tested. The magnitude of the direct effect completely standardised path coefficients were interpreted for all significant path coefficients. The proportion of variance explained in each of the endogenous latent variables by the model was interpreted.

In the final analysis, the structural model depicted in Figure 2.3 can be considered to provide a satisfactory and plausible description of the process that causes variance in organisational unit performance if:

- The model fits the data well;
- The path coefficients for the hypothesised structural relations are significant, and;
- The model explains a substantial proportion of the variance in each of the endogenous latent variables.

3.8.4.7 Considering possible structural model modification

Despite diligent theorising on the manner in which the leadership competencies combine to affect unit performance is almost inevitable that the researcher has failed to fully capture all the intricacies of the complex cunning logic at work in the manner that leaders affect the performance levels of their units. This can be due to omission of influential latent variables. Part of this failure, however, also lies in the initial inability of the researcher to have picked up on theoretically meaningful structural linkages between latent variables that are included in the model. The modification indices (Diamantopoulos & Siguaw, 2000) calculated by LISREL for the Γ and $\mathbf{B}$ matrices indicate currently excluded structural paths that would significantly improve the fit of the comprehensive model. The completely standardised expected change values indicate the expected magnitude of the parameter estimates if the paths would be freed. The modification index values and the completely standardised change values were used to decide whether any meaningful possibilities exist to improve the fit of the model through the addition of additional paths. Modification of the model were however only considered if such alternations are theoretically sound (Diamantopoulos & Siguaw, 2000; Henning, Theron & Spangenberg, 2004).

3.9 Summary

In this section the hypotheses relevant to the study were stated, as well as the decided upon research methodology to be used to test the hypotheses. An overview of the research design, sampling technique and the resultant sample measuring instruments and statistical analysis techniques was provided.

CHAPTER 4

RESEARCH RESULTS

4.1 Introduction

The purpose of this chapter is to present and discuss the statistical results of the various analyses performed, as accounted for in Chapter 3. The objective of this study was to develop and empirically test the comprehensive leadership-work unit performance structural model. The theoretical argument presented in the literature study resulted in the inclusion of rational-analytical unit related behaviours, affective-interactive unit related behaviours, rational-analytical inter-individual related behaviours, affective-interactive inter-individual related behaviours and intra-personal behaviour as additional latent variables in the original PI model as depicted in Figure 2.1. The resultant elaborated structural model was depicted in Figure 2.3. The overarching substantive hypothesis was that the structural model depicted in Figure 2.3 provides a valid account of how leadership competencies influence work-unit performance. The overarching substantive research hypothesis was dissected into nineteen more detailed, path-specific (direct effect) substantive research hypotheses. The overarching hypothesis as well as substantive hypotheses were translated into statistical hypotheses.

This chapter is dedicated to report on the results of the statistical analyses aimed at testing the stated null hypotheses. The treatment of missing values, dimensionality analyses and item analyses will first be discussed to establish the psychometric integrity of the indicator variables used to represent the various latent variables. This will be followed by an evaluation of the extent to which the data satisfied the statistical data assumptions relevant to the data analysis techniques utilised. The fit of the measurement model is subsequently evaluated. In evaluating the success with which the latent variables comprising the structural model have been operationalised, no distinction is made between the exogenous and endogenous measurement models. On condition of acceptable measurement model fit, the structural model was to be considered.

4.2 Missing Values

The presence of missing values had to be addressed as it is a part of almost all research. Missing data can result in serious problems in data analysis. The severity thereof depends on the reasons for the missing data, the quantity of the missing data, as well as the patterns thereof. The researcher can gain valuable information from the pattern of missing data. Missing values scattered randomly across the data pose less severe problems than those values scattered in a non-random pattern. The latter is serious because they affect the generalizability of the result (Tabachnick & Fidell, 2001).

The method used to impute missing values depends on the number of missing values, the mechanism that produced the missing data as well as the nature of the data, especially whether the assumption for multivariate normality is met. The dataset had few missing values. Nevertheless the presence thereof needed to be addressed before the data could be analysed. Various options are available when dealing with missing values which are briefly discussed below (Du Toit & Du Toit, 2001; Mels, 2003).

The following options were considered:

- List-wise deletion
- Pair-wise deletion
- Imputation by matching
- Multiple imputations
- Full information maximum likelihood

List-wise deletion requires the deletion of complete cases when there are missing values on one or more of the indicator variables (Dunbar-Isaacson, 2006). An important pitfall with this option is that the size of the sample could be significantly reduced which could result in sampling bias (Du Toit & Du Toit, 2001). However, the main advantage of this method is that all analyses are conducted with the same number of cases.

The second option focuses on deleting cases only for analysis on variables where values are missing (Dunbar-Isaacson, 2006). Pair-wise deletion only deletesthose cases that have missing values on the indicator variables involved in the particular analysis. The disadvantage of *pair-wise deletion* is that deletion can produce problems in the calculation of the various covariance matrixes when the effective sample size for the calculation of the various covariance terms differs markedly.

The technique of *imputation by matching* assigns values from other cases with similar observed values on a set of matching variables to cases with missing values on a specific variable. A minimisation criterion regulates whether missing values are imputed (Jöreskog & Sörbom as cited in Dunbar-Isaacson, 2006). Imputation does not take place for a case if the minimization criterion is not satisfied or if no observation exists that has complete data on the set of matching variables (Enders *et al*. as cited in Dunbar-Isaacson, 2006). The procedure, however, still assumes that the data values are missing at random.

The technique of *multiple imputations* imputes a number of values for each missing value. Each imputation creates a complete data set (Davey *et al*, Raghunatha & Schafer as cited in Dunbar-Isaacson, 2006, p. 29). In LISREL, missing values for each case are substituted with the average of the values imputed in each of the data sets (Du Toit & Du Toit, 2001). Plausible values are therefore delivered whilst also reflecting the uncertainty in the estimates. Multiple imputation assumes that data is missing at random and that the observed data follows an underlying multivariate normal distribution (Du Toit & Du Toit, 2001).

Full information maximum likelihood (FIML) utilises an iterative approach, the expectation-maximisation (EM) algorithm, which computes a case-wise likelihood function using only the variables that are observed for specific cases. Estimates of missing values are obtained based on the incomplete observed data to maximise the observed data likelihood (Enders & Bandalos, 2001). The disadvantage of the FIML procedure is that it directly returns a covariance matrix calculated from the imputed data. Further item analysis, dimensionality analysis and the calculation of item parcels is therefore not possible. FIML also assumes that data is missing at random and that the observed data follows an underlying multivariate normal distribution (Du Toit & Du Toit, 2001).

Based on the foregoing considerations, it was decided to use multiple imputations to treat the problem of missing values. The items can be considered as continuous variables (5 or more scale points) and the items distributions approximately follow symmetric, mesokurtic distributions. The multiple imputation method conducts several imputations for each missing value. Each imputation creates a completed data set, which could be analysed separately in order to obtain multiple estimates of the parameters of the model (Davey et al as cited in Dunbar-Isaacson, p.26, 2006). In LISREL, missing values for each case are substituted with the average of the values imputed in the dataset (Du Toit & Du Toit, 2001). Plausible values are therefore delivered whilst also reflecting the uncertainty in the estimates.

Missing values did not seriously plague the majority of the items comprising the scales used to operationalise the latent variables in the model. Table 4.1 depicts a summary of the distribution of the missing values.

Table 4.1.

Number of missing values per item

LBIV1	LBIV2	LBIV3	LBIV4	LBIV5	LBIV6	LBIV7	LBIV8
0	0	0	0	0	0	0	0
LBIV9	LBIV10	LBIV11	LBIV12	LBIV13	LBIV14	LBIV15	LBIV16
0	0	0	0	0	0	0	0
LBIV17	LBIV18	LBIV19	LBIV20	LBIV21	LBIV22	LBIV23	LBIV24
0	0	0	0	0	0	0	0
LBIV25	LBIV26	LBIV27	LBIV28	LBIV29	LBIV30	LBIV31	LBIV32
0	0	0	0	0	0	0	0
LBIV33	LBIV34	LBIV35	LBIV36	LBIV37	LBIV38	LBIV39	LBIV40
0	0	0	0	0	0	0	0
LBIV41	LBIV42	LBIV43	LBIV44	LBIV45	LBIV46	LBIV47	LBIV48
0	0	0	0	0	0	0	0
LBIV49	LBIV50	LBIV51	LBIV52	LBIV53	LBIV54	LBIV55	LBIV56
0	0	0	0	0	0	0	0

LBIV57	LBIV58	LBIV59	LBIV60	LBIV61	LBIV62	LBIV63	LBIV64
0	0	0	0	0	0	0	0
LBIV65	LBIV66	LBIV67	LBIV68	LBIV69	LBIV70	LBIV71	LBIV72
0	0	0	0	0	0	0	0
LBIV73	LBIV74	LBIV75	LBIV76	LBIV77	LBIV78	LBIV79	LBIV80
0	0	0	0	0	0	0	0
LBIV81	LBIV82	LBIV83	LBIV84	LBIV85	LBIV86	LBIV87	LBIV88
0	0	0	0	0	0	0	0
LBIV89	LBIV90	LBIV91	LBIV92	LBIV93	LBIV94	LBIV95	LBIV96
0	0	0	0	0	0	0	0
PIV1	PIV2	PIV3	PIV4	PIV5	PIV6	PIV7	PIV8
0	0	0	0	0	0	0	0
PIV9	PIV10	PIV11	PIV12	PIV13	PIV14	PIV15	PIV16
0	0	0	0	0	0	0	0
PIV17	PIV18	PIV19	PIV20	PIV21	PIV22	PIV23	PIV24
0	0	0	0	0	0	0	0
PIV25	PIV26	PIV27	PIV28	PIV29	PIV30	PIV31	PIV32
0	0	0	0	0	0	0	0
PIV33	PIV34	PIV35	PIV36	PIV37	PIV38	PIV39	PIV40
0	0	0	0	0	0	0	0
PIV41	PIV42	PIV43	PIV44	PIV45	PIV46	PIV47	PIV48
0	0	0	0	0	0	0	0
PIV49	PIV50	PIV51	PIV52	PIV53	PIV54	PIV55	PIV56
0	0	0	0	0	0	0	0

4.3 Item Analysis

Item analysis allows one to detect and remove specific items not contributing to a valid and reliable description of the latent dimension in question. The rationale behind performance of item analysis via the SPSS reliability procedure is that it can be very informative when a scale is unreliable of fails to show expected levels of validity. It can also help explain why a scale is reliable or unreliable as well as suggest ways of improvement. The reliability and validity of a scale can generally be improved by removing bad items. The selection, substitution, or revision of items identified by item analysis assists test developers to improve instruments' validity and reliability (Anastasi & Urbina, 1997).

Item analysis was conducted on each of the latent variable scales included in the Performance Index (PI) and Leadership Behavioural Inventory (LBI) questionnaires used to measure the latent variables included in the comprehensive leadership-work unit performance structural model depicted in Figure 2.3. Item analyses were conducted to investigate: (i) the homogeneity of each sub-scale, (ii) the reliability of indicators of each latent variable and (iii) screen items prior to their inclusion in composite item parcels representing the latent variables. Problematic items were not used to represent latent variables in the model and were not included in the calculation of composite indicator variables.

Item analysis was performed on the imputed data set only. It was performed on the individual PI responses before aggregating the data across units. The Reliability procedure of SPSS 19 (SPSS, 2011) was used for the anlyses.

4.3.1 Item analysis findings: Performance Index (PI) Subscales

Table 4.2 represents a summary of the item analysis results for each of the latent variable scales comprising the Performance Index questionnaire. The coefficient of internal consistency (Cronbach's alpha) for all 8 subscales was found to be satisfactory (> .80). No items were deleted.

Table 4.2

Reliability results of Performance Index latent variable scales

Scale	Sample Size	Number of items	Mean	Variance	Standard Deviation	Cronbach alpha
Production & Efficiency	1790	5	18.94	9.8	3.13	.828
Core People Processes	1790	9	32	39.011	6.246	.88
Work Climate	1790	7	25.44	32.278	5.681	.921
Satisfaction	1790	9	30.75	65.041	8.065	.943
Adaptability	1790	7	24.25	50.639	7.1166	.94
Capacity	1790	7	23.89	86.295	9.29	.961
Market Share	1790	7	24.82	132.412	11.507	97.7
Future Growth	1790	5	17.47	91.461	9.564	.98

4.3.1.1 Production and Efficiency

The *Production and Efficiency* scale comprised of five items. The results for the item analysis for the *Production and Efficiency* subscale are depicted in Table 4.3.

Table 4.3

Item analysis results for the Production and Efficiency subscale

Cronbach's Alpha	Cronbach's Alpha based on Standardized Items	N of items
.828	.83	5

	Mean	Std. Deviation	N
PIV1	3.80	.771	1581
PIV2	3.75	.802	1581
PIV3	3.99	.774	1581
PIV4	3.55	.836	1581
PIV5	3.85	.879	1581

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.788	3.552	3.987	.435	1.123	.025	5
Item Variances	.662	.595	.773	.178	1.299	.006	5
Inter-Item Correlations	.494	.431	.587	.156	1.363	.003	5

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
PIV1	15.14	6.526	.680	.484	.779
PIV2	15.19	6.537	.639	.425	.790
PIV3	14.95	6.655	.638	.423	.791
PIV4	15.39	6.648	.570	.327	.810
PIV5	15.09	6.341	.607	.370	.800

The *Production and Efficiency* scale obtained a Cronbach's alpha of .828. The absence of extreme means and small standard deviations indicated the absence of poor items. When looking at the item statistics the means fell in a range from 3.55 to 3.99 (on a 5-point scale) and the standard deviations from .771 to .879. All the corrected item total correlations were larger than .30 indicating that the correlation between each item and the total score calculated from the remaining items was satisfactorily and that the items were reflecting the same underlying factor. In addition, the squared multiple correlations were all larger than .30 and the results revealed that none of the items, if deleted, would increase the current Cronbach alpha. None of the items were therefore flagged as problematic items and all the items of the *Production and Efficiency* scale were retained.

4.3.1.2 Core People Processes

The *Core People Processes* scale comprised of 9 items. The results for the item analysis for the *Core People Processes* subscale are depicted in Table 4.4.

Table 4.4

Item analysis results for the Core People Processes subscale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.880	.881	9

	Mean	Std. Deviation	N
PIV6	3.61	.810	1544
PIV7	3.58	1.009	1544
PIV8	3.48	.968	1544
PIV9	3.54	.960	1544
PIV10	3.57	.979	1544
PIV11	3.53	.919	1544
PIV12	3.70	.982	1544
PIV13	3.59	.990	1544
PIV14	3.41	1.107	1544

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.555	3.410	3.697	.287	1.084	.007	9
Item Variances	.945	.656	1.226	.569	1.868	.022	9
Inter-Item Correlations	.452	.331	.564	.234	1.708	.003	9

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
PIV6	28.39	32.990	.576	.337	.871
PIV7	28.42	30.651	.657	.448	.864
PIV8	28.52	31.186	.637	.423	.865
PIV9	28.46	31.235	.638	.416	.865
PIV10	28.43	30.809	.666	.476	.863
PIV11	28.46	31.742	.620	.417	.867
PIV12	28.30	30.696	.675	.466	.862
PIV13	28.40	30.858	.653	.442	.864
PIV14	28.59	31.418	.513	.288	.878

This scale obtained a Cronbach's alpha of .880. The item statistics showed the item means range from 3.41 to 3.70 (on a 5-point scale) and the standard deviation range from .810 to 1.107. All the corrected item total and squared multiple correlations were larger than .30 except item PIV14 with a squared multiple correlation of .288.

The results revealed that none of the items, if deleted, would increase the current Cronbach alpha. All items of the *Core People Processes* subscale were retained.

4.3.1.3 Work unit climate

The *Work Unit Climate* scale comprised of 7 items. The results for the item analysis for this subscale are depicted in Table 4.5.

Table 4.5

Item analysis results for the Work Unit Climate subscale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.921	.921	7

	Mean	Std. Deviation	N
PIV15	3.74	.987	1701
PIV16	3.59	.998	1701
PIV17	3.56	.933	1701
PIV18	3.68	.961	1701
PIV19	3.57	1.009	1701
PIV20	3.55	.992	1701
PIV21	3.74	1.012	1701

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.634	3.554	3.739	.185	1.052	.007	7
Item Variances	.970	.870	1.024	.153	1.176	.003	7
Inter-Item Correlations	.626	.516	.742	.226	1.437	.003	7

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
PIV15	21.70	24.232	.728	.601	.912
PIV16	21.84	23.696	.781	.679	.907
PIV17	21.88	24.228	.782	.643	.907
PIV18	21.75	24.334	.740	.576	.911
PIV19	21.87	24.017	.732	.580	.912
PIV20	21.88	23.792	.775	.622	.907
PIV21	21.70	23.881	.746	.580	.910

A Cronbach alpha of .921 was obtained for the *Work Unit Climate* subscale. Visual inspection of the item statistics showed that the items means ranged from 3.55 to 3.74 (on a 7-point scale) for the 7 items included in the subscale. Standard deviations ranged from .933 to 1.012. All the corrected item total and squared multiple correlations were larger than .30. The results revealed that none of the items on the *Work Unit Climate* subscale, if deleted, would increase the current Cronbach alpha.

4.3.1.4 Employee Satisfaction

The *Employee Satisfaction* subscale comprised of 9 items. The results for the item analysis for the *Employee Satisfaction* subscale are depicted in Table 4.6.

Table 4.6

Item analysis results for the Employee Satisfaction subscale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.943	.943	9

	Mean	Std. Deviation	N
PIV22	3.38	.977	1633
PIV23	3.48	1.015	1633
PIV24	2.80	1.083	1633
PIV25	2.94	1.125	1633
PIV26	3.33	1.110	1633
PIV27	3.80	1.075	1633
PIV28	3.73	1.133	1633
PIV29	3.61	1.119	1633
PIV30	3.67	1.086	1633

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.416	2.804	3.804	1.000	1.357	.120	9
Item Variances	1.170	.954	1.283	.329	1.345	.012	9
Inter-Item Correlations	.648	.485	.849	.364	1.750	.009	9

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
PIV22	27.37	53.472	.743	.564	.938
PIV23	27.27	52.353	.794	.642	.936
PIV24	27.94	53.682	.642	.515	.944
PIV25	27.80	51.825	.738	.626	.939
PIV26	27.41	51.611	.765	.609	.937
PIV27	26.94	51.073	.833	.779	.933
PIV28	27.02	50.254	.841	.800	.933
PIV29	27.13	50.398	.843	.788	.933
PIV30	27.08	51.143	.819	.719	.934

The reliability statistics indicated a highly satisfactory Cronbach’s alpha of .943. Further investigation showed that the items means ranged from 2.8 to 3.8 and the standard deviations ranged from .977 to 1.125. No extreme means or distinctly smaller standard deviations therefore exist. All the corrected item total and squared multiple correlations were larger than .30. Item PIV24 obtained the lowest squared multiple correlation and corrected item-total correlation values. The results indicated that this item, if deleted, would increase the Cronbach alpha. The increase is, however, negligible and although it could be technically flagged as a less successful item, the item total correlation and the squared multiple correlation is sufficiently high to not delete the item from the item pool.

4.3.1.5 Adaptability

The *Adaptability* subscale comprised 7 items. The results for the item analysis for the *Adaptability* subscale are depicted in Table 4.7.

Table 4.7

Item analysis results for the Adaptability subscale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.940	.941	7

	Mean	Std. Deviation	N
PIV31	3.54	1.124	1608
PIV32	3.53	1.121	1608
PIV33	3.42	1.133	1608
PIV34	3.28	1.214	1608
PIV35	3.47	1.245	1608
PIV36	3.46	1.223	1608
PIV37	3.55	1.230	1608

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.464	3.278	3.549	.271	1.083	.009	7
Item Variances	1.405	1.257	1.551	.293	1.233	.017	7
Inter-Item Correlations	.694	.614	.790	.176	1.286	.002	7

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
PIV31	20.71	38.428	.786	.653	.932
PIV32	20.72	37.900	.832	.732	.928
PIV33	20.82	37.722	.836	.725	.928
PIV34	20.97	37.416	.791	.646	.932
PIV35	20.78	36.758	.817	.675	.930
PIV36	20.79	37.243	.797	.659	.931
PIV37	20.70	37.563	.767	.622	.934

The *Adaptability* subscale items returned a Cronbach alpha of .940. Visual inspection of the means and the standard deviations revealed the absence of extreme means and small standard deviations and therefore the absence of poor items. The mean ranged from 3.28 to 3.55 (on a 7-point scale) and the standard deviation ranged from 1.121 to 1.230. The inter-item correlation matrix revealed that all the items correlated above .50. All the corrected item total correlations were larger than .30 indicating that the correlation between each item and the total score calculated from the remaining items was satisfactorily and that the items were reflecting the same underlying factor. In addition, the squared multiple correlations were all larger than .30 and the results revealed than none of the items, if deleted, would increase the current Cronbach alpha. None of the items were therefore flagged as problematic items and all the items of the *Adaptability* subscale were retained.

4.3.1.6 Capacity

The *Capacity* subscale comprised 7 items. The results for the item analysis for the *Capacity* subscale are depicted in Table 4.8.

Table 4.8

Item analysis results for the Capacity subscale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.961	.961	7

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.961	.961	7

	Mean	Std. Deviation	N
PIV38	3.27	1.382	1050
PIV39	3.43	1.495	1050
PIV40	3.31	1.460	1050
PIV41	3.45	1.484	1050
PIV42	3.45	1.461	1050
PIV43	3.47	1.468	1050
PIV44	3.52	1.568	1050

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.413	3.266	3.516	.250	1.077	.008	7
Item Variances	2.175	1.909	2.460	.550	1.288	.027	7
Inter-Item Correlations	.779	.724	.869	.145	1.200	.002	7

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
PIV38	20.63	65.126	.864	.761	.955
PIV39	20.47	64.775	.802	.647	.959
PIV40	20.58	64.409	.843	.724	.956
PIV41	20.44	63.753	.858	.750	.955
PIV42	20.44	63.137	.905	.835	.951
PIV43	20.42	63.318	.891	.815	.952
PIV44	20.38	62.182	.875	.778	.954

A Cronbach's alpha of .961 was obtained for the *Capacity* subscale. Further investigation showed that the items means ranged from 3.27 to 3.52 (on a 7-point scale) for the 7 items included in the scale. Standard deviations ranged from 1.382 to 1.568. No extreme means or distinctly smaller standard deviations therefore exist. In the inter-item correlation matrix all the items correlated above .50 with the other items in the scale. All the corrected item total correlations and squared multiple correlations were larger than .30, with item PIV42 receiving the highest values. The results reveal that none of the items, if deleted, would increase the current Cronbach alpha. None of the items were therefore flagged as problematic items and all the items of the *Capacity* subscale were retained.

4.3.1.7 Market Share

The *Market Share* subscale comprised 7 items. The results for the item analysis for the *Market Share* subscale are depicted in Table 4.9.

Table 4.9

Item analysis results for the Market Share subscale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.977	.977	7

	Mean	Std. Deviation	N
PIV45	3.49	1.636	899
PIV46	3.53	1.701	899
PIV47	3.38	1.783	899
PIV48	3.65	1.721	899
PIV49	3.40	1.849	899
PIV50	3.61	1.766	899
PIV51	3.76	1.814	899

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.546	3.377	3.763	.386	1.114	.019	7
Item Variances	3.077	2.676	3.419	.744	1.278	.064	7
Inter-Item Correlations	.860	.817	.909	.093	1.113	.001	7

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
PIV45	21.33	99.752	.918	.862	.973
PIV46	21.29	98.262	.927	.878	.972
PIV47	21.45	97.624	.897	.826	.974
PIV48	21.18	97.744	.932	.872	.972
PIV49	21.42	96.373	.898	.828	.974
PIV50	21.21	97.534	.910	.855	.973
PIV51	21.06	96.314	.922	.871	.973

Table 4.8 indicates a satisfactory value for the Cronbach coefficient of internal consistency (.977). The values of the item statistics did not warrant the deletion of any items. All items were retained.

4.3.1.8 Future Growth

The *Future Growth* subscale comprised 5 items. The results for the item analysis for the *Future Growth* subscale are depicted in Table 4.10.

Table 4.10

Item analysis results for the Future Growth subscale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.980	.981	5

	Mean	Std. Deviation	N
PIV52	3.55	1.925	808
PIV53	3.46	1.922	808
PIV54	3.58	1.970	808
PIV55	3.47	2.019	808
PIV56	3.41	2.095	808

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.494	3.407	3.579	.172	1.050	.005	5
Item Variances	3.949	3.693	4.388	.694	1.188	.085	5
Inter-Item Correlations	.910	.881	.947	.066	1.075	.000	5

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
PIV52	13.92	59.748	.941	.908	.975
PIV53	14.01	59.477	.954	.927	.974
PIV54	13.89	58.802	.952	.909	.974
PIV55	14.00	58.514	.935	.875	.976
PIV56	14.06	57.587	.927	.870	.978

A highly satisfactory value for the Cronbach coefficient of internal consistency is present for the *Future Growth* subscale (.980). The values of the item statistics did not warrant the deletion of any items.

4.3.2 Item analysis findings: Leadership Behavioural Inventory (LBI) subscales

Table 4.11 represents a summary of the item analysis results for each of the latent variable subscales comprising the Leadership Behavioural Inventory. The coefficient of internal consistency (Cronbach's alpha) of 16 of the 20 subscales was found to be satisfactory (> .80) and two items were deleted.

Table 4.11

Summary of item analysis for LBI subscales

Scale	Sample Size	Number of items	Mean	Variance	Standard Deviation	Cronbach alpha
Exscan	1790	4	16.14	7.513	2.741	.797
Inscan	1790	4	15.77	7.735	2.781	.786
Vision	1790	4	15.74	8.544	2.923	.803
Strategy	1790	4	16.1	7.726	2.78	.802
Planning	1790	4	1.49	7.538	2.746	.845
Self Discipline	1790	5	19.89	12.666	3.559	.821
Self Develop	1790	4	16.08	7.891	2.809	.755
Empower	1790	7	27.94	23.011	4.797	.827
Process	1790	6	24.3	16.377	4.047	.873
Articulate	1790	4	15.69	9.228	3.038	.852
Inspire	1790	4	15.94	8.751	2.958	.859
Trust	1790	8	32.99	28.276	5.318	.836
Hardiness	1790	4	16.41	8.012	2.831	.803
Entrepreneur	1790	6	23.82	16.462	4.057	.830
Concern	1790	6	24.08	18.801	4.336	.88

Interpret	1790	6	23.75	18.52	4.303	.879
Coordinate	1790	4	1.94	8.674	2.945	.832
Boundries	1790	4	16.82	6.577	2.65	.780
Review	1790	4	16.12	9.66	3.108	.868
Celeb	1790	4	16.15	10.76	3.28	.888

4.3.2.1 Internal Scan

The *Internal Scan* subscale of the Leadership Behavioural Inventory (LBI) comprised four items (See Table 2.3). Table 4.12 presents the item statistics for the *Internal Scan* subscale.

Table 4.12

Item statistics for the Internal Scan subscale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.786	.790	4

	Mean	Std. Deviation	N
LBIV1	3.86	.954	1549
LBIV25	3.71	.964	1549
LBIV49	4.31	.766	1549
LBIV73	4.26	.811	1549

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.034	3.711	4.308	.597	1.161	.086	4
Item Variances	.771	.587	.930	.344	1.586	.030	4
Inter-Item Correlations	.485	.370	.584	.213	1.576	.007	4

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LBIV1	12.27	4.323	.575	.368	.745
LBIV25	12.42	4.093	.638	.425	.711
LBIV49	11.83	4.819	.627	.430	.723
LBIV73	11.88	4.875	.553	.371	.753

Table 4.12 indicates a somewhat marginal value for the Cronbach coefficient of internal consistency (.786). Visual inspection of the means and standard deviations revealed the absence of extreme means and small standard deviations and therefore the absence of poor items. The mean ranged from 3.71 to 4.31 (on a 7-point scale) and the standard deviation ranged from .766 to .964. All the corrected item total correlations were larger than .30 indicating that the correlation between each item

and the total score calculated from the remaining items was satisfactorily and that the items were reflecting the same underlying factor. The squared multiple correlations were all larger than .30 and the results revealed that none of the items, if deleted, would increase the current Cronbach's alpha. None of the items were therefore flagged as problematic items and all the items of the *Internal Scan* subscale were retained.

4.3.2.2 External Scan

The *External Scan* subscale of the Leadership Behavioural Inventory (LBI) comprised of four items. Table 4.13 presents the item statistics for the *External Scan* subscale.

Table 4.13

Item statistics for the External Scan subscale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.797	.800	4

	Mean	Std. Deviation	N
LBIV2	3.85	.970	1591
LBIV26	3.92	.890	1591
LBIV50	4.15	.784	1591
LBIV74	3.86	.874	1591

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.943	3.849	4.145	.297	1.077	.019	4
Item Variances	.778	.615	.941	.326	1.531	.018	4
Inter-Item Correlations	.501	.384	.610	.226	1.587	.005	4

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LBIV2	11.92	4.583	.532	.289	.790
LBIV26	11.85	4.441	.667	.458	.717
LBIV50	11.63	5.072	.580	.355	.762
LBIV74	11.92	4.487	.672	.463	.715

The reliability statistics indicated a Cronbach's alpha of .797. The Cronbach's alpha would not have increased if any items were deleted. No items were flagged as problematic.

4.3.2.3 Vision

The *Vision* subscale of the Leadership Behavioural Inventory (LBI) comprised of four items. Table 4.14 presents the item statistics for the *Vision* subscale.

Table 4.14

Item statistics for the Vision subscale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.803	.804	4

	Mean	Std. Deviation	N
LBIV3	3.91	.945	1522
LBIV27	3.90	.930	1522
LBIV51	3.83	.959	1522
LBIV75	4.10	.851	1522

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.935	3.827	4.103	.276	1.072	.014	4
Item Variances	.850	.724	.919	.195	1.270	.008	4
Inter-Item Correlations	.506	.434	.584	.150	1.346	.004	4

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LBIV3	11.83	5.304	.539	.293	.791
LBIV27	11.84	5.070	.623	.401	.750
LBIV51	11.91	4.747	.689	.483	.716
LBIV75	11.64	5.367	.622	.400	.752

The Cronbach coefficient of internal consistency for the original scale (.803) exceeds the critical cut-off value of .80. No items were flagged as problematic.

4.3.2.4 Strategy

The *Strategy* subscale comprised of four items. Table 4.15 presents the item statistics for the *Strategy* subscale.

Table 4.15

Item statistics for the Strategy subscale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.802	.804	4

	Mean	Std. Deviation	N
LBIV6	4.05	.850	1561
LBIV30	3.96	.918	1561
LBIV54	3.85	.932	1561
LBIV78	4.24	.802	1561

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.024	3.853	4.235	.382	1.099	.026	4
Item Variances	.769	.643	.868	.225	1.350	.011	4
Inter-Item Correlations	.506	.484	.561	.077	1.159	.001	4

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LBIV6	12.04	4.762	.604	.367	.758
LBIV30	12.14	4.520	.605	.368	.759
LBIV54	12.24	4.400	.629	.405	.747
LBIV78	11.86	4.846	.634	.408	.747

The Cronbach coefficient of internal consistency for the original scale (.802) slightly exceeds the critical cut-off value of .80. No items were flagged as problematic.

4.3.2.5 Planning

The *Planning* subscale of the Leadership Behavioural Inventory (LBI) comprised of four items. Table 4.16 presents the item statistics for the *Planning* subscale.

Table 4.16

Item statistics for the Planning subscale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.845	.847	4

	Mean	Std. Deviation	N
LBIV22	4.07	.878	1504
LBIV46	4.05	.844	1504
LBIV70	4.18	.795	1504
LBIV94	4.19	.804	1504

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.122	4.047	4.191	.145	1.036	.006	4
Item Variances	.690	.633	.771	.138	1.219	.004	4
Inter-Item Correlations	.580	.512	.674	.162	1.316	.004	4

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LBIV22	12.42	4.525	.600	.361	.840
LBIV46	12.44	4.394	.687	.481	.800
LBIV70	12.30	4.475	.722	.539	.786
LBIV94	12.30	4.444	.723	.539	.786

The Cronbach coefficient of internal consistency for the original scale (.845) exceeds the critical cut-off value of .80. No items were flagged as problematic.

4.3.2.6 Self Discipline

The *Self Discipline* subscale of the Leadership Behavioural Inventory (LBI) comprised of five items. Table 4.17 presents the item statistics for the *Self Discipline* subscale.

Table 4.17

Item statistics for the Self Discipline subscale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.821	.822	5

	Mean	Std. Deviation	N
LBIV8	4.25	.912	1484
LBIV32	3.77	.977	1484
LBIV56	3.98	.923	1484
LBIV64	3.85	.975	1484
LBIV80	4.04	.868	1484

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.978	3.770	4.248	.478	1.127	.034	5
Item Variances	.869	.753	.955	.202	1.269	.007	5
Inter-Item Correlations	.480	.315	.643	.329	2.045	.012	5

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LBIV8	15.64	8.382	.654	.481	.775
LBIV32	16.12	8.037	.663	.448	.771
LBIV56	15.91	9.324	.441	.215	.834
LBIV64	16.04	8.022	.669	.500	.770
LBIV80	15.85	8.576	.657	.434	.775

The *Self Discipline* scale obtained a Cronbach's alpha of .821. The item statistics showed the mean ranging from 3.77 to 4.25 (on a 7-point scale) and the standard deviation ranging from .868 to .977. The corrected item-total flagged item LBIV56 as a poor item as it obtained a correlation of .441, compared to the other item correlations which range from .654 to .669. The squared multiple correlations also suggest that item LBIV56 was a poor item as it obtained a value of .215 compared to the rest of the items which returned values ranging from .434 to.500. Furthermore, it was indicated that the deletion of item LBIV56 would increase Cronbach's alpha from .821 to .834 whilst none of the other items, if deleted, would result in an increase in the Cronbach alpha. With the above mentioned evidence it was decided to delete item LBIV56.

The results of the re-run analysis after item LBIV56 was deleted indicated an increase in the Cronbach alpha from .821 to a value of .834. No additional items came to the fore as problematic items after the deletion of item LBIV56.

4.3.2.7 Self Development

The *Self Development* subscale of the Leadership Behavioural Inventory (LBI) comprised of four items. Table 4.18 presents the item statistics for the *Self Development* subscale.

Table 4.18

Item statistics for the Self Development subscale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.755	.761	4

	Mean	Std. Deviation	N
LBIV7	4.01	.924	1540
LBIV31	3.64	1.040	1540
LBIV55	4.20	.911	1540
LBIV79	4.23	.813	1540

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.020	3.642	4.232	.590	1.162	.074	4
Item Variances	.856	.660	1.081	.421	1.638	.030	4
Inter-Item Correlations	.443	.330	.549	.219	1.663	.005	4

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LBIV7	12.08	4.647	.601	.382	.670
LBIV31	12.44	4.647	.483	.254	.744
LBIV55	11.88	4.821	.560	.362	.693
LBIV79	11.85	5.092	.583	.341	.686

The Cronbach coefficient of internal consistency for the original scale is somewhat marginal .755. No items were flagged as problematic.

4.3.2.8 Empowerment

The *Empowerment* subscale of the Leadership Behavioural Inventory (LBI) comprised of seven items. Table 4.19 presents the item statistics for the *Empowerment* subscale.

Table 4.19

Item statistics for the Empowerment subscale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.827	.837	7

	Mean	Std. Deviation	N
LBIV9	3.99	.951	1388
LBIV11	4.13	.917	1388
LBIV33	3.78	.898	1388
LBIV57	4.11	.813	1388
LBIV81	3.82	.902	1388
LBIV87	4.07	1.149	1388
LBIV88	4.05	1.165	1388

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.992	3.784	4.125	.341	1.090	.019	7
Item Variances	.958	.661	1.357	.696	2.054	.073	7
Inter-Item Correlations	.423	.310	.562	.251	1.809	.006	7

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LBIV9	23.96	16.938	.660	.464	.789
LBIV11	23.82	17.544	.602	.409	.799
LBIV33	24.16	17.457	.632	.426	.795
LBIV57	23.84	18.063	.621	.413	.799
LBIV81	24.12	17.637	.601	.376	.799
LBIV87	23.87	17.118	.481	.233	.823
LBIV88	23.89	17.002	.484	.246	.823

Empowerment returned a Cronbach alpha of .827 and exceeds the critical cut-off of .80. Visual inspection of the means and standard deviations revealed the absence of extreme means and small standard deviations and therefore the absence of poor items. The item-total statistics revealed that none of the items, if deleted, would increase the current Cronbach alpha. None of the items were therefore flagged as problematic items and all the items of the *Empowerment* scale were retained.

4.3.2.9 Process

The *Process* subscale of the Leadership Behavioural Inventory (LBI) comprised of six items. Table 4.20 presents the item statistics for the *Process* subscale.

Table 4.20

Item statistics for the Process subscale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.873	.873	6

	Mean	Std. Deviation	N
LBIV10	3.90	.857	1417
LBIV34	3.92	.868	1417
LBIV58	4.11	.817	1417
LBIV59	4.18	.853	1417
LBIV82	4.00	.930	1417
LBIV83	4.19	.846	1417

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.051	3.903	4.193	.291	1.075	.016	6
Item Variances	.744	.668	.864	.197	1.295	.004	6
Inter-Item Correlations	.534	.445	.623	.178	1.401	.003	6

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LBIV10	20.40	11.763	.660	.458	.854
LBIV34	20.38	11.706	.659	.459	.854
LBIV58	20.19	11.821	.692	.501	.849
LBIV59	20.13	11.460	.726	.534	.842
LBIV82	20.30	11.178	.697	.504	.848
LBIV83	20.11	12.043	.616	.401	.861

The Cronbach coefficient of internal consistency for the original scale (.873) exceeds the critical cut-off value of .80. No items were flagged as problematic.

4.3.2.10 Articulate

The *Articulate* subscale of the Leadership Behavioural Inventory (LBI) comprised of four items. Table 4.21 presents the item statistics for the *Articulate* subscale.

Table 4.21

Item statistics for the Articulate subscale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.852	.852	4

	Mean	Std. Deviation	N
LBIV5	3.93	.940	1565
LBIV29	3.77	.955	1565
LBIV53	3.84	.904	1565
LBIV77	4.15	.847	1565

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.923	3.767	4.153	.386	1.102	.028	4
Item Variances	.833	.718	.913	.194	1.271	.007	4
Inter-Item Correlations	.591	.553	.682	.129	1.234	.002	4

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LBIV5	11.76	5.452	.658	.434	.826
LBIV29	11.93	5.220	.709	.523	.804
LBIV53	11.85	5.316	.742	.562	.790
LBIV77	11.54	5.801	.664	.445	.824

The Cronbach coefficient of internal consistency for the original scale (.852) exceeds the critical cut-off value of .80. No items were flagged as problematic.

4.3.2.11 Inspire

The *Inspire* scale comprised four items. Table 4.22 presents the item statistics for the *Inspire* subscale.

Table 4.22

Item statistics for the Inspire subscale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.859	.859	4

	Mean	Std. Deviation	N
LBIV19	4.00	.890	1534
LBIV43	3.87	.907	1534
LBIV67	4.04	.864	1534
LBIV91	4.03	.865	1534

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.985	3.872	4.039	.168	1.043	.006	4
Item Variances	.778	.747	.823	.076	1.101	.001	4
Inter-Item Correlations	.604	.521	.667	.146	1.280	.004	4

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LBIV19	11.94	5.085	.717	.530	.816
LBIV43	12.07	4.980	.728	.548	.811
LBIV67	11.90	5.070	.754	.568	.801
LBIV91	11.92	5.477	.623	.401	.853

The Cronbach coefficient of internal consistency for the original scale (.859) exceeds the critical cut-off value of .80. No items were flagged as problematic.

4.3.2.12 Trust

The *Trust* subscale of the Leadership Behavioural Inventory (LBI) comprised eight items. Table 4.23 presents the item statistics for the *Trust* subscale.

Table 4.23

Item statistics for the Trust subscale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.836	.865	8

	Mean	Std. Deviation	N
LBIV4	4.18	.944	1456
LBIV13	3.98	.903	1456
LBIV28	4.18	.837	1456
LBIV37	4.25	1.526	1456
LBIV52	3.94	.879	1456
LBIV61	3.94	.840	1456
LBIV76	4.14	.855	1456

	Mean	Std. Deviation	N
LBIV4	4.18	.944	1456
LBIV13	3.98	.903	1456
LBIV28	4.18	.837	1456
LBIV37	4.25	1.526	1456
LBIV52	3.94	.879	1456
LBIV61	3.94	.840	1456
LBIV76	4.14	.855	1456
LBIV85	4.38	.807	1456

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.123	3.935	4.380	.444	1.113	.025	8
Item Variances	.950	.651	2.328	1.677	3.577	.316	8
Inter-Item Correlations	.444	.243	.609	.367	2.509	.014	8

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LBIV4	28.80	21.879	.623	.438	.809
LBIV13	29.01	22.411	.590	.384	.814
LBIV28	28.81	22.219	.679	.498	.805
LBIV37	28.74	21.195	.338	.118	.877
LBIV52	29.05	21.931	.677	.540	.804
LBIV61	29.05	22.586	.625	.449	.811
LBIV76	28.84	22.474	.625	.453	.810
LBIV85	28.61	22.557	.661	.476	.807

The *Trust* subscale obtained a Cronbach's alpha of .836. The item statistics showed the mean ranging from 3.935 to 4.380 (on a 7-point scale) and the standard deviation ranging from .807 to 1.526. In the inter-item correlation matrix item LBIV37 stood out dramatically with all its correlations below .50. Furthermore, the corrected item-total correlation flagged item LBIV37 as a poor item as it obtained a correlation of .338, compared to the other item correlations which ranged from .590 to .679. The squared multiple correlations also suggested that item LBIV37 was a poor item as it obtained a value of .118, compared to the rest of the items which returned values ranging from .384 to.540.

Furthermore, it was indicated that the deletion of item LBIV37 would increase Cronbach's alpha from .836 to .877 whilst none of the other items, if deleted, would result in an increase in the Cronbach alpha. With the above mentioned evidence it was decided to delete item LBIV37. The analysis was re-run.

The results of the re-run analysis after item LBIV37 was deleted indicated an increase in the Cronbach alpha from .836 to .876. It was indicated that none of the items, if deleted, would further increase the Cronbach's alpha of .876 and hence item LBIV37 was the only item deleted from the *Trust* subscale.

4.3.2.13 Hardiness

The *Hardiness* subscale of the Leadership Behavioural Inventory (LBI) comprised four items. Table 4.24 presents the item statistics for the *Hardiness* subscale.

Table 4.24

Item statistics for the Hardiness subscale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.803	.805	4

	Mean	Std. Deviation	N
LBIV14	4.05	.953	1670
LBIV38	4.20	.823	1670
LBIV62	4.06	.952	1670
LBIV86	4.10	.832	1670

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.103	4.054	4.204	.150	1.037	.005	4
Item Variances	.796	.678	.909	.231	1.341	.017	4
Inter-Item Correlations	.508	.421	.573	.152	1.362	.003	4

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LBIV14	12.36	4.605	.610	.391	.758
LBIV38	12.21	4.948	.652	.435	.740
LBIV62	12.35	4.499	.645	.426	.740
LBIV86	12.32	5.159	.572	.356	.775

The Cronbach coefficient of internal consistency for the original scale (.803) exceeds the critical cut-off value of .80. No items were flagged as problematic.

4.3.2.14 Entrepreneur

The *Entrepreneur* subscale of the Leadership Behavioural Inventory (LBI) comprised six items. Table 4.25 presents the item statistics for the *Entrepreneur* subscale.

Table 4.25

Item statistics for the Entrepreneur subscale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.830	.834	6

	Mean	Std. Deviation	N
LBIV21	3.57	1.079	1540
LBIV39	4.00	.917	1540
LBIV45	4.01	.867	1540
LBIV63	3.96	.899	1540
LBIV69	4.25	.835	1540
LBIV93	4.03	.901	1540

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.970	3.567	4.251	.684	1.192	.050	6
Item Variances	.846	.698	1.164	.467	1.669	.027	6
Inter-Item Correlations	.455	.288	.645	.357	2.236	.010	6

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LBIV21	20.25	11.436	.529	.281	.823
LBIV39	19.82	12.264	.523	.288	.819
LBIV45	19.81	11.622	.692	.499	.785
LBIV63	19.86	11.359	.709	.535	.781
LBIV69	19.57	12.784	.499	.259	.822
LBIV93	19.79	11.455	.688	.511	.785

The Cronbach coefficient of internal consistency for the original scale (.830) exceeds the critical cut-off value of .80. No items were flagged as problematic.

4.3.2.15 Concern

The *Concern* subscale of the Leadership Behavioural Inventory (LBI) comprised six items (See Table 2.3). Table 4.26 presents the item statistics for the *Concern* subscale.

Table 4.26

Item statistics for the Concern subscale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.888	.889	6

	Mean	Std. Deviation	N
LBIV16	3.87	.911	1521

LBIV18	4.07	.879	1521
LBIV40	4.01	.887	1521
LBIV42	3.97	.954	1521
LBIV66	4.28	.841	1521
LBIV89	3.87	.938	1521

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.013	3.870	4.282	.412	1.107	.024	6
Item Variances	.814	.708	.911	.203	1.286	.006	6
Inter-Item Correlations	.571	.523	.646	.123	1.236	.001	6

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LBIV16	20.21	13.194	.722	.534	.866
LBIV18	20.01	13.295	.739	.556	.863
LBIV40	20.07	13.514	.691	.480	.871
LBIV42	20.10	12.919	.725	.537	.865
LBIV66	19.80	13.822	.683	.478	.872
LBIV89	20.21	13.347	.668	.452	.875

The Cronbach coefficient of internal consistency for the original scale (.888) far exceeds the critical cut-off value of .80. No items were flagged as problematic.

4.3.2.16 Interpret

The *Interpret* subscale of the Leadership Behavioural Inventory (LBI) comprised six items. Table 4.27 presents the item statistics for the *Interpret* subscale.

Table 4.27

Item statistics for the Interpret subscale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.879	.879	6

	Mean	Std. Deviation	N
LBIV15	4.02	.853	1544
LBIV17	4.02	.893	1544
LBIV35	4.01	.920	1544
LBIV41	3.78	.952	1544
LBIV65	4.07	.894	1544
LBIV89	3.85	.937	1544

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.958	3.775	4.071	.295	1.078	.013	6
Item Variances	.826	.728	.905	.177	1.243	.004	6
Inter-Item Correlations	.548	.478	.651	.174	1.364	.003	6

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LBIV15	19.73	13.762	.637	.439	.866
LBIV17	19.73	13.181	.700	.541	.856
LBIV35	19.74	13.044	.696	.497	.856
LBIV41	19.97	13.011	.671	.456	.861
LBIV65	19.68	12.940	.743	.570	.849
LBIV89	19.89	13.098	.670	.466	.861

The Cronbach coefficient of internal consistency for the original scale (.879) exceeds the critical cut-off value of .80. No items were flagged as problematic.

4.3.2.17 Coordination

The *Coordination* subscale of the Leadership Behavioural Inventory (LBI) comprised four items (See Table 2.3). Table 4.28 presents the item statistics for the *Coordination* subscale.

Table 4.28

Item statistics for the Coordination subscale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.832	.833	4

	Mean	Std. Deviation	N
LBIV20	3.97	.942	1510
LBIV44	3.89	.870	1510
LBIV68	4.00	.901	1510
LBIV92	4.08	.897	1510

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.986	3.893	4.079	.186	1.048	.006	4
Item Variances	.815	.757	.888	.131	1.173	.003	4
Inter-Item Correlations	.555	.504	.590	.087	1.172	.001	4

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LBIV20	11.97	5.032	.651	.432	.793
LBIV44	12.05	5.168	.695	.484	.773
LBIV68	11.94	5.240	.636	.411	.799
LBIV92	11.87	5.169	.662	.439	.787

The Cronbach coefficient of internal consistency for the original scale (.832) exceeds the critical cut-off value of .80. No items were flagged as problematic.

4.3.2.18 Boundaries

The *Boundaries* subscale of the Leadership Behavioural Inventory (LBI) comprised four items. Table 4.29 presents the item statistics for the *Boundaries* subscale.

Table 4.29

Item statistics for the Boundaries subscale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.780	.780	4

	Mean	Std. Deviation	N
LBIV12	4.26	.832	1493
LBIV36	4.20	.816	1493
LBIV60	4.25	.800	1493
LBIV84	4.11	.854	1493

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.207	4.112	4.261	.149	1.036	.005	4
Item Variances	.682	.641	.729	.089	1.139	.001	4
Inter-Item Correlations	.470	.394	.638	.244	1.619	.007	4

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LBIV12	12.57	3.859	.619	.441	.709
LBIV36	12.62	3.818	.657	.475	.689
LBIV60	12.58	4.282	.500	.254	.769
LBIV84	12.72	3.924	.569	.327	.736

The Cronbach coefficient of internal consistency for the original scale (.780) falls below the critical cut-off value of .80. The item statistics showed the item means to range from 4.11 to 4.26 (on a 7-point scale) and the standard deviations to range from .800 to .854. All the corrected item total and squared multiple correlations were larger than .30, except for item LBIV60 with a squared multiple correlation of .254. The results revealed that none of the items, if deleted, would increase the current Cronbach alpha. None of the items were therefore flagged as problematic items and all the items of the *Boundaries* subscale were retained.

4.3.2.19 Review

The *Review* subscale of the Leadership Behavioural Inventory (LBI) comprised four items. Table 4.30 presents the item statistics for the *Review* subscale.

Table 4.30

Item statistics for the Review subscale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.868	.867	4

	Mean	Std. Deviation	N
LBIV23	4.00	.924	1479
LBIV47	4.07	.919	1479
LBIV71	4.11	.885	1479
LBIV95	3.95	.945	1479

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.031	3.946	4.108	.162	1.041	.005	4
Item Variances	.844	.783	.893	.110	1.141	.002	4
Inter-Item Correlations	.621	.555	.671	.117	1.210	.002	4

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LBIV23	12.12	5.767	.685	.475	.844
LBIV47	12.05	5.636	.728	.534	.827
LBIV71	12.01	5.890	.696	.491	.840
LBIV95	12.18	5.402	.766	.587	.811

The Cronbach coefficient of internal consistency for the original scale (.868) exceeds the critical cut-off value of .80. No items were flagged as problematic.

4.3.2.20 Celebrate

The *Celebrate* subscale of the Leadership Behavioural Inventory (LBI) comprised four items. Table 4.31 presents the item statistics for the *Celebrate* subscale.

Table 4.31

Item statistics for the Celeb subscale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.888	.889	4

	Mean	Std. Deviation	N
LBIV24	4.06	.937	1544
LBIV48	4.09	.915	1544
LBIV72	3.97	.992	1544
LBIV96	4.03	.946	1544

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.038	3.968	4.093	.125	1.031	.003	4
Item Variances	.898	.838	.983	.146	1.174	.004	4
Inter-Item Correlations	.667	.588	.744	.156	1.265	.004	4

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LBIV24	12.09	6.304	.761	.594	.854
LBIV48	12.06	6.313	.785	.632	.845
LBIV72	12.18	6.383	.677	.462	.887
LBIV96	12.12	6.113	.802	.651	.838

The Cronbach coefficient of internal consistency for the original scale (.888) exceeds the critical cut-off value of .80. No items were flagged as problematic.

4.4 Dimensionality Analysis

Specific design intentions guided the construction of the various scales used to operationalise the latent variables in the structural model (Figure 2.3). The items comprising the scale were meant to operate as stimulus sets to which test takers respond with behaviour that is primarily an expression of a specific underlying latent variable. The intention was to obtain a relatively uncontaminated measure of specific latent variables. The objective of the dimensionality analysis was to evaluate the success with which each item, along with the rest of the items in the particular subscale, measures the specific latent variable it was designed to reflect.

Factor analysis refers to a family of multivariate statistical procedures that seeks to condense a large number of observed variables (in this case items) into highly correlated groups that measure a single underlying construct (Allen & Yen, 1979). The factor loading of an indicator variable on a factor is described as the slope of the regression of an observed variable on the underlying factor that it represents (Allen & Yen, 1979). Byrne (2001) further indicates that although inter-factor relations are of interest, any regression structure amongst them is not considered in the factor-analytic model. In essence this approach assumes that each variable is a linear combination of some number on common factors and a unique factor.

Stanek (1995, p. 9) presents it as follows:

$$Z_j = [\Sigma]_k(a_{jk}S_k) + a_j u S_j u$$

Where:

z - standardised variable,

a - factor loading

s - -common factor or factor score

j - index for variables,

k - index for factors, and

u - denotes the unique portion

Unrestricted principal axis factor analyses with oblique rotation were performed on the various subscales of the PI and the LBI. The objective of the analyses was to evaluate the assumption that all the items in a subscale measure a single underlying factor and to evaluate the success with which each item, along with the rest of the items in the particular subscale, measures the specific latent variable it was designed to reflect.

The decision on how many factors to extract to explain the observed correlation matrix was based on the eigenvalue-greater-than-one rule and on the scree test (Tabachnick & Fidell, 2007). Factor loadings were considered satisfactory if they were greater than .50. The adequacy of the extracted solution was evaluated by calculating the percentage of large residual correlations. Residual correlations were considered to be large if they are larger than .05.

4.4.1 Dimensionality Analysis: Performance Index (PI) subscales

4.4.1.1 Production and efficiency

No poor items were found in the item analysis and therefore all items were included in the dimensionality analysis of the *Production and Efficiency* subscale. The correlation matrix should contain correlations that are bigger than .30 and statistically significant ($p < .05$) for the correlation matrix to be factor analysable. The correlation matrix indicated that the matrix was factor analysable as all the correlations were bigger than .30 and all were significant ($p < .50$). The Kaiser-Meyer-Olkin (KMO) is a measure of sampling adequacy and reflects the ratio of the sum of the squared inter-item correlations to the sum of the squared inter-item correlations plus the sum of the squared partial inter-item correlations, summed across all correlations. The correlation matrix is deemed factor analysable when the KMO approaches unity, or at least achieves a value bigger than .60 (Tabachnick & Fidell, 2007). A KMO value of .846 was obtained providing sufficient evidence that the *Production and Efficiency* subscale was factor analysable (> .60). The Bartlett's Test of Sphericity tests the null hypothesis that the correlation matrix is an identity matrix in the population (i.e., the diagonal contains 1's and all off-diagonal elements are zero's) (Tabachnick & Fidell, 2007). The Bartlett's Test of Sphericity indicated that H_0 could be rejected ($p < .05$) providing supplementary support that the matrix was factor analysable.

The *Production and Efficiency* latent variable was conceptualised as a unidimensional construct. The SPSS exploratory factor analysis results indicated that a single underlying factor explained the observed correlations between the items of the subscale. Only one factor has an eigenvalue greater than unity. The screeplot, in-line with above, also suggested that one factor should be extracted. The factor matrix indicated that all the items loaded satisfactorily on the single extracted factor as all factor loadings were larger than .50. The extracted factor structure is shown in Table 4.32. Furthermore, none (0%) of the residual correlations were larger than .05 suggesting that the factor solution provides a very credible explanation for the observed inter-item correlation matrix. The unidimensionality assumption was thus corroborated.

Table 4.32

Extracted factor matrix of the Production and Efficiency subscale

	Factor
	1
PIV1	.775
PIV2	.722
PIV3	.719
PIV5	.672
PIV4	.628

The basket of evidence provided by the item analysis and the exploratory factor analysis of the *Production and Efficiency* subscale suggests that the items of the subscale can be used to represent the *Production and Efficiency* latent variable when testing the fit of the structural model depicted in Figure 2.3.

4.4.1.2 Core People Processes

The results for this dimensionality analysis indicated that the correlation matrix was factor analysable as all the obtained correlations exceeded .30 and all were significant ($p < .05$). Furthermore, the KMO was .931 and the Bartlett's Test of Sphericity indicated that H_0 could be rejected.

One factor was extracted in terms of the observed correlation matrix, since only one factor obtained an eigenvalue greater than one. As expected, the factor matrix indicated that all the items loaded satisfactorily onto the single extracted factor. Three (8%) of the residual correlations were larger than .50, suggesting that the factor solution provides a credible explanation for the observed inter-item correlation matrix. The resultant factor structure is shown in Table 4.33. The unidimensionality assumption for this subscale was thus corroborated.

Table 4.33

Extracted factor matrix for the Core People Processes subscale

	Factor
	1
PIV12	.725
PIV10	.720
PIV7	.709
PIV13	.695
PIV8	.687

PIV9	.686
PIV11	.669
PIV6	.614
PIV14	.547

4.4.1.3 Work Climate

For this subscale the dimensionality analysis was run by including all items as none were flagged as poor in the item analysis. The correlation matrix showed that all correlations were larger than .30 and all were significant ($p < .50$). The subscale obtained a KMO of .913 and the Bartlett's Test of Sphericity allowed for the null hypothesis to be rejected, thus there was strong evidence that the correlation matrix was factor analysable.

One factor was extracted, since only one factor obtained an eigenvalue greater than one. The scree plot also suggested that a single factor should be extracted. The factor matrix indicated that all the items loaded satisfactorily on the single extracted factor as all factor loadings were larger than .50. The resultant factor structure is shown in Table 4.34. Furthermore, 23% of the residual correlations were larger than .05. This suggests the factor solution provides a credible explanation of the observed inter-item correlation matrix. The unidimensionality assumption was thus corroborated.

Table 4.34

Extracted factor matrix for the Work Climate subscale

	Factor 1
PIV16	.822
PIV17	.821
PIV20	.812
PIV21	.781
PIV18	.774
PIV19	.766
PIV15	.765

4.4.1.4 Employee Satisfaction

The item analysis indicated that item PIV24 was a somewhat problematic item and it was subsequently decided to delete it from the subscale. The dimensionality analysis performed on the *Employee Satisfaction* subscale was, therefore, performed without item PIV24. All the items in the correlation matrix obtained correlations exceeding the .30 cut-off value and all the correlations were significant ($p < .05$). The *Employee Satisfaction* subscale obtained a KMO of .941 and it was deduced from the results that H_0 could be rejected, meaning that the correlation matrix was factor analysable.

In-line with what was hypothesised, the results revealed that only one factor could be extracted since only one factor obtained an eigenvalue greater than 1. The resultant factor structure is shown in Table 4.35. The scree plot, inline with the above, also suggested that one factor should be extracted. Furthermore, all the items could be considered satisfactory in terms of the proportion of item variance that could be explained by the first factor. The item loadings were all larger than .50. The unidimensionality assumption was thus corroborated. Only 21% of non-redundant residuals obtained absolute values greater than .05 thus suggesting that the extracted factor solution provided a reasonably credible explanation of the observed inter-item correlation matrix.

Table 4.35

Extracted factor matrix for the Employee Satisfaction subscale

	Factor 1
PIV29	.892
PIV28	.891
PIV27	.883
PIV30	.857
PIV23	.822
PIV26	.770
PIV22	.752
PIV25	.720

4.4.1.5 Adaptability

The *Adaptability* subscale obtained a KMO of .932 and it was deduced from the results that Bartlett's H_0 could be rejected, meaning that the correlation matrix was factor analysable. *Adaptability* was conceptualised as a unidimensional latent dimension. The *Adaptability* construct is not further divisible into more specific variables. The SPSS exploratory factory analysis results indicated that a single underlying factor explained the observed correlations between the items that remained in the subscale after the item analysis. Only one factor obtained an eigenvalue greater than unity. The scree plot also suggested the extraction of a single factor. The extracted factor structure is shown in Table 4.36. All the items in the *Adaptability* subscale loaded satisfactory on the single underlying factor.

Table 4.36

Extracted factor matrix for the Adaptability subscale

	Factor
	1
PIV33	.869
PIV32	.866
PIV35	.844
PIV36	.822
PIV34	.821
PIV31	.817
PIV37	.791

The extracted solution seems to provide a credible explanation for the observed correlation matrix asonly three (14%) of the non-redundant residuals obtained absolute values greater than .05.

4.4.1.6 Capacity

The results for this dimensionality analysis indicated that the correlation matrix was factor analysable as all the obtained correlations exceeded .30 and all were significant ($p < .05$). Furthermore, the KMO was .949 and the Bartlett's Test of Sphericity indicated that H_0 could be rejected.

One factor was extracted to explain the observed correlation matrix, since only one factor obtained an eigenvalue greater than 1. As expected, the factor matrix indicated that all the items loaded satisfactorily onto the single extracted factor. All obtained factor loadings were bigger than .70 and none (0%) of the reproduced correlations deviated more than .05 from the observed correlations, suggesting that the factor solution provides a very credible explanation for the observed inter-item correlation matrix. The extracted factor structure is shown in Table 4.37.

Table 4.37

Extracted factor matrix for the Capacity subscale

	Factor 1
PIV42	.929
PIV43	.914
PIV44	.897
PIV38	.884
PIV41	.877
PIV40	.861
PIV39	.818

The basket of evidence provided by the item analysis and the exploratory factor analysis of the Capacity subscale suggested that the items of the subscale can be used to represent the *Capacity* latent variable when testing the structural model depicted in Figure 2.3.

4.4.1.7 Market Share

The results for this dimensionality analysis indicated that the correlation matrix was factor analysable as all the obtained correlations exceeded .30 and all were significant ($p < .05$). Furthermore, the KMO was .942 and the Bartlett's Test of Sphericity indicated that H_0 could be rejected.

Only one factor had to be extracted to explain the observed correlation matrix, since only one factor obtained an eigenvalue greater than one. As expected, the factor matrix indicated that all the items loaded satisfactorily onto the single extracted factor. All the obtained factor loadings were bigger than .70. Only one (4%) of the reproduced correlations deviated more than .05 from the observed correlations, suggesting that the factor solution provides a credible explanation for the observed inter-item correlation matrix. The resultant factor structure is shown in Table 4.38. The unidimensionality assumption for this subscale was thus corroborated.

Table 4.38

Extracted factor matrix for the Market Share subscale

	Factor 1
PIV48	.945
PIV46	.940
PIV51	.935
PIV45	.931
PIV50	.922
PIV49	.909
PIV47	.908

4.4.1.8 Future Growth

The *Future Growth* subscale obtained a KMO of .911 and it was deduced from the results that Bartlett's H_0 could be rejected, meaning that the correlation matrix was factor analysable. *Future Growth* was conceptualised as a unidimensional latent dimension of the *Future Growth* construct that is not further divisible into more specific variables. The SPSS exploratory factory analysis results indicated that a single underlying factor explained the observed correlations between the items that remained in the subscale after the item analysis. Only one factor obtained an eigenvalue greater than unity. The scree plot also suggested the extraction of a single factor. The extracted factor structure is shown in Table 4.39. As expected, the factor matrix indicated that all the items loaded satisfactorily onto the single extracted factor. All the obtained factor loadings were bigger than .70. One (4%) of the residual correlations was larger than .50, suggesting that the factor solution provides a credible explanation for the observed inter-item correlation matrix.

Table 4.39

Extracted factor matrix for the Future Growth subscale

	Factor
	1
PIV53	.968
PIV54	.965
PIV52	.954
PIV55	.945
PIV56	.937

4.4.2 Dimensionality Analysis: Leadership Behavioural Inventory (LBI) subscales

4.4.2.1 External Scan

The results for this dimensionality analysis indicated that the correlation matrix was factor analysable as all the obtained correlations exceeded .30 and all were significant ($p < .05$). Furthermore, the KMO was .741 and the Bartlett's Test of Sphericity indicated that H_0 could be rejected ($p < .05$).

Only one factor had to be extracted to explain the observed correlation matrix, since only one factor obtained an eigenvalue greater than 1. As expected, the factor matrix indicated that all the items loaded satisfactorily onto one factor. However, 50% of the residual correlations were larger than .05. The credibility of the extracted factor solution was therefore somewhat tenuous. The resultant factor structure is shown in Table 4.40. The unidimensionality assumption for this subscale was thus to some degree corroborated.

Table 4.40

Extracted factor matrix for the External Scan subscale

	Factor
	1
LBIV49	.742
LBIV25	.736
LBIV73	.656
LBIV1	.654

4.4.2.2 Internal Scan

The results for this dimensionality analysis indicated that the correlation matrix was factor analysable as all the obtained correlations exceeded the .30 cut-off value and all were significant ($p < .05$). Furthermore, the KMO was .789 and the Bartlett's Test of Sphericity indicated that H_0 could be rejected ($p < .05$).

One factor was extracted, since only one factor obtained an eigenvalue greater than 1. As expected, the factor matrix indicated that all the items loaded satisfactorily onto the single extracted factor factor. There were no (0%) non-redundant residuals with absolute values greater than .05, suggesting that the factor solution provides a credible explanation for the observed inter-item correlation matrix. The resultant factor structure is shown in Table 4.41. The unidimensionality assumption for this subscale was thus corroborated.

Table 4.41

Extracted factor matrix for the Internal Scan subscale

	Factor
	1
LBIV74	.789
LBIV26	.784
LBIV50	.667
LBIV2	.597

4.4.2.3 Vision

The *Vision* latent variable was conceptualised as a unidimensional construct. The SPSS exploratory factor analysis results indicated that a single underlying factor was needed to explain the observed correlations between the items of the subscale. Only one factor obtained an eigenvalue greater than unity. The scree plot also suggested the extraction ofa single factor. The extracted factor structure is shown in Table 4.42. The items comprising the *Vision* subscale all loaded satisfactory on the single underlying factor.

Table 4.42

Extracted factor matrix for the Vision subscale

	Factor
	1
LBIV51	.814
LBIV27	.716
LBIV75	.715
LBIV3	.605

Zero (0%) non-redundant residuals returned absolute values greater than .05. The extracted factor solution therefore provided a credible explanation of the observed correlation matrix.The basket of evidence provided by the item analysis and the exploratory factor analysis of the *Vision* subscale provided support for the use of the items of the subscale to represent the *Vision* latent variable when testing the fit of the structural model depicted in Figure 2.3.

4.4.2.4 Strategy

The results for this dimensionality analysis indicated that the correlation matrix was factor analysable as all the obtained correlations exceeded the .30 cut-off value and all were significant ($p < .05$). Furthermore, the KMO was .795 and the Bartlett's Test of Sphericity indicated that H_0 could be rejected ($p < .05$).

One factor was extracted since only one factor obtained an eigenvalue greater than 1. As expected, the factor matrix indicated that all the items loaded satisfactorily onto one factor. There were no (0%) non-redundant residuals with absolute values greater than .05, suggesting that the factor solution provides a credible explanation for the observed inter-item correlation matrix. The resultant factor structure is shown in Table 4.43. The unidimensionality assumption for this subscale was thus corroborated.

Table 4.43

Extracted factor matrix for the Strategy subscale

	Factor 1
LBIV78	.733
LBIV54	.730
LBIV30	.692
LBIV6	.692

4.4.2.5 Planning

The results for this dimensionality analysis indicated that the correlation matrix was factor analysable as all the obtained correlations exceeded the .30 cut-off value and all were significant ($p < .05$). Furthermore, the KMO was .815 and the Bartlett's Test of Sphericity indicated that H_0 could be rejected ($p < .05$).

Only one factor had to be extracted to explain the observed correlation matrix, since only one factor obtained an eigenvalue greater than 1. As expected, the factor matrix indicated that all the items loaded satisfactorily onto one factor. There were no (0%) non-redundant residuals with absolute values greater than .05, suggesting that the factor solution provides a credible explanation for the observed inter-item correlation matrix. The resultant factor structure is shown in Table 4.44. The unidimensionality assumption for this subscale was thus corroborated.

Table 4.44

Extracted factor matrix for the Planning subscale

	Factor 1
LBIV94	.815
LBIV70	.815
LBIV46	.765
LBIV22	.655

4.4.2.6 Self Discipline

Item LBIV56 was found to be a poor item in the item analysis and was therefore not included in the dimensionality analysis of the *Self Discipline* subscale. The correlation matrix should contain correlations that that are bigger than .30 and significant ($p < .05$) for the correlation matrix to be factor analysable. The correlation matrix indicated that the matrix was factor analysable as all the correlations were bigger than .30 and all were significant ($p < .05$). A KMO value of .797 was obtained providing sufficient evidence that the *Self Discipline* subscale was factor analysable (> .60). The Bartlett's Test of Sphericity tests the null hypothesis that the correlation matrix is an identity matrix in the population (i.e., the diagonal contains one's and all off-diagonal elements are zero's) (Tabachnick & Fidell, 2007). The Bartlett's Test of Sphericity indicated that H_0 could be rejected ($p < .05$) providing further support that the matrix was factor analysable.

One factor was extracted, since only one factor obtained an eigenvalue greater than 1. The scree plot also suggested that a single factor should be extracted. The factor matrix indicated that all the items loaded satisfactorily on the single extracted factor as all factor loadings were larger than .50. The resultant factor structure is shown in Table 4.45. Furthermore none (0%) of the residual correlations were larger than .05 suggesting that the factor solution provides a credible explanation for the observed inter-item correlation matrix. The unidimensionality assumption was thus corroborated.

Table 4.45

Extracted factor matrix for the Self Discipline subscale

	Factor 1
LBIV64	.787
LBIV8	.767
LBIV32	.734
LBIV80	.699

4.4.2.7 Self Development

The *Self Development* subscale obtained a KMO of .748 and it was deduced from the results that H_0 could be rejected, meaning that the correlation matrix was factor analysable. *Self Development* was conceptualised as a unidimensional latent dimension of the *Self Development* construct that is not further divisible into more specific variables. The SPSS exploratory factory analysis results indicated that a single underlying factor explained the observed correlations between the items that remained in the subscale after the item analysis. Only one factor obtained an eigenvalue greater than unity. The scree plot also suggested the extraction of a single factor. The extracted factor structure is shown in Table 4.46. As expected, the factor matrix indicated that all the items loaded satisfactorily onto the single extracted factor. Two (33%) residual correlations were larger than .50. This indicated that the factor solution provides a sufficient albeit borderline explanation for the observed inter-item correlation matrix.

Table 4.46

Extracted factor matrix for the Self Development subscale

	Factor 1
LBIV7	.730
LBIV79	.688
LBIV55	.687
LBIV31	.563

4.4.2.8 Empowerment

The results for this dimensionality analysis indicated that the correlation matrix was factor analysable as all the obtained correlations exceeded the .30 cut-off value and all were significant ($p < .05$). The KMO was .889 and the Bartlett's Test of Sphericity indicated that H_0 could be rejected ($p < .05$).

One factor was extracted to explain the observed correlation matrix, since only one factor obtained an eigenvalue greater than 1. The factor matrix indicated that all the items loaded satisfactorily onto the single extracted factor. There were 2 (9%) non-redundant residuals with absolute values greater than .05, suggesting that the factor solution provides a credible explanation for the observed inter-item correlation matrix. The resultant factor structure is shown in Table 4.47. The unidimensionality assumption for *Empowerment* subscale was thus corroborated.

Table 4.47

Extracted factor matrix for the Empowerment subscale

	Factor 1
LBIV9	.742
LBIV33	.708
LBIV57	.699
LBIV11	.680

LBIV81	.673
LBIV88	.529
LBIV87	.526

4.4.2.9 Process

All items were included in the dimensionality analysis of the *Process* subscale. The correlation matrix should contain correlations that that are bigger than .30 and significant ($p < .05$) for the correlation matrix to be factor analysable. The correlation matrix indicated that the matrix was factor analysable as all the correlations were bigger than .30 and all were significant ($p < .05$). A KMO value of .886 was obtained providing sufficient evidence that the *Process* subscale was factor analysable (> .60). The Bartlett's Test of Sphericity tests the null hypothesis that the correlation matrix is an identity matrix in the population (i.e., the diagonal contains 1's and all off-diagonal elements are zero's) (Tabachnick & Fidell, 2007). The Bartlett's Test of Sphericity indicated that H_0could be rejected ($p < .05$) providing further support that the matrix was factor analysable.

One factor was extracted, since only one factor obtained an eigenvalue greater than 1. The scree plot also suggested that a single factor should be extracted. The factor matrix indicated that all the items loaded satisfactorily on the single extracted factor as all factor loadings were larger than .50. The resultant factor structure is shown in Table 4.48. Furthermore only 13.0% of the residual correlations were larger than .05 suggesting that the factor solution provides a credible explanation for the observed inter-item correlation matrix. The unidimensionality assumption was thus corroborated.

Table 4.48

Extracted factor matrix for the Process subscale

	Factor 1
LBIV59	.791
LBIV82	.756
LBIV58	.752
LBIV34	.713
LBIV10	.713
LBIV83	.663

4.4.2.10 Articulate

The results for this dimensionality analysis indicated that the correlation matrix was factor analysable as all the obtained correlations exceeded .30 and all were significant ($p < .05$). Furthermore, the KMO was .813 and the Bartlett's Test of Sphericity indicated that $_{H0}$could be rejected.

Only one factor was extracted to explain the observed correlation matrix, since only one factor obtained an eigenvalue greater than one. As expected, the factor matrix indicated that all the items loaded satisfactorily onto the single extracted factor. All the obtained factor loadings were bigger than .70. None (0%) of the residual correlations were larger than .05, suggesting that the factor solution provides a credible explanation for the observed inter-item correlation matrix. The resultant factor structure is shown in Table 4.49. The unidimensionality assumption for this subscale was thus corroborated.

Table 4.49

Extracted factor matrix for the Articulate subscale

	Factor 1
LBIV53	.834
LBIV29	.791
LBIV77	.729
LBIV5	.722

4.4.2.11 Inspire

The *Inspire* latent variable was conceptualised as a unidimensional construct. The SPSS exploratory factor analysis resultsindicated that a single underlying factor was needed to explain the observed correlations between the items of the subscale. Only one factor obtained an eigenvalue greater than unity. The scree plot also suggested the extraction of a single factor. The extracted factor structure is shown in Table 4.50. The items comprising the *Inspire* subscale all loaded satisfactorily on the single underlying factor.

Table 4.50

Extracted factor matrix for the Inspire subscale

	Factor
	1
LBIV67	.837
LBIV43	.808
LBIV19	.792
LBIV91	.676

Zero (0%) non-redundant residuals returned absolute values greater than .05. The extracted factor solution therefore provided a credible explanation of the observed correlation matrix.

The basket of evidence provided by the item analysis and the exploratory factor analysis of the *Inspire* subscale provided support for the use of the items of the subscale to represent the *Inspire* latent variable when testing the fit of the structural model depicted in Figure 2.3.

4.4.2.12 Trust

For this subscale the dimensionality analysis was run by excluding item LBIV37 which was found to be a poor item in the item analysis. The correlation matrix showed that all correlations were larger than .30 and all were significant ($p < .05$). The subscale obtained a KMO of .904 and the Bartlett's Test of Sphericity allowed for the null hypothesis to be rejected, thus there was strong evidence that the correlation matrix was factor analysable.

One factor was extracted, since only one factor obtained an eigenvalue greater than 1. The scree plot also suggested that a single factor should be extracted. The factor matrix indicated that all the items loaded acceptablyon the single extractedfactor as all factor loadings were larger than .50. The resultant factor structure is shown in Table 4.51. Furthermore 28% of the residual correlations were larger than .05 suggesting that the factor solution provides a borderline credible explanation for the observed inter-item correlation matrix. The unidimensionality assumption was nonetheless considered corroborated.

Table 4.51

Extracted factor matrix for the Trust subscale

	Factor
	1
LBIV52	.771
LBIV28	.760
LBIV85	.718
LBIV76	.700
LBIV61	.691
LBIV4	.685
LBIV13	.647

4.4.2.13 Hardiness

The results for this dimensionality analysis indicated that the correlation matrix was factor analysable. All the obtained correlations exceeded the .30 cut-off value and all were significant ($p < .05$). The KMO was .778 and the Bartlett's Test of Sphericity indicated that H_0 could be rejected ($p < .05$).

One factor was extracted to explain the observed correlation matrix, since only one factor obtained an eigenvalue greater than 1. The factor matrix indicated that all the items loaded adequately onto one factor. There were two (33%) non-redundant residuals with absolute values greater than .05, suggesting that the factor solution provides a somewhat borderline credible explanation for the observed inter-item correlation matrix. The resultant factor structure is shown in Table 4.52. The unidimensionality assumption for *Hardiness* subscale was nonetheless considered corroborated.

Table 4.52

Extracted factor matrix for the Hardiness subscale

	Factor
	1
LBIV38	.757
LBIV62	.742
LBIV14	.696
LBIV86	.657

4.4.2.14 Entrepreneur

The results for this dimensionality analysis indicated that the correlation matrix was factor analysable. Most of the obtained correlations exceeded the .30 cut-off value, but all were significant ($p < .05$). The KMO was .876 and the Bartlett's Test of Sphericity indicated that H_0 could be rejected ($p < .05$).

One factor was extracted to explain the observed correlation matrix, since only one factor obtained an eigenvalue greater than 1. The factor matrix indicated that all the items loaded adequately onto the single extracted factor. There were no (0%) non-redundant residuals with absolute values greater than .05, suggesting that the factor solution provides a credible explanation for the observed inter-item correlation matrix. The resultant factor structure is shown in Table 4.53. The unidimensionality assumption for *Entrepreneur* subscale was thus corroborated.

Table 4.53

Extracted factor matrix for the Entrepreneur subscale

	Factor
	1
LBIV63	.803
LBIV93	.778
LBIV45	.778
LBIV21	.576
LBIV39	.576
LBIV69	.547

4.4.2.15 Concern

The results for this dimensionality analysis indicated that the correlation matrix was factor analysable. All the obtained correlations exceeded the .30 cut-off value, and all were significant ($p < .05$). The KMO was .911 and the Bartlett's Test of Sphericity indicated that H_0 could be rejected ($p < .05$).

One factor was extracted to explain the observed correlation matrix, since only one factor obtained an eigenvalue greater than 1. The factor matrix indicated that all the items loaded satisfactorily onto the one extracted factor. All the obtained factor loadings were bigger than .70 and there were no (0%) non-redundant residuals with absolute values greater than .05.This suggests that the factor solution provides a credible explanation for the observed inter-item correlation matrix. The resultant factor structure is shown in Table 4.54. The unidimensionality assumption for *Concern* subscale was thus corroborated.

Table 4.54

Extracted factor matrix for the Concern subscale

	Factor 1
LBIV18	.799
LBIV42	.792
LBIV16	.777
LBIV90	.755
LBIV40	.731
LBIV66	.712

4.4.2.16 Interpret

For this subscale the dimensionality analysis was run by including all items as none were flagged as poor in the item analysis. The subscale obtained a KMO of .885 and the Bartlett's Test of Sphericity allowed for the null hypothesis to be rejected, thus there was strong evidence that the correlation matrix was factor analysable.

One factor was extracted, since only one factor obtained an eigenvalue greater than one. The scree plot also suggested that a single factor should be extracted. The factor matrix indicated that all the items loaded satisfactorily on the one extracted factor.The resultant factor structure are shown in Table 4.55. Furthermore, 13% of the reproduced correlations deviated more than .05 from their corresponding observed correlations. This suggests the factor solution provides a credible explanation of the observed inter-item correlation matrix. The unidimentionality assumption was thus corroborated.

Table 4.55

Extracted factor matrix for the Interpret subscale

	Factor 1
LBIV65	.807
LBIV17	.759
LBIV35	.750
LBIV41	.721
LBIV89	.721
LBIV15	.685

4.4.2.17 Coordinate

The results for this dimensionality analysis indicated that the correlation matrix was factor analysable. All the obtained correlations exceeded the .30 cut-off value, and all were significant ($p < .05$). The KMO was .812 and the Bartlett's Test of Sphericity indicated that H_0 could be rejected ($p < .05$).

One factor was extracted to explain the observed correlation matrix, since only one factor obtained an eigenvalue greater than 1. The factor matrix indicated that all the items loaded satisfactorily onto the one extracted factor. All the obtained factor loadings were bigger than .70 and there were no (0%) non-redundant residuals with absolute values greater than .05. This suggests that the factor solution provides a credible explanation for the observed inter-item correlation matrix. The resultant factor structure is shown in Table 4.56. The unidimensionality assumption for *Coordinate* subscale was thus corroborated.

Table 4.56

Extracted factor matrix for the Coordinate subscale

	Factor 1
LBIV44	.789
LBIV92	.745
LBIV20	.733
LBIV68	.713

4.4.2.18 Boundaries

The results for this dimensionality analysis indicated that the correlation matrix was factor analysable. All the obtained correlations exceeded the .30 cut-off value, and all were significant ($p < .05$). The KMO was .750 and the Bartlett's Test of Sphericity indicated that H_0 could be rejected ($p < .05$).

Only one factor had to be extracted to explain the observed correlation matrix, since only one factor obtained an eigenvalue greater than 1. The factor matrix indicated that all the items loaded adequately onto the one extracted factor. Furthermore, 16% of the reproduced correlations deviated more than .05 from their corresponding observed correlations. This suggests that the factor solution provides a credible explanation for the observed inter-item correlation matrix. The resultant factor structure is shown in Table 4.57. The unidimensionality assumption for *Boudries* subscale was thus corroborated.

Table 4.57

Extracted factor matrix for the Boundaries subscale

	Factor 1
LBIV36	.797
LBIV12	.744
LBIV84	.648
LBIV60	.561

4.4.2.19 Review

The results for this dimensionality analysis indicated that the correlation matrix was factor analysable. All the obtained correlations exceeded the .30 cut-off value, and all were significant ($p < .05$). The KMO was .829 and the Bartlett's Test of Sphericity indicated that H_0 could be rejected ($p < .05$).

Only one factor had to be extracted to explain the observed correlation matrix, since only one factor obtained an eigenvalue greater than 1. The factor matrix indicated that all the items loaded acceptably onto the one extracted factor. All the obtained factor loadings were bigger than .70 and none (0%) of the residual correlations were larger than .05. This suggests that the factor solution provides a credible explanation for the observed inter-item correlation matrix. The resultant factor structure is shown in Table 4.58. The unidimensionality assumption for *Review* subscale was thus corroborated.

Table 4.58

Extracted factor matrix for the Review subscale

	Factor 1
LBIV95	.850
LBIV47	.799
LBIV71	.759
LBIV23	.745

4.4.2.20 Celebrate

The results for this dimensionality analysis indicated that the correlation matrix was factor analysable. All the obtained correlations exceeded the .30 cut-off value, and all were significant ($p < .05$). The KMO was .837 and the Bartlett's Test of Sphericity indicated that H_0 could be rejected ($p < .05$).

Only one factor had to be extracted to explain the observed correlation matrix, since only one factor obtained an eigenvalue greater than 1. The factor matrix indicated that all the items loaded satisfactorily onto the single extracted factor. All the obtained factor loadings were bigger than .70 and none (0%) of the residual correlations were larger than .05. This indicates that the factor solution provides a credible explanation for the observed inter-item correlation matrix. The resultant factor structure is shown in Table 4.59. The unidimensionality assumption for *Celebrate* subscale was thus corroborated.

Table 4.59

Extracted factor matrix for the Celebrate subscale

	Factor 1
LBIV96	.874
LBIV48	.853
LBIV24	.823
LBIV72	.719

4.5 Conclusion derived from the Item and Dimensionality Analysis

The reason for the foregoing analyses was to provide insight into the functioning of the subscales of the latent variables in the comprehensive leadership-work unit performance structural model as depicted in Figure 2.3. The analysis assisted in gaining an understanding about the psychometric integrity of the indicator variables that were tasked to represent each of the latent variables. The item and dimensionality analyses report results which provided sufficient justification to combine the surviving items into item parcels as indicated in section 3.5. The item analyses revealed sufficient internal consistency for the latent variable subscales. Only three subscales did not achieve alpha values exceeding .80. The item statistics revealed that there were poor items which were flagged and after gaining a basket of evidence incriminating these items two items were deleted in the 20 LBI subscales.

All scales of both the Performance Index and the Leadership Behavioural Inventory passed the EFA test of the unidimensionality assumption as was originally hypothesised.

4.6 Item Parcelling

Structural equation modelling (SEM) was used to perform the confirmatory factor analysis on the data set, obtained after imputation of missing values. For this purpose, two indicator variables (item parcels) were calculated for each subscale. The interest in applying parcels within SEM is largely based on its proposed advantages compared to single items. The advantages are related to both the difference in psychometric characteristics between items and parcels and to factor-solution and model-fit advantages accruing to models based on parcels (Little *et al.,* 2002). By creating parcels, the researcher constructed new variables that are closer to being continuous (better approximations to normally distributed continuous variables), which allows for a distribution closer to normal, and may therefore reduce distortion of estimates (Bandalos, 2002). Parcelling can be viewed as a heuristic approach to converting ordered categorical data to continuous data with an eye toward minimising the complications caused by using ordered-categorical variables (Nasser& Takahashi, 2003).

The composite score of an item parcel is normally more reliable than single item scores. Item parcels also yield variance-covariance matrices that are amenable to linear factor analysis (Hagvet & Nasser, 2004). When compared with individual items, model-fit indices as measured by the root means squared error of approximation (RMSEA), comparative fit index (CFI), and the chi-square test also improve systematically as the number of items per parcel increased, provided items had a uni-dimensional structure (Bandalos, 2002).

Item parcelling is not without disadvantages. As Holt (2003) and Little *et al.* (2002) emphasise, item parcels work best when constructed on uni-dimensional structures. Item parcels drawn from assessing a multi-dimensional construct are themselves like to be multidimensional in composition, leading to difficulties in interpretation. Another disadvantage is that item parcelling may improve model fit for all models, even if they are misspecified (Bandalos *et al.,* 2002). As a result, item parcelling may reduce the probability that misspecified models may be identified, and this possibly increases the chance of Type II errors (failing to reject a model that should have been rejected) (Little *et al*., 2002).

Taken all advantages and disadvantageous into consideration it was decided to use item parcels for this research, but to remain alert to the potential consequences of doing so when considering model fit. Item parcels were calculated by using the mean of the items assigned to the parcel. Two parcels were calculated per latent variable. Even numbered items were assigned to one parcel and uneven numbered items to the other.

4.7 Testing for Multivariate Normality

Multivariate statistics in general and structural equation modelling in particular are based on a number of critical assumptions. Before proceeding with the main analyses it was necessary to assess the extent to which the data complies with these assumptions (Tabachnick & Fidell, 2007). The default method of estimation when fitting models to continuous data (maximum likelihood) assume that the distribution of indicator variables follow a multivariate normal distribution (Mels, 2003). Failure to satisfy this assumption results in incorrect standard errors and chi-square estimates (Du Toit & Du Toit, 2001; Mels, 2003).

The results of the item and exploratory factor analysis warranted the formation of item parcels for each of the latent variables. Parcels (composite variables) from even and uneven numbered items were created with SPSS and imported into PRELIS. The parcels were treated as continuous variables. The multivariate normality of the composite item parcels in this study was evaluated via PRELIS. The results of the test for multivariate normality of are shown in Table 4.60a.

Table 4.60a

Test of Multivariate normality for the Leadership-Work unit Performance indicator variables before normalisation

Skewness			Kurtosis			Skewness and	Kurtosis
Value	Z-Score	P-Value	Value	Z-Score	P-Value	Chi-Square	P-Value
349.943	97.013	.000	1107.591	26.474	.000	10112.393	.000

Table 4.60a indicates that the null hypothesis of multivariate normality had to be rejected ($X^2 = 10112.393$; $p < .05$). Since the quality of the solution obtained in structural equation modelling is to a large extent dependent on multivariate normality, it was decided to normalise the variables through PRELIS. The results of the test for multivariate normality are presented in Table 4.60b.

Table 4.60b

Test of Multivariate normality for the Leadership-Work unit Performance indicator variables after normalisation

Skewness			Kurtosis			Skewness and Kurtosis	
Value	Z-Score	P-Value	Value	Z-Score	P-Value	Chi-Square	P-Value
111.471	27.762	.000	857.76	16.494	.000	1042.802	.000

Table 4.60b indicates that the normalisation procedure failed to rectify the multivariate normality problem ($p < .05$) although it succeeded in marginally improving the multivariate symmetry and kurtosis of the indicator variable distribution. The chi-squared decreased from 10112.393 to 1042.802. The normalised data was used in the subsequent evaluation of the fit of the measurement and comprehensive LISREL models.

4.8 Measurement Model

The measurement model represents the relationship between the leadership and unit performance latent variables and theirmanifest indicators and is expressed by equation 1:

$$\mathbf{X} = \mathbf{\Lambda}_x \boldsymbol{\xi} + \boldsymbol{\delta} \quad \mathbf{1}$$

The $\mathbf{\Lambda}_x$ represents the matrix of lambda coefficients (λ), which indicate the loading of the indicators on their designated latent variable. The vector of latent variables is signified by thesymbol $\boldsymbol{\xi}$ (ksi), whereas the symbol $\boldsymbol{\delta}$ (delta) is used to indicate a vector of measurement error terms (Diamantopoulos & Siguaw, 2000). **X** represents a vector of composite indicator variables (i.e., item parcels). Ultimately, the purpose of the confirmatory factor analysis is to determine whether the operationalisation of the latent variables comprising the structural model in terms of item parcels was successful. The operationalisation can be considered successful if the measurement model specified in equation 1 can successfully reproduce the observed covariance matrix (i.e., if the model fits well) and if the measurement model parameter estimates indicate that the majority of the variance in the indicator variables can be explained in terms of the latent variables they were tasked to reflect.

The fit of the estimated leadership-work unit performance measurement model is discussed next. A decision is made on the credibility of the measurement model parameter estimates and the parameters estimates of the fitted model are finally discussed. A visual representation of the fitted leadership-work unit performance measurement model is provided in Figure 4.1 and the overall fit statistics are presented in Table 4.61.

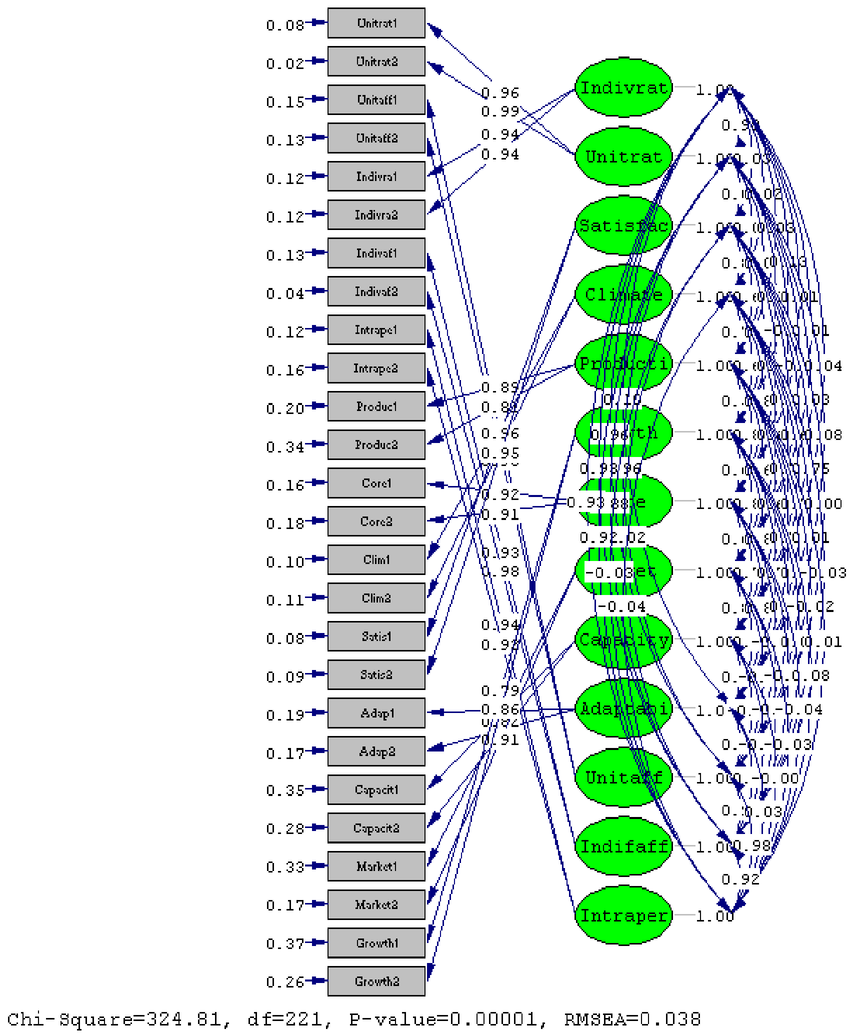

Figure 4.1 Representation of the fitted Leadership-Work-unit performance measurement model

4.8.1 Measurement model fit indices

The leadership-work unit performance measurement model showed good fit. The full spectrum of the fit statistics is shown in Table 4.61. The measurement model converged in 13 iterations.

Table 4.61

Goodness-of-fit statistics of the Leadership-Work unit performance Measurement Model

Degrees of Freedom	221
Minimum Fit Function Chi-Square	382.44 (P = .00)
Normal Theory Weighted Least Squares Chi-Square	371.17 (P = .00)
Satorra-Bentler Scaled Chi-Square	324.81 (P = .00)
Chi-Square Corrected for Non-Normality	862.15 (P = .00)
Estimated Non-centrality Parameter (NCP)	103.81
90 Percent Confidence Interval for NCP	(59.60 ; 156.00)
Minimum Fit Function Value	1.17
Population Discrepancy Function Value (F0)	.32
90 Percent Confidence Interval for F0	(.18 ; .48)
Root Mean Square Error of Approximation (RMSEA)	.038
90 Percent Confidence Interval for RMSEA	(.029 ; .047)
P-Value for Test of Close Fit (RMSEA < .05)	.99
Expected Cross-Validation Index (ECVI)	1.79
90 Percent Confidence Interval for ECVI	(1.66 ; 1.95)
ECVI for Saturated Model	2.15
ECVI for Independence Model	74.85
Chi-Square for Independence Model with 325 Degrees of Freedom	24347.91
Independence AIC	24399.91
Model AIC	584.81
Saturated AIC	702
Independence CAIC	24524.45
Model CAIC	1207.5
Saturated CAIC	2383.28
Normed Fit Index (NFI)	.99
Non-Normed Fit Index (NNFI)	.99
Parsimony Normed Fit Index (PNFI)	.67
Comparative Fit Index (CFI)	1
Incremental Fit Index (IFI)	1
Relative Fit Index (RFI)	.98
Critical N (CN)	274.83
Root Mean Square Residual (RMR)	.0062
Standardised RMR	.02
Goodness of Fit Index (GFI)	.92
Adjusted Goodness of Fit Index (AGFI)	.87
Parsimony Goodness of Fit Index (PGFI)	.58

The following exact fit null hypothesis was tested:

$$H_{01}: \text{RMSEA} = 0$$
$$H_{a1}: \text{RMSEA} > 0$$

The following close fit null hypothesis was also tested:

$$H_{02}: \text{RMSEA} = .05$$
$$H_{a2}: \text{RMSEA} > .05$$

The Satorra-Bentler scale chi-square indicated a value of 324.18 ($p = .00$). The null hypothesis of the exact model fit is thus rejected.

Another indication of the model fit achieved is also depicted by the extent to which the minimum fit function value approaches zero and it was found to be 1.17. This indicates good fit. The estimated population discrepancy function value (F0) reflects the extent to which the observed population co-variance matrix (Σ) is estimated to differ from the reproduced population co-variance resulting from the parameters minimizing the selected discrepancy function fitting the model on Σ. A point estimate of .32 was obtained for F0 with confidence interval limits of (.18 ; .48) in this case. According to Theron (personal communication 24 July 2012), a perfect model fit would have been achieved if F0 had been zero because the observed population co-variance (Σ) would then have been equal to the estimated population co-variance. The root mean square error of approximation (RMSEA) indicates how well the model, with unknown but optimally chosen parameter estimates would fit the populations' covariance matrix (Byrne, 1998). In recent years it has become regarded as one of the most informative fit indices (Diamantopoulos & Sigauw, 2000), due to its sensitivity to the number of estimated parameters in the model. In other words, the RMSEA favours parsimony in that it will choose the model with the lesser number of parameters. RMSEA indexes the discrepancy between the observed population co-variance matrix and the estimated population co-variance matrix implied by the model per degree of freedom. Values exceeding .10 are generally regarded as indicative of poor fit; values greater than or equal to .08 but less than .10 is indicative of mediocre fit. Values above .05 but less than .08 are indicative of reasonable fit and values below .05 are generally regarded to indicate good model fit. The RMSEA value of .038 indicates that the measurement model shows very good model fit. The fact that the upper bound of the confidence interval (.029 – .047) falls below the critical cut off value of .05 moreover indicates that the null hypothesis of close fit would not be rejected. The p-value for the Test of Close fit (H_{02}: RMSEA<.05) was .99. The close fit null hypothesis was therefore not rejected ($p > .05$) and thus it is concluded that the measurement model shows very good fit.

The good fit of the measurement model warrant further interpretation of the model parameter estimates. Good model fit does not in and by itself indicate that the operationalisation of the leadership-work unit performance latent variables succeeded.

4.8.2 Measurement Model Residuals

Residuals represent the difference between corresponding cells in the observed and fitted covariance matrices (Jöreskog & Sörbom, 1993). Residuals, especially standardised residuals, provide valuable diagnostic information on sources of lack of fit in models (Jöreskog & Sörbom, 1993; Kelloway, 1998). Standardised residuals can be interpreted as standard normal deviates, i.e. z-scores. Jöreskog and Sörbom (1993) explain that a standardised residual refers to a residual that is divided by its estimated standard error. They are considered large it they exceed +2.58 or -2.58 (Diamantopoulos & Sigauw, 2000). A well fitting model will be characterised by standardised residuals that are symmetrically clustered around the zero point (Jöreskog & Sörbom, 1993). Positive residuals indicate underestimation and thus imply the need for additional explanatory paths (C.C. Theron, personal communication, 24 July 2012). Negative residuals would indicate that the model overestimates the covariance between specific observed variables. Rectifying this situation would, therefore, lie in removing some or all of the paths that are associates with the indicator variables in question (Kelloway, 1998). Table 4.62 provides a summary of the standardised residuals obtained for this analysis.

Table 4.62

Summary Statistics for Leadership-Work unit performance Measurement Model Standardised Residuals

Smallest Standardised Residual	-9.91
Median Standardised Residual	0
Largest Standardised Residual	2.6
Residual for Indivaf1 and Unitrat1	-2.6
Residual for Indivaf1 and Unitrat2	-3.12
Residual for Adap2 and Produc1	-9.91
Residual for Growth2 and Unitrat2	2.6

Table 4.62 indicates three large negative residuals as well as one large positive residual. This means that only 4 out of 351 (1.14%) unique observed variance-covariances terms were poorly estimated by the fitted model. The small percentage of large residuals again comments favourably on the fit of the model. A possible explanation for the large positive residual could be the fact that the measurement model fails to model the structural relationship that exist between these latent variables. The three large negative residuals could indicate that some of the paths in the measurement model should be removed.

According to Jöreskog and Sörbom (1993), all the standardised residuals may be examined collectively in a stem-and-leaf plot and a Q-plot. The stem-and-leaf plot of the leadership-work unit performance measurement model is depicted in Figure 4.2. Residuals which are distributed approximately symmetrical around zero characterise a good model. An excess of residuals on the positive or negative side would indicate that the covariance terms are systematically under or over estimated.

-9|	9
-8|	
-7|	
-6|	
-5|	
-4|	
-3|	1
-2|	622
-1|	665555554444433000000000000000000000
0|	99999888888888877777777777776666665555555555555444444444444444433333333333+02
0|	111111111111112222222222222222222222222222223333333333333444444444445555555556666+24
1|	111111111112223300000000000000
2|	1111246

Figure 4.2 Stem-And-leaf plot for Leadership-Work unit performance measurement Model Standardised Residuals

The stem-and-leaf plot depicted in Figure 4.2 indicates the distribution of standardised residuals to be negatively skewed. This further indicates that, in terms of substantial estimation errors, the measurement model tends to overestimate rather than underestimate the observed covariance matrix. The limited number of large standardised residuals, however, means that this is not a serious problem.

The Q-plot displayed in Figure 4.3, provides an additional graphical display of residuals by plotting the standardised residuals (horizontal axis) against the quantiles of the normal distribution (Diamantopoulos & Sigauw, 2000). The Q-plot indicates good model fit as there is a relatively small angular deviation of the standardised residuals for all pairs of observed variables from the 45º reference line in the Q-plot.To the extent that the data points swivel away from the 45-degree reference line the model fit is less than satisfactory. The Q-plot in figure 4.3 indicates a good model fit as the standardised residuals of pairs of observed variables tend to fall close to the reference line. It tends to deviate in the lower region of the X-axis. This is in-line with the results reported in Table 4.62 where large negative standardised residuals were found to dominate. Subsequently, given the examination of the residuals, it is important to also evaluate the measurement model modification indices.

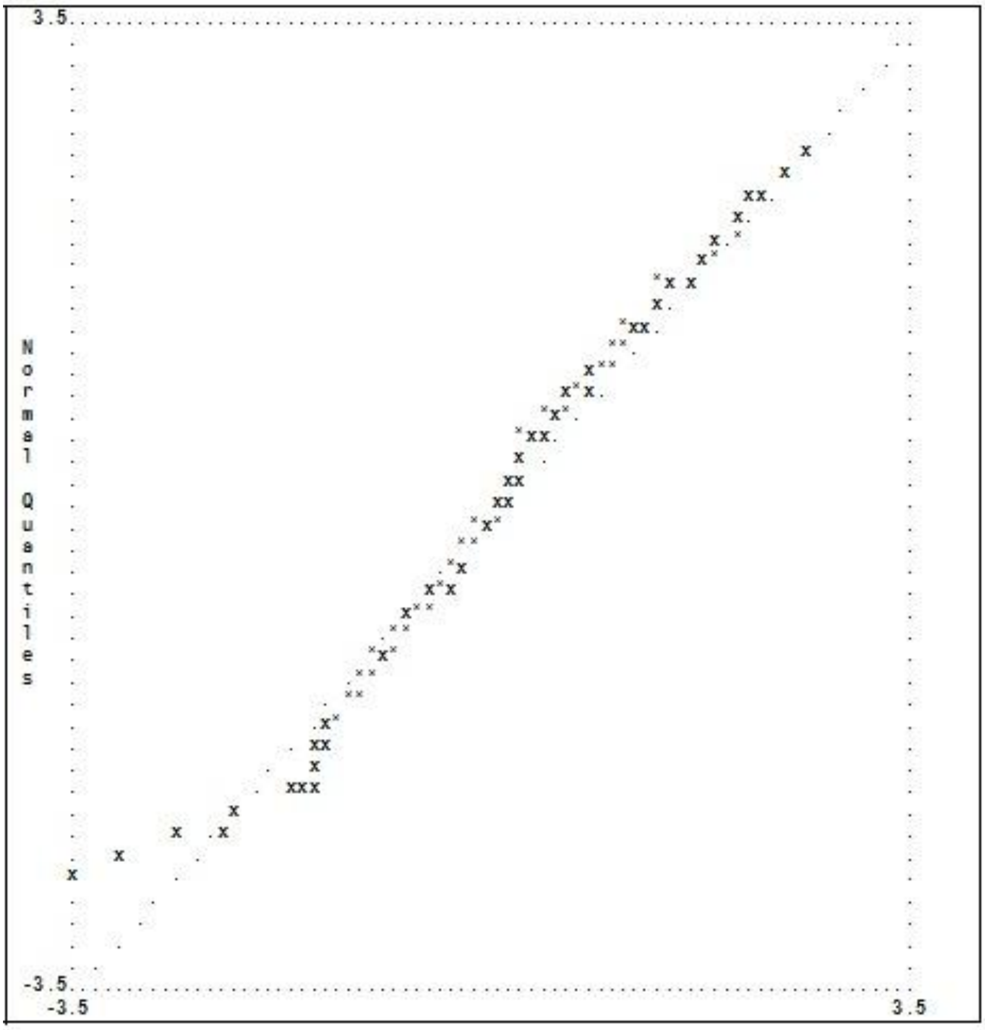

Figure 4.3 Q-plot of Leadership-Work unit Performance Measurement Model Standardised Residuals

4.8.3 Measurement Model Modification Indices

Examining modification indices calculated for the currently fixed parameters of the model provides an additional way of determining if one or more paths would significantly improve the model fit. Model modification indices (MI) calculated by LISREL serve to estimate the decrease that should occur in the X^2 statistic if parameters that are currently fixed are set free and the model re-estimated. Large modification index values (> 6.6349) would be indicative of parameters that, if set free, would improve the fit of the model significantly ($p < .01$) (Diamantopoulos & Siguaw, 2000; Jöreskog & Sörbom, 1993). Any alternation to the model as suggested by modification indices should, however, only be considered if such alternations are substantively justifiable (Diamantopoulos & Siguaw, 2000). Thus, alterations should make sense in relation to the theory of the influence on work unit performance. In the evaluation of the modification indices calculated for Λ^X and Θ_ε the emphases does not fall as much on possible ways of actually modifying the measurement model as it still falls on evaluating the fit of the model (Diamantopoulos & Siguaw, 2000). If only a limited number of ways exist to improve the fit of the model this comments favourably on the fit of the current model.

Examination of the modification index values calculated for the Λ^X matrix shown in Table 4.63 indicates that an item parcel designated to measure *Affective-interactive Inter-individual related behaviours* also load on *Rational-analytical Unit related leader behaviours*. An item parcel designated to measure *Core People Processes* also load on *Satisfaction*. It was further noted that an item parcel designated to reflect *Production* also load on *Capacity* and that an item parcel designated to reflect *Intrapersonal behaviours* load on *Affective-interactive inter-individual related behaviours*. Table 4.63 suggests that these additional paths would significantly improve the fit of the model[10].

Table 4.63

Modification indices of Leadership-Work unit Performance Measurement Model for LAMBDA-X

	Indivrat	Unitrat	Satisfac	Climate	Producti	Growth	Core
Unitrat1	.07	- -	.14	.23	0	.73	0
Unitrat2	- -	- -	.14	.25	0	.71	0
Unitaff1	.2	.11	.89	.87	1.71	.17	1.58
Unitaff2	- -	- -	.9	.88	1.82	.17	1.6
Indivra1	- -	- -	.41	0	.03	.79	.02

[10]It needs to be acknowledged that freeing the factor loading with the highest factor loading might in the subsequent output produce modification indices for Λ_X that are all smaller than 6.6349

Indivra2	- -	0	.41	0	.03	.76	.02
Indivaf1	6.9	25.44	1.81	.2	.07	3.16	.11
Indivaf2	4.82	9.68	1.85	.24	.09	3.44	.14
Intrape1	.1	3.14	0	.24	.58	.01	.96
Intrape2	.02	.52	0	.24	.57	.01	.98
Produc1	3.06	2.77	- -	- -	- -	- -	- -
Produc2	3.11	2.84	1.39	- -	- -	4.75	- -
Core1	.05	.01	8.55	0	.37	.05	- -
Core2	.04	.01	15.69	.01	.5	.07	- -
Clim1	.18	.44	1.69	- -	.61	.18	3.19
Clim2	.18	.44	8.16	- -	.75	.18	- -
Satis1	.16	.22	- -	.04	.83	.82	.02
Satis2	.16	.22	- -	.06	.69	.88	.02
Adap1	1.36	1.02	.37	.08	1.47	1.32	.01
Adap2	1.36	1.01	.65	.15	2.49	1.55	.01
Capacit1	.08	0	.76	3	.18	.3	.93
Capacit2	.08	0	.79	2.71	.22	.42	1.13
Market1	.86	1.73	.07	1.05	6.62	- -	4.78
Market2	.92	1.84	.08	.72	4.37	1.38	2.21
Growth1	2.89	3.66	.04	.44	.8	- -	1.89
Growth2	3.08	4	.05	.4	.63	- -	1.32

	Market	Capacity	Adaptabi	Unitaff	Indifaff	Intraper
Unitrat1	.64	.62	.03	.71	.07	2.92
Unitrat2	.67	.7	.04	- -	1.11	- -
Unitaff1	0	.57	1.15	- -	2.39	.33
Unitaff2	0	.58	1.28	- -	- -	- -
Indivra1	.05	.01	.07	- -	- -	- -
Indivra2	.05	.01	.07	.18	1.09	.03
Indivaf1	.84	1.84	.94	1.46	- -	.51
Indivaf2	.92	2.04	1.23	1.21	- -	.21
Intrape1	.09	.16	.19	1.79	7.61	- -
Intrape2	.09	.16	.19	.42	3.22	- -
Produc1	- -	- -	- -	2.57	2.14	1.2
Produc2	3.84	13.91	- -	2.56	2.08	1.17
Core1	.1	.18	.92	.14	.07	.47
Core2	.18	.37	1.63	.13	.07	.44
Clim1	.14	.14	.04	.05	.04	0
Clim2	.15	.16	.04	.05	.04	0
Satis1	.04	.26	.05	.1	.01	.23
Satis2	.04	.27	.06	.1	.01	.23
Adap1	.27	.1	- -	1.66	1.83	2.09
Adap2	.43	.17	- -	1.66	1.84	2.09
Capacit1	.12	- -	1.55	.36	1.26	.36

Capacit2	.18	- -	2.41	.37	1.29	.37
Market1	- -	- -	4.25	1.25	.9	1.77
Market2	- -	1.29	2.25	1.3	.9	1.78
Growth1	5.9	- -	.09	2.37	1.51	1.69
Growth2	1.2	.16	.03	2.55	1.6	1.78

Only seven out of a possible 286 ways of modifying the factor loading pattern (2,45%) will results in a significant improvement in the model. This small percentage comments favourably on the fit of the model.

As can be seen from the Table 4.64 thirteen of the modification index values calculated for the measurement error variance-covariance matrix were large (> 6.6349) and therefore thirteen parameters, if set free, would improve the fit of the model significantly ($p < .01$).

Table 4.64

Modification index values calculated for the Covariance Matrix

	Unitrat1	Unitrat2	Unitaff1	Unitaff2	Indivra1	Indivra2	Indivaf1	Indivaf2	Intrape1
	--------	--------	--------	--------	--------	--------	--------	--------	--------
Unitrat1	- -	- -							
Unitrat2	- -	- -							
Unitaff1	1.42	.32	- -	- -					
Unitaff2	1.31	.31	- -	- -					
Indivra1	.32	3.02	10.49	.19	- -	- -			
Indivra2	2.53	.83	.18	5.36	- -	- -			
Indivaf1	7.6	5.29	3.67	20.27	.13	3.51	- -	- -	
Indivaf2	1.6	7.6	54.1	.86	.39	1.33	- -	- -	
Intrape1	.22	.01	.78	6.92	.92	.21	7.44	.34	- -
Intrape2	18.76	10.43	6.13	.32	11.89	3.83	1.62	4.03	- -
Produc1	.04	2.11	1.09	.25	2.04	1.86	.02	.65	1.37
Produc2	.02	1.73	1.68	.2	2.99	2.76	.3	.36	.78
Core1	.02	1.23	.29	.01	.6	.01	.03	.09	0
Core2	2.36	6.1	1.98	.77	.07	.39	.63	1.15	3.89
Clim1	.12	.01	0	2.27	.12	.04	.37	.02	2.64
Clim2	.08	.33	0	2.48	.08	.07	.07	.18	1.63
Satis1	2.3	1.32	.03	.04	.85	.07	1.25	0	.52
Satis2	1.79	1.02	.06	.07	2.43	.82	3.95	.41	.02
Adap1	.04	.15	.06	0	.3	.02	3.11	1.01	2.6
Adap2	.27	.04	0	.05	1.1	.44	1.75	.46	1.17
Capacit1	.04	.75	.51	.39	1.42	.06	.03	1.41	.26

Capacit2	.52	2.55	.06	.96	.69	0	.46	.47	1.22
Market1	.35	1.57	0	3.38	.72	1.58	1.12	0	.08
Market2	.04	.75	.98	.46	1	.63	1.65	.15	.67
Growth1	.25	4.24	.01	.11	.54	.32	.22	.03	.07
Growth2	1.03	5.35	.01	.06	3.41	.49	.7	.75	1.22

	Produc1	Produc2	Core1	Core2	Clim1	Clim2	Satis1	Satis2
Indivaf1								
Indivaf2								
Intrape1								
Intrape2								
Produc1	- -	- -						
Produc2	- -	- -						
Core1	.01	.02	- -	- -				
Core2	.01	.02	- -	- -				
Clim1	.4	.86	1.65	6.33	- -	- -		
Clim2	.84	.79	.02	1.21	- -	- -		
Satis1	.15	.4	6.18	5.72	3.64	2.8	- -	- -
Satis2	.02	.87	.01	.01	1.56	1.07	- -	- -
Adap1	6.22	2.36	8.71	9.35	0	.02	.2	0
Adap2	8.93	4.46	.92	1.03	.06	.01	.73	.23
Capacit1	.26	.38	.06	.24	.16	1.16	4.83	4.84
Capacit2	1.32	1.74	.07	.91	.08	1.15	2.62	2.61
Market1	.27	1.15	.01	.84	1.07	2.46	.06	.86
Market2	.16	.84	.8	.06	.36	1.07	.65	.02
Growth1	.81	.92	.17	.4	.04	.15	.2	.17
Growth2	4.42	5.32	.02	.61	1.01	1.37	1.84	1.79

	Adap1	Adap2	Capacit1	Capacit2	Market1	Market2	Growth1	Growth2
Adap1	- -							
Adap2	- -	- -						
Capacit1	7.29	.06	- -					
Capacit2	.59	3.94	- -	- -				
Market1	.81	.13	.16	10.95	- -			
Market2	.16	.4	.26	4.44	- -	- -		
Growth1	.01	.61	.31	.57	3.31	4.1	- -	
Growth2	2.94	5.91	.07	0	3.03	4.04	- -	- -

Only thirteen of the two hundred and ninety-six covariance terms currently fixed to zero would, if set free, significantly improve the fit of the model. This reflects favourably on the measurement model.

4.8.4 Decision on the Fit of the Measurement Model

The model fit statistics seem to unanimously suggest that the model fits closely to the data. The fit statistics in Table 4.61 generally indicate a good fitting model. Only a small percentage large negative standardised residuals as well as one large positive standardised residual exist. A limited number of modification index values exist in Λ_X and Θ_{ε}. The measurement model parameters estimates therefore may be regarded as credible in as far as it is possible to reasonably accurately reproduce the observed covariances from them. The interpretation of the measurement model parameter estimates is therefore regarded as permissible.

4.9 Interpretation of the Leadership-Work unit performance model parameter estimates

If a measure is designed to provide a valid reflection of a specific latent variable, then the slope of the regression of X_i on ξ_j in the fitted measurement model has to be substantial and significant (Diamantopoulos & Siguaw, 2000). The unstandardized Λ_X matrix (Table 4.65 below) contains the regression coefficients of the regression of the manifest variables on the latent variables they were linked to. The regression coefficients of the manifest variables on the latent variables are significant ($p < .05$) if the t-values, as indicated in the matrix, exceed I1,96I. Significant indicator loadings provide validity evidence in favour of the indicators (Diamantopoulos & Siguaw, 2000).

Table 4.65

Leadership-Work Unit Performance Measurement Model Unstandardised Lambda-X Matrix

	Indivrat	Unitrat	Satisfac	Climate	Product	Growth	Core
Unitrat1		.40					
		(.02)					
		23.77					
Unitrat2		.41					
		(.02)					
		24.13					
Indivra1	.40						
	(.02)						
	24.13						

Indivra2	.41						
	(.02)						
	22.42						
Produc1					.35		
					(.02)		
					19.29		
Produc1					.35		
					(.02)		
					16.48		
Core1							.40
							(.02)
							20.95
Core2							.40
							(.02)
							20.34
Clim1				.45			
				(.02)			
				22.71			
Clim2				.47			
				(.02)			
				23.36			
Satis1			.50				
			(.02)				
			23.41				
Satis2			.52				
			(.02)				
			22.95				
Growth1						.71	
						(.05)	
						15.06	
Growth2						.80	
						(.04)	
						18.15	
	Market	Capacity	Adaptabi	Unitaff	Indivaff	Intraper	
Unitaff1				.37			
				(.02)			
				21.52			
Unitaff2				.37			
				(.02)			
				21.88			
Indivaf1					.37		
					(.02)		
					22.87		
Indivaf2					.41		
					(.02)		

				24.58	
Adap1			.53		
			(.03)		
			20.58		
Adap2			.55		
			(.03)		
			20.62		
Capacit1		.54			
		(.03)			
		16.88			
Capacit2		.66			
		(.04)			
		17.92			
Market1	.62				
	(.04)				
	17.41				
Market2	.68				
	(.04)				
	19.11				
Intrape1					.35
					(.02)
					22.84
Intrap2					.36
					(.02)
					23.59

All the factor loadings, indicated in the Lambda-X matrix (Table 4.65) are significant with t >|1,96|. There is, however a problem with solely relying on unstandardised loadings and their associated t-values warn Diamantopoulos and Siguaw (2000). As it is unstandardised, it might be hard to compare and interpret the validity of different indicators measuring a particular construct. The authors recommend that the magnitude of the standardised loadings should also be investigated.

In the completely standardised solution of LISREL, both the latent and indicator variables are standardised. According to Becker (2009), values in the standardised solution can be interpreted as the regression of the standardised observed variables on the standardised latent variables. The completely standardised factor loading matrix is presented in Table 4.66. 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. The proportion of the indicator variance explained in terms of the latent variable it is meant to express is indicated by the square of the completely standardised factor loadings (Diamantopoulos & Siguaw, 2000).

Table 4.66

Leadership-Work Unit Performance Measurement model Completely Standardised Solution Lambda-X

	Indivrat	Unitrat	Satisfac	Climate	Producti	Growth	Core
	--------	--------	--------	--------	--------	------	--
Unitrat1	- -	.96	- -	- -	- -	-	-
Unitrat2	- -	.99	- -	- -	- -	-	-
Indivra1	.94	- -	- -	- -	- -	-	-
Indivra2	.94	- -	- -	- -	- -	-	-
Produc1	- -	- -	- -	- -	.89	-	-
Produc2	- -	- -	- -	- -	.81	-	-
Core1	- -	- -	- -	- -	- -	-	.92
Core2	- -	- -	- -	- -	- -	-	.91
Clim1	- -	- -	- -	.95	- -	-	-
Clim2	- -	- -	- -	.95	- -	-	-
Satis1	- -	- -	.96	- -	- -	-	-
Satis2	- -	- -	.95	- -	- -	-	-
Growth1	- -	- -	- -	- -	- -	.79	
Growth2	- -	- -	- -	- -	- -	.86	

	Market	Capacity	Adaptabi	Unitaff	Indifaff	Intraper
	--------	--------	--------	--------	--------	------
Unitaff1				.92		
Unitaff2				.93		
Indivaf1					.93	
Indivaf2					.98	
Intrape1						.94
Intrape2						.92
Adap1			.90			
Adap2			.91			
Capacit1		.81				
Capacit2		.85				
Market1	.82					
Market2	.91					

Standardised loading estimates should be .50 or higher, but ideally .70 or higher (Hair *et al*., 2006). The reason for this is that standardised lambda loadings will be squared in order to express the proportion of variance in the indicator variables that can be explained by each dimension constituting the model. For example, a loading of .71 square equates to .50. Thus, only 50% of unique latent variable variance is expressed by the designated indicators. As lambda loadings fall below .70, more than half of the variance in the measure is due to error variance (systematic and random) (C.C.Theron, personal communication, 7 June 2011). However, standardised loading estimates of .50 and higher are still acceptable (Becker, 2009) and will be considered sufficiently large (Myburgh, 2011). When adhering to the stricter interpretation rule suggested by Hair et al. (2006) all 26 indicators met the minimum lambda loading criterion (indicated in the above Table 4.66).

Table 4.67 shows the squared multiple correlations (R^2) of each indicator, shifting the attention to the reliability of indicators (Diamantopoulos & Sigauw, 2000). A high squared multiple correlation would indicate that the latent variable that the item parcels was designated to represent does explain a large proportion of the variance in the item parcel scores (Moyo, 2009).

Since each indicator only loads on a single variable the squared completely standardised loadings equal the R^2 values shown in Table 4.67. The squared multiple correlations (R^2) of the indicators depicted in Table 4.67 show the proportion of variance in an indicator that is explained by its underlying latent variable.

Table 4.67

Leadership-Work Unit Performance Measurement Model Squared Multiple Correlations for X-Variables

Unitrat1	Unitrat2	Unitaff1	Unitaff2	Indivra1	Indivra2	Indivaf1	Indivaf2	Intrape1
.92	.98	.85	.87	.88	.88	.87	.96	.88
Intrape2	Produc1	Produc2	Core1	Core2	Clim1	Clim2	Satis1	Satis2
.84	.8	.66	.84	.82	.90	.89	.92	.91
Adap1	Adap2	Capacit1	Capacit2	Market1	Market2	Growth1	Growth2	
.81	.83	.65	.72	.67	.83	.63	.74	

The completely standardised error variance of the i^{th} indicator variable (θ δ_{ii}) in Table 4.68 consists of systematic non-relevant variance and random error variance. The values shown in Table 4.67 could therefore be interpreted as indicator variable validity coefficients, $\rho(X_i, \xi_j)$. Since ($\lambda_{ij}^2 + \theta\delta_{ii}$) are equal to unity in the completely standardized solution, the validity coefficients in equation 2: $\rho(X_i,\xi_j)$ can be defined as follows:

$\rho(X_{ij}) = \sigma^2_{systematic\text{-}relevant}/(\sigma^2_{systematic\text{-}relevant} + \sigma^2_{non\text{-}relevant})$

$= \lambda_{ij}^2/[\lambda_{ij}^2 + \theta_{ii}]$

$= 1 - (\theta_{ii}/[\lambda_{ij}^2 + \ _{ii}])$

$= 1 - \ _{ii}$

$=\lambda_{ij}^2$ **2**

Since reliability could be defined as the extent to which variance in indicator variables can be attributed to systematic sources, irrespective of whether the source of variance is relevant to the measurement intention or not, the values shown in Table 4.67 could simultaneously be interpreted as lower bound estimates of the item reliabilities ρ_{ii} (Diamantopoulos & Siguaw, 2000). The extent to which the true item reliabilities would be under-estimated would be determined by the extent to which $\theta\delta_{ii}$ contains the effect of the systematic non-relevant latent influences. In terms of the foregoing argument the values of the squared multiple correlations for the indicator variables shown in Table 4.67 are all satisfactory and appear to adequately reflect variance in the latent variables they are meant to reflect. Except for *Product2*, *Capacit1*, *Market1* and *Growth1*, all indicators explain more than 70% variance in the latent variables they were meant to reflect. *Produc2* and *Growth1* can be regarded as problematic to some degree. However, even for these indicators, more than half of the variance is explained by the latent variable it was meant to reflect. The latent variables therefore appear to succeed quite well in explaining variance in the indicator variables in which they are meant to express themselves.

Table 4.68

Leadership-Work Unit Performance Measurement Model Completely Standardized Theta-Delta Matrix

Unitrat1	Unitrat2	Unitaff1	Unitaff2	Indivra1	Indivra2	Indivaf1	Indivaf2	Intrape1
.08	.02	.15	.13	.12	.12	.13	.04	.12
Intrape2	Produc1	Produc2	Core1	Core2	Clim1	Clim2	Satis1	Satis2
.16	.2	.34	.16	.18	.1	.11	.08	.09
Adap1	Adap2	Capacit1	Capacit2	Market1	Market2	Growth1	Growth2	
.19	.17	.35	.28	.33	.17	.37	.26	

4.10 Results summary for the Measurement Model

The measurement model showed good fit. All the indicator variables loaded statistically significantly ($p < .05$) on the latent variables they were tasked to reflect. Measurement error variances were generally small, even though significant ($p < .05$). It is therefore concluded that the operationalisation of the latent variables comprising the structural model was successful. It is therefore possible to derive an unambiguous verdict on the fit of the structural model from the fit of the comprehensive LISREL model. Should the comprehensive LISREL model fit poorly it inevitably will mean that problems exist in the structural model.

4.11 Structural Model Fit

The measurement model showed good fit and the indicator variables generally reflected their designated latent variables well. This permitted the testing of the structural relationships between latent variables hypothesised by the proposed model depicted in Figure 2.3 via SEM.

Equation 3 denotes the structural part of the model (Diamantopoulos & Siguaw, 2000).

$\boldsymbol{\eta} = \mathbf{B}\boldsymbol{\eta} + \boldsymbol{\Gamma}\boldsymbol{\xi} + \boldsymbol{\zeta}3$

B = a matrix containing the β (beta) parameters (describing the slope of the regression of η_i on η_j);

Γ = matrix containing the γ (gamma) parameters (describing the slope of the regression of $\eta_i$onξ_j);

ζ = vector of structural error terms linked to the endogenous (η; eta) variables.

4.11.1 Overall fit assessment

LISREL 8.80 (Jöreskog & Sörbom, 1996b) was used to evaluate the model fit of the leadership-unit performance partial competency model shown in Figure 2.3. Robust maximum likelihood estimation was used due to the lack of multivariate normality in the data. An admissible solution of parameter estimates for the leadership-work unit performance structural model was obtained after 38 iterations. Table 4.69 presents the full spectrum of fit indices provided by LISREL to assess the absolute fit of the model.

Table 4.69

Goodness-of-fit Statistics for the Leadership-Work Unit Performance Structural Model

Degrees of Freedom	274
Minimum Fit Function Chi-Square	602.20 (P = .0)
Normal Theory Weighted Least Squares Chi-Square	592.10 (P = .0)
Satorra-Bentler Scaled Chi-Square	**520.78 (P = .0)**
Chi-Square Corrected for Non-Normality	3417.05 (P = .0)
Estimated Non-centrality Parameter (NCP)	246.78
90 Percent Confidence Interval for NCP	(186.20 ; 315.17)
Minimum Fit Function Value	1.85
Population Discrepancy Function Value (F0)	.76
90 Percent Confidence Interval for F0	(.57 ; .97)
Root Mean Square Error of Approximation (RMSEA)	.053
90 Percent Confidence Interval for RMSEA	(.046 ; .059)

P-Value for Test of Close Fit (RMSEA < .05)	.26
Expected Cross-Validation Index (ECVI)	2.07
90 Percent Confidence Interval for ECVI	(1.88 ; 2.28)
ECVI for Saturated Model	2.15
ECVI for Independence Model	74.85
Chi-Square for Independence Model with 325 Degrees of Freedom	24347.91
Independence AIC	24399.91
Model AIC	674.78
Saturated AIC	702
Independence CAIC	24524.45
Model CAIC	1043.61
Saturated CAIC	2383.28
Normed Fit Index (NFI)	.98
Non-Normed Fit Index (NNFI)	.99
Parsimony Normed Fit Index (PNFI)	.83
Comparative Fit Index (CFI)	.99
Incremental Fit Index (IFI)	.99
Relative Fit Index (RFI)	.97
Critical N (CN)	208.44
Root Mean Square Residual (RMR)	.013
Standardised RMR	.034
Goodness of Fit Index (GFI)	.88
Adjusted Goodness of Fit Index (AGFI)	.84
Parsimony Goodness of Fit Index (PGFI)	.68

The Satorra-Bentler Scaled Chi-Square X^2 value of 520.78 ($p = .00$) indicated that the null hypothesis of exact fit H_{01} RMSEA = 0 should be rejected ($p<.05$). A non-significant X^2 indicates model fit in that the model can reproduce the observed covariance matrix to a degree of accuracy that can be explained in terms of sampling error only (Kelloway, 1998). However, in this case the model is not able to reproduce the observed covariance matrix sufficiently accurately to allow the discrepancy to be attributed to sampling error only. The root mean square residual (RMR) of .013 which represents the absolute value of the covariance residuals and the standardised RMR, representing the fitted residual divided by their estimate standard errors .034 indicates adequate fit.

The RMSEA indicated a value of .053 indicated that the structural model showed reasonable approximate fit. Values less than .05 indicate good fit. The 90% confidence interval for RMSEA shown in the above Table 4.69 (.046 ; .059) includes the critical .05 value which indicates reasonable fit. The fact that the confidence interval (.029 – .047) includes the critical cut off value of .05 moreover indicates that the null hypothesis of close fit would not be rejected. The p-value for the Test of Close fit (H_{02}: RMSEA<.05) was .26. The close fit null hypothesis was therefore not rejected ($p > .05$) and thus it is concluded that the structural model shows close fit in the parameter.

Evaluating and determining the fit of the structural model indicates to what extent the fitted model reproduces the observed sample covariance matrix (Diamantopoulos & Sigauw, 2000). The foregoing evidence indicates the model was unable to reproduce the observed covariance matrix to a degree of accuracy that can be explained in terms of sampling error. It was able to reproduce the observed covariance matrix to a degree of accuracy that warrants sufficient faith in the structural model and the derived parameter estimates to continue with the interpretation of these estimates.

4.11.2 Inspection of the Structural Model Residuals

The structural model shows reasonable approximate fit. This is also reflected by the standardised residual results as indicated by Table 4.70. One would expect to see more large positive or large negative residuals than what the measurement model produced.

Table 4.70

Summary Statistics for Leadership-Work Unit Performance Standardised Residuals

Largest Negative Standardised Residuals	
Residual for Adap2 and Produc1	-4.24
Residual for Indivaf1 and Unitrat1	-3.89
Residual for Indivaf1 and Unitrat2	-4.8
Residual for Intrape1 and Indivra2	-4.34
Largest Positive Standardised Residuals	

Residual for Capacit2 and Clim2	2.78
Residual for Market1 and Capacit1	3.15
Residual for Market1 and Capacit2	4.88
Residual for Market2 and Capacit2	3.25
Residual for Growth2 and Unitrat2	2.97
Residual for Growth2 and Indivra2	2.69
Residual for Growth2 and Market1	2.62
Residual for Intrape2 and Unitaff1	5.39

Table 4.70 shows eight large positive residuals indicating that additional explanatory paths should be added to the model which could better account for the covariance between the variables and 4 large negative standardised residuals.

The stem-and-leaf plot and the Q-plot are depicted in Figure 4.4 and Figure 4.5 respectively. A good fitting model would be characterized by a stem-and-leaf plot in which the residuals are distributed approximately symmetrical around zero and with minimal spread. From the stem-and-leaf plot depicted in Figure 4.4, the distribution of the standardised residuals appears to be slightly positively skewed. Again the estimated model parameters therefore tend to underestimate the observed covariance terms more than they tend to overestimate them.

```
- 4  |  832
- 3  |  9
- 2  |  552000
- 1  |  99887776666655544433222211110000000000
- 0  |  99999998888888888887777777776666666555555544444444444444443333333333333333+84
  0  |  1111111111111111111222222222222222222333333333333344444455555555555555666677+29
  1  |  00000011122233333444477777778888
  2  |  12344678
  3  |  012
  4  |  9
  5  |  4
```

Figure 4.4 Leadership-Work Unit Performance Structural Model Stem-And-Leaf Plot of Standardised Residuals

Figure 4.5 illustrates the Q-plot. As can be seen from this figure, the data deviates from the 45-degree reference line which reflects negatively on the fit of the model. The model appears to be quite satisfactory however as the data points only swivel away from the 45-degree reference line at the upper end in a positive direction. This reflects the preponderance of large positive residuals.

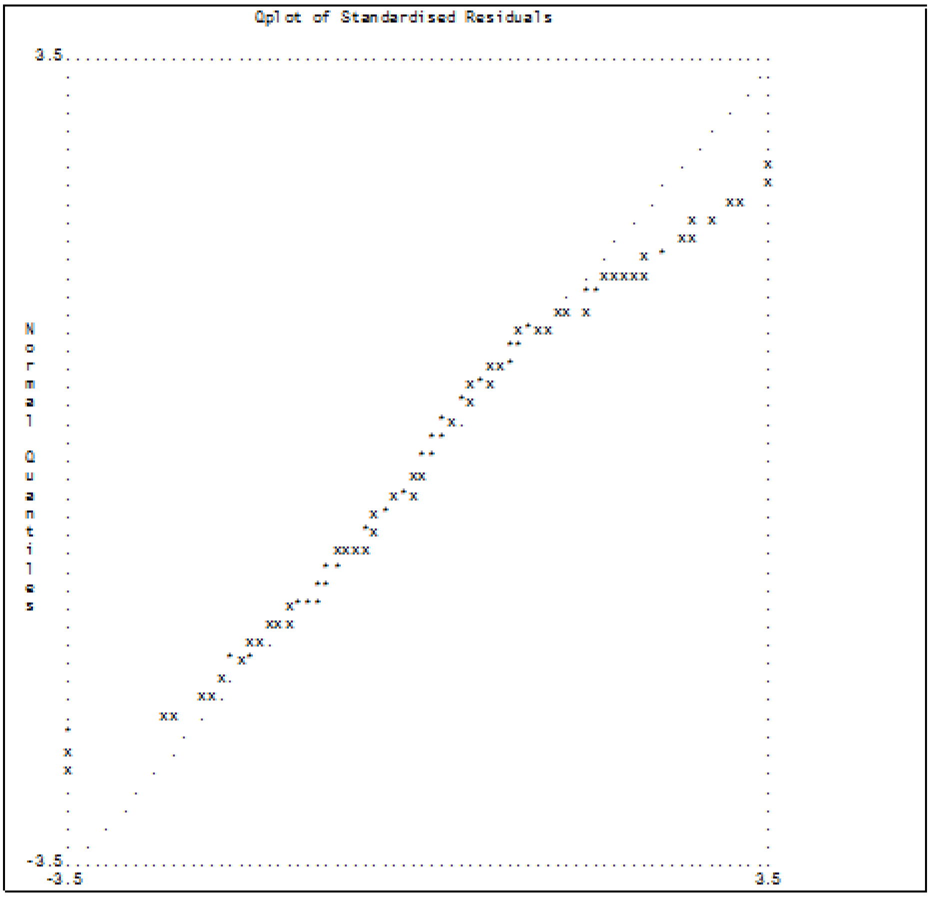

Figure 4.5 Leadership-Work Unit Performance structural Model Q-Plot of Standardised Residuals

The available basket of evidence indicates a close fitting structural model in the parameter and a reasonable fitting model in the sample. The interpretation of the structural model parameters are, however warranted.

4.11.3 Interpretation of Structural Model parameters

The overall goodness-of-fit measures as well as the distribution of standardised residuals indicate that the leadership-work unit performance structural model fits the data reasonably well. The structural model was further evaluated to determine whether each of the hypothesised theoretical relationships is supported by the data (Diamantopoulos & Siguaw, 2000).

The completely standardised solution for the structural model is shown in Figure 4.6.

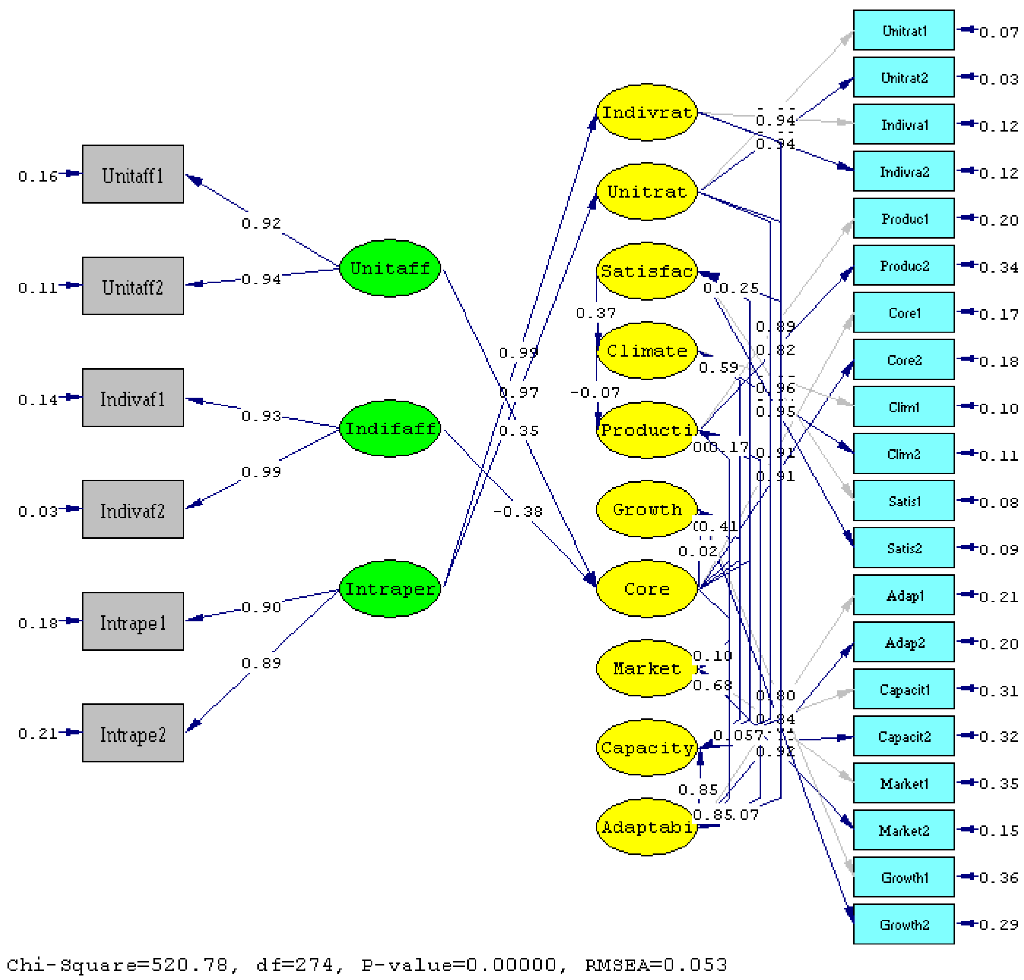

Figure 4.6 Representation of the Leadership-Work Unit Performance Structural Model

When assessing the structural model, Diamantopoulos and Siguaw (2000) identify four issues to keep in mind. It is important to assess whether the signs of the parameters representing the paths between latent variables are in agreement with the nature of the causal effect hypothesised to exist between the latent variables. Secondly, one must assess whether the parameter estimates are significant ($p < .05$). Assuming significance, one must assess the magnitude of the parameter estimates (via the standardised solution) indicating the strength of the hypothesised relationships. Lastly, one should evaluate the squared multiple correlations (R^2), indicating the amount of variance in each endogenous latent variable that is explained by the latent variables linked to it in terms of the hypothesised structural model. Table 4.71 provides the results of the unstandardised gamma matrix.

Table 4.71

Leadership-Work unit performance structural model unstandardised Gamma Matrix

	Unitaff	Indifaff	Intraper
Indivrat	- -	- -	.99
			(.04)
			23.30*
Unitrat	- -	- -	.97
			-.04
			22.76*
Core	.35	-.38	- -
	(.31)	(.31)	
	1.14	-1.23	

*p<.05

As is evident from Table 4.71, H_{07} and H_{08} can be rejected (p<.05). The gamma estimates γ_{23} and γ_{13} are therefore statistically significant (p<.05). Table 4.71 also indicated that H_{05} and H_{06} cannot be rejected (p>.05). The gamma estimates γ_{72} and γ_{71} are therefore statistically insignificant (p>.05). Support is obtained for the path specific substantive hypothesis that intrapersonal competence has a positive effect on the unit rational analytic competence of a leader. Similar, intrapersonal leader competence has a positive effect on the interpersonal rational analytical competence of a leader.

Table 4.71 further indicates that *Unit Affective* has a statistically insignificant effect on *Core People Processes;* thus the relationship postulated between *Affective-interactive unit related behaviours* and *Core People Processes* in the structural model is not corroborated. Similarly, Table 4.71 indicates that *Individual Affective* (Affective-interactive inter-individual related behaviours) has a statistically insignificant negative effect on *Core People Processes* and H_{05} can therefore not be rejected.

The unstandardised **B** matrix, shown in Table 4.72, is used to assess the significance of the estimated path coefficients β_{ij}.

Table 4.72

*Leadership-Work Unit Performance Structural Model Beta (**B**) matrix*

	Indivrat	Unitrat	Satisfac	Climate	Producti	Growth
Climate	- -	- -	.37 (.07) 5.33*	- -	-	-
Producti	- -	- -	- -	-.07 (.13) -.49	-	-
Market	- -	- -	- -	- -	.10 (.08) 1.33	-
Capacity	-.07 (.21) -.34	.05 (.20) .26	- -	- -	-	-
Adaptabi	- -	.07 (.04) 1.79	- -	- -	-	-

	Core	Market	Capacity	Adaptabi
	--------	--------	--------	--------
Indivrat	- -	- -	- -	- -
Unitrat	- -	- -	- -	- -
Satisfac	.59 (.10) 5.88*	- -	- -	.25 (.09) 2.74*
Climate	.59 (.07) 8.56*	- -	- -	- -
Producti	.73 (.19) 3.92*	- -	.02 (.12) .19	.17 (.16) 1.08
Growth	.02 (.08) .26	.51 (.07) 7.28*	.41 (.08) 5.01*	- -
Core	- -	- -	- -	- -
Market	- -	- -	- -	.68 (.08) 8.27*

Capacity	- -	- -	- -	.85 (.05) 16.54*
Adaptabi	.85 (.05) 18.46*	- -	- -	- -

* p<.05

The values indicated in Table 4.72 show that only some null hypotheses formulated with regards to the **B** paths were supported. Hypotheses 11-14 and 16-20 all obtained t-values greater than 1.96 and the β-estimates associated with these hypotheses are therefore statistically significant. It is evident that H_{010} (*Climate* positively influences *Production*) was not supported. The t-value obtained (-.49) is smaller than 1.96 and the β_{54} estimate is therefore not statistically significant. The sign associated with β_{54} was in disagreement with the proposed direction of the effect of production on Climate. Hypotheses 2-5, 6, 9, and 15 all showed insignificant relationships (t < l1.96l). The associated null hypotheses could therefore not be rejected.

4.11.4 Completely Standardised Solution

By examining the completely standardised **Γ** and **B** parameter estimates, additional insight can be obtained into the natureand magnitude of the significant effects in the model (Diamantoloulos & Siguaw, 2000). These parameter estimates are not affected by differences in the unit of measurement of the latent variables and can thus be compared across equations (Diamantoloulos & Siguaw, 2000). The completely standardised gamma and beta parameter estimates reflect the average change, expressed in standard deviation units, in the endogenous latent variables, directly resulting from a one standard deviation change in an endogenous or exogenous latent variable to which it has been linked, holding the effect of all other variables constant (Diamantoloulos & Siguaw, 2000). The completely standardized beta estimates are shown in Table 4.73 and the completely standardised gamma estimates in Table 4.74.

Table 4.73

Leadership-Work Unit Performance Structural Model Completely Standardised Beta Estimates

	Indivrat	Unitrat	Satisfac	Climate	Producti	Growth	Core	Market	Capacity	Adaptabi
Indivrat	- -	- -	- -	- -	-	-	- -	- -	- -	- -
Unitrat	- -	- -	- -	- -	-	-	- -	- -	- -	- -
Satisfac	- -	- -	- -	- -	-	-	.59	- -	- -	.25
Climate	- -	- -	.37	- -	-	-	.59	- -	- -	- -
Producti	- -	- -	- -	-.07	-	-	.73	- -	.02	.17
Growth	- -	- -	- -	- -	-	-	.02	.51	.41	- -
Core	- -	- -	- -	- -	-	-	- -	- -	- -	- -
Market	- -	- -	- -	- -	.10	-	- -	- -	- -	.68
Capacity	-.07	.05	- -	- -	-	-	- -	- -	- -	.85
Adaptabi	- -	.07	- -	- -	-	-	.85	- -	- -	- -

Table 4.74

Leadership-Work Unit Performance Structural Model Completely Standardised Gamma Estimates

	Unitaff	Indifaff	Intraper
Indivrat	- -	- -	.99
Unitrat	- -	- -	.97
Core	.35	-.38	- -

Table 4.73 and Table 4.74 indicate that of the significant effects, the effect of *Intra-personal behaviour* on *Rational-Analytical inter-individual related behaviours* is the most pronounced (.99) closely followed by the effect of *Intra-personal behaviour* on *Rational-Analytical unit-related behaviours* (.97). One standard deviation increase in the level of competence a leader displays on *Intra-personal behaviour* tends to translate to almost one standard deviation change in the level of competence a leader displays on *Rational-Analytical inter-individual* and *unit-related behaviours.* Similarly, the effect of *Core People Processes* on *Adaptability* (.85), as well as the effect of *Adaptability* on *Capacity* (.85) is pronounced, followed by the effect of *Core People Processes* on *Production* (.73).

Structural coefficients are regression coefficients. In a simple linear regression model, in which both the dependent and independent variables have been standardised to have a mean of zero and a standard deviation of one, the regression slope is equal to the correlation between the dependent and independent variable (Mels, 2000). In a multiple linear regression model, however, this no longer holds. Only two of the regression effects portrayed in Figure 2.3 can be regarded as simple linear regression effects (i.e. all but the first two rows in Table 4.73 and Table 4.74 (taken collectively) contains more than one freed parameter.

4.11.5 Variance explained in the endogenous latent variables

R^2 signifies the proportion of the variance in the endogenous latent variable that is accounted for by the leadership-work unit performance structural model. Table 4.75 indicates the R^2 values for the endogenous latent variables.

Table 4.75

Leadership-Work Unit Performance Structural Model Completely Standardised Beta Estimates

Indivrat	Unitrat	Satisfac	Climate	Producti	Growth	Core	Market	Capacity	Adaptabi
.97	.95	.67	.84	.70	.73	.01	.58	.72	.73

As indicated in Table 4.75, the leadership-work unit performance structural model successfully accounts for the variance in *Individual Rational leadership* (Rational-analytical inter-individual related) competencies, followed by *Unit Rational leadership* (rational-analytical unit related) competencies. The leadership-work unit performance structural model reasonably successfully accounts for the variance in all the latent variables in the model but for *Core People Processes*. The model dismally fails to explain why organisational work units vary in the degree to which they succeed in communicating, interacting, managing conflict, maintaining creative turbulence, value the integrity and uniqueness of the individual, learn through feedback and reward performance.

The completely standardised structural error variances are shown in Table 4.76.

Table 4.76

Structural Error Variance for the endogenous latent variables in the structural model.

Indivrat	Unitrat	Satisfac	Climate	Producti	Growth	Core	Market	Capacity	Adaptabi
.03	.05	.33	.16	.3	.27	.99	.42	.28	.27
(.01)	(.01)	(.06)	(.02)	(.06)	(.05)	(.09)	(.07)	(.05)	(.04)
1.74	5.6	5.78	7.34	5.48	5.58	10.52	5.89	5.09	6.82

Table 4.76 indicates that for nine of the endogenous latent variables a statistically significant proportion of the variance is brought about by effects currently not included in the model. The results in Table 4.76 echo the findings in Table 4.75.

4.11.6 Modification indices and possible further model modification options

The leadership-work unit performance structural model depicted in Figure 2.3 seems to fit the data reasonably well. The foregoing analysis of the standardised residuals does imply that the addition of one or more paths would improve the fit of the model. Table 4.77 indicates six possible paths that if they would be freed, would statistically significantly ($p<.01$) improve model fit. None of the paths currently fixed to zero that, if freed, would statistically significantly improve the fit of the model involves a path between a second-order leadership competency and a unit performance dimension. Jöreskog and Sörbom (1993) suggest that the path with the highest statistically significant modification index value should be considered first. The currently fixed path may be set free to be estimated if the proposed structural linkage makes substantive theoretical sense, if the sign of the completely standardised expected change agrees with theoretical expectations and if the magnitude of the completely standardised expected change warrants freeing the path. If the currently fixed path with the highest statistically significant modification index value does not warrant being set free then the path with the next highest modification index value should be considered. If a currently fixed path is freed and the model refitted the same procedure is then repeated until the Γ and B matrices no longer contain any statistically significant modification index values.

Table 4.77

Model Modification Indices calculated for the B matrix

	Indivrat	Unitrat	Satisfac	Climate	Producti	Growth	Core	Market	Capacity	Adaptabi
Indivrat	- -	14.51	1.04	1.49	1.02	1.22	1.72	1.46	3.21	3.45
Unitrat	- -	- -	1.63	.24	0	1.23	.13	.16	.48	.56
Satisfac	0	.08	- -	- -	.34	.73	- -	1.45	.33	- -
Climate	0	.01	- -	- -	.37	2.04	- -	2.54	1.65	.49
Producti	.05	.01	- -	- -	- -	- -	- -	- -	- -	- -
Growth	6.64	7.94	0	- -	18.51	- -	- -	- -	- -	- -
Core	- -	- -	- -	- -	0	- -	- -	- -	- -	- -
Market	1.34	1.32	.58	1.11	- -	6.64	1.13	- -	27.61	- -
Capacity	- -	- -	.01	1.89	1.01	22.19	2.03	37.29	- -	- -
Adaptabi	- -	- -	- -	- -	- -	1.48	- -	.99	1.95	- -

Table 4.77 suggests that *Market Standing* should be allowed to affect *Capacity*. This is a suggestion that makes substantive theoretical sense as a favourable market reputation tends to make it easier to attract resources, especially financial and human resources. This was a finding already reported in Theron et al. (2004). Allowing for a path between *Market Standing* should and *Capacity* in the current model does not bring any additional paths between second-order leadership competencies and unit performance dimensions to the fore. Ultimately that is where the disappointment with the current model lies. The modification indices calculated for Γ and B do not seem to hold any suggestions on the manner in which leadership affects unit performance.

Table 4.78 reveals that no additional paths between any exogenous latent variable and endogenous latent variables would significantly improve the fit of the proposed leadership-work unit performance structural model.

Table 4.78

Model Modification Indices calculated for the Γ matrix

	Unitaff	Indifaff	Intraper
Indivrat	.07	5.1	- -
Unitrat	10.32	21.93	- -
Satisfac	0	.01	0
Climate	0	0	0

Producti	.07	.06	.07
Growth	7.12	6.47	7.03
Core	- -	- -	- -
Market	1.1	.41	1.32
Capacity	- -	- -	- -
Adaptabi	- -	1.46	- -

CHAPTER 5

CONCLUSIONS, RECOMMENDATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

5.1 Introduction

The leader of a work unit is generally assumed to play a vital role in the units' ability to achieve success. The leaders' actions and behaviours are assumed to influence the characteristics of the unit and through that the behaviour of the unit to ultimately achieve unit goals. It is, therefore, proposed that work unit performance can be influenced by promoting the level of competence of the unit leader on the leadership competencies that constitute leadership. Fundamentally this is the basic premise underlying leadership development interventions.

Typically leadership development interventions do not, however, target specific leadership competencies in an attempt to remedy unit performance problems on specific unit performance dimensions. Specific unit performance problems are therefore typically not diagnosed in terms of the unit leader's lack of competence on specific leadership competencies. In the absence of a comprehensive leadership-unit performance competency model it will however be extremely difficult to develop theoretically justifiable diagnostic hypotheses to test and, if supported, to base remedial treatment on. It would thus be useful for Human Resource Practitioners and Industrial Psychologists in the industry to understand how specific leadership competencies combine to affect the level of performance an organisational unit achieves on the unit performance dimensions. It would provide them with a diagnostic framework that would allow tracing and targeting specific leadership competencies to develop as part of an attempt to treat specific work unit performance problems on specific unit performance dimensions. Such a leadership-unit performance structural model will also be of value to direct proactive leadership development initiatives aimed at specific unit performance dimensions.

The need for such a comprehensive leadership-unit performance competency model to serve as a diagnostic framework is indispensible as the variance found in work unit performance is not a random event. Rather, differences in unit performance are an expression of the systematic working of a complex nomological network of person-centred and situational/environmental latent variables. In order to rationally and purposefully design appropriate reactive [or proactive] interventions to enhance unit performance on specific unit performance dimensions requires a valid understanding of this nomological network.

Spangenberg and Theron (2004) took initial steps to combine literature covering organisational effectiveness and financial and non-financial performance measures to compile a baseline structure for a model of work unit performance effectiveness. The Performance Index (PI) encompasses the unit performance dimensions for which the unit leader could be held responsible. Although there is an array of leadership questionnaires available, a unique South African instrument was needed to assess the capabilities required by leaders and managers to lead change and transformation. The Leadership Behavioural Inventory (LBI) was developed by Spangenberg and Theron (2002). Following on the work of Spangenberg and Theron (2002; 2004), Henning *et al*. (2004) and Theron *et al.* (2004) this study has come up with an expanded leadership-work unit performance structural model, using Henning *et al.*'s (2004) work unit performance structural model as a foundation. The current study added leadership factors to the Henning *et al.* (2004) work unit performance structural model and this expanded model was subsequently empirically tested.

5.2 Results

5.2.1 Evaluation of the Measurement Model

The success with which the latent variables in the proposed structural model were operationalised was tested by testing the fit of the measurement model using structural equation modelling (SEM). Various indices were interpreted to assess the goodness-of-fit of the measurement model and it was found that the measurement model fits the data well, but not perfectly. The claim that the specific indicator variables used to reflect the specific latent variables comprising the leadership-work unit performance structural model does, however, seem reasonable.

All item parcels loaded statistically significantly ($p<.05$) on the latent variables they were designed to reflect. The values of the squared multiple correlations for the indicators were generally high. The measurement error variances were generally quite low. This legitimised the use of the proposed operationalization of the latent variables to empirically test the leadership-work unit performance structural model.

5.2.2 Evaluation of the Structural Model

The fit of the proposed leadership-unit performance structural model (Figure 2.3) was tested using structural equation modelling (SEM).

Reasonable model fit was obtained when the fit of the structural model was tested. The model showed close fit. However, the stem-and-leaf plot indicated that the distribution of the standardised residuals appeared to be slightly positively skewed. The estimated model parameters therefore, on average, tended to underestimate the observed covariance terms, suggesting that the model fail to account for one or more influential paths. Modification indices calculated for Γ and $\mathbf{B}$ suggested meaningful additional paths that could be added to the model but none of these involved the relationship between the second-order leadership competencies and dimensions of unit performance. Furthermore, less than perfect model fit was indicated by the fact that the standardised residuals for all pairs of observed variables tended to deviate slightly from the 45-degree reference line in the Q-plot.

Inspection of the beta matrix indicated that none of the leadership dimensions has a statistically significant effect on the work unit performance dimensions as indicated by the PI. No support was therefore obtained for the substantive hypotheses that *Unit Rational Analytical Competence* (η_2) of the leader has a positive linear effect on *Adaptability* (η_{10}), that *Unit Rational Analytical Competence* (η_2) of the leader has a positive linear effect on *Capacity* (η_9), that *Interpersonal rational analytical competence* (η_1) of the leader has a positive linear effect on *Capacity* (η_9), that *Interpersonal affective competence* (ξ_2) of the leader has a positive linear effect on

Core People Processes (η_7) and that *Unit Affective Interactive Leader Competence* (ξ_1) has a positive linear effect on *Core People Processes* (η_7).

Inspection of the gamma matrix showed that *Intra personal Competence* (ξ_3) of the leader has a statistically significant ($p<.05$) positive effect on *Unit Rational Analytical Competence* (η_2). *Intra personal leader competence* (ξ_3) also has a statistically significant ($p<.05$) positive effect on *Interpersonal Rational Analytical Competence* (η_1).

Leaders that do not evade difficult tasks and decisions but rather faces them head-on for the sake of the unit, demonstrate a willingness to take risks for the benefit of the unit. A leader who develops accurate and penetrating self-awareness seems to be more successful at gathering and analysing information, be able to develop a clear vision on the future state and functioning of the unit, conceptualise a strategy on the manner in which the vision can be realised, develop unit processes and structures required to implement the strategy as well as develop and implement performance plans for unit members based on the strategy.

Leaders that display hardiness, decisiveness, integrity and self-awareness also seem to be perceived to be more successful at making individual followers think critically about current realities and how they currently do things, assisting followers to plan, monitor and modify their performance and rewarding excellent performance when it occurs.

The beta matrix in addition essentially echoed the findings of Henning *et al*. (2004) and Theron *et al*. (2004) on the nature of the structural relations existing between the unit performance dimensions.

5.3 Limitations to the Research Methodology

This study did encounter limitations that needed to be acknowledged and addressed in subsequent research studies. Although most of these limitations or shortcomings in the research methodology have already been discussed throughout the text, some of the more important limitations will be highlighted again.

The most important setback experienced in the study involved the inability to convince a sufficiently large sample of organisational units to take part in the study. The logistics involved in getting a sample of work unit members within the sample to complete the PI as well as getting the leader to complete the LBI, was unsuccessful. Various completed PI questionnaires were received without an accompanying completed LBI, and *visa versa*. This forced the use of an archival data base maintained by Psychology at Work.

The proposed leadership-work unit performance structural model was tested on a non-probability, convenience sample. The results obtained in this study should be generalised to other contexts with great circumspection. In order to determine the external validity of the research findings obtained on this sample, the research would have to be replicated on a sample with a demographic profile that differs systematically form the current on one or more variables.

5.4 Suggestions for Future Research

The objective of this study was to obtain a valid understanding of the manner in which the competence of unit leaders on leader competencies determine the level of performance their units achieve on specific unit performance dimensions. This study failed to significantly move the insights gained by Henning *et al*. (2004) and by Theron *et al.* (2004) forward. In contrast to most studies where the focus falls on possible ways in which the partially corroborated proposed structural model can be elaborated when making suggestions for future research, the focus in this study needs to fall on revisiting the theoretical foundation of the study. Given Henning *et al*.'s (2004) and Theron *et al*.'s (2004) research on the structural relations existing between the unit performance dimensions it seems highly unlikely that unit leaders will affect latent unit performance dimensions like *Production*, *Market Standing*, *Future Growth* and *Satisfaction* directly. *Core People Processes*, *Capacity* and *Adaptability* seem to be logical portals through which the influence of the leader will affect the former latent unit performance dimensions. This line of reasoning taken in conjunction with the findings of this study seems to suggest that the shortcoming in the current theorising lies with the leadership part of the current theorising.

The following possible explanations for the current findings should be considered. These possibilities should not be considered to be mutually exclusive. It is thereby also not denied that additional explanations might also be applicable.

The first is that the effect of leader competencies on unit performance is mediated by currently ignored latent variables. *Trust in the leader* and B*uy-in into the unit vision* are examples of possible mediator variables. These variables are, however, already part of the *Core People Process* and *Satisfaction* latent variable in the model.

The second possible explanation for the current findings is that situational variables modify the influence of leader competencies on the portal unit performance latent variables through which the influence of the leader will affect unit performance.

A third possible explanation for the current findings is that the first-order LBI leadership competencies have been inappropriately reduced to second-order leadership competency factors. Earlier it was pointed out that it would be straightforward to make use of the four phase headings (analysing and interpreting the environment; formulating the vision and strategy; preparing the unit for implementing the vision and strategy; and implementing the vision and strategy) already available in describing the first-order latent variables as second-order factors. It was, however argued that it would be erroneous to assume all the first-order factors classified under each of these phases should be viewed as having some sort of correlation due to proximity of chronology. It is possible that the dismissal of the four phase structure as a useful framework in which to understand differences in unit performance was premature.

It is proposed that it should be empirically investigated whether the four phase structure can serve as a second-order structure for the first-order LBI factors. If the second-order LBI measurement model defined in terms of four second-order phase factors shows close fit and if the gamma paths are all statistically significant the arguments presented in the LBI 2 descriptive report (Spangenberg & Theron, 2011a) should be used to examine the need to introduce mediating variables like for example *Unit vision*, or *Follower-leader trust* and the manner in which the second-order phase factors map onto the unit performance dimensions.

The LBI first-order factors measure the extent to which the leader displays specific leadership competencies. The LBI does, however, not pronounce a verdict on the appropriateness of the content of the leadership behaviour. For example the LBI measures the extent to which the leaders scans the external environment for environmental developments that might affect the functioning of the unit. It also measures the extent to which the leader develops a vision for the unit. The LBI does, however not assess the quality of the environmental assessment or the quality of the vision. The LBI therefore does not assess the quality of the outcomes achieved through the leadership behaviours. To do so would set the LBI as a type of omniscient Über-leader. A fifth possible explanation for the current findings is therefore that the current LBI second-order factors fail to significantly explain variance in unit performance because they only take the extent to which specific leadership behaviours are displayed into account but not the quality of the outcomes of the behaviour. Unit performance will result if the leader scans the unit environment, develops a vision and a strategy to implement the vision, develops processes and structures to carry the vision and develops human capital that is able to implement the strategy. The leader should correctly pick up and correctly interpret developments in the environment, develop an appropriate vision, develop an appropriate strategy and develop appropriate human capital. Who is to judge the degree to which the assessment of the unit environment, the vision or the strategy are appropriate for the situation? It can be argued that the level of performance of the unit actually achieves on the unit performance dimensions under the reign of the unit leader, serve as the judge of the appropriateness of the leader's behaviours. This line of reasoning suggests that the model should be elaborated with *Situational appropriateness* latent variables that moderate the effect of the second-order leadership competencies on the portal unit performance latent variables. Measurement of these latent variables are however, not possible without presuming some infinitely wise, omniscient Über-leader to create the denotations of these latent variables.

The finding in this study that the paths from *Capacity*, *Adaptability* and *Climate* to *Production* are statistically insignificant (p>.05), in conjunction with similar findings in Henning *et al*. (2004) and Theron *et a*l. (2004), suggest the need to revisit the theorising underlying these paths. The argument that *Capacity*, *Adaptability* and *Climate* in some way should simultaneously affect *Production* is compelling. Sufficient indications seem to exist that the answer lies beyond mere main effects. Interactions between these three variables present one possibility.

The nomological network of variables that explain the influence of leadership on work unit performance is vast and consists of a multitude of richly interwoven variables. The task of completely unfolding the comprehensive leadership-work unit performance nomological network is too enormous for any one researcher to achieve successfully and a multi pronged approach is necessary. This can only be achieved by means of a collaborated effort and a shared investment of resources from various researchers who build upon each other’s research. It is thus suggested that many different stakeholders further delve into the various possibilities of how leadership influences work unit performance and that they do so from many different angles to gain a better understanding of the complex nomological network.

5.5 Managerial implication

Research serves specific cognitive interests (Babbie & Mouton, 2001). Research should assist the discipline in question to serve society. This line of reasoning underpinned the introductory argument in terms of which the objective of this research study was motivated. This study unfortunately failed to successfully develop a leadership-unit performance structural model that validly describes the manner in which leadership competencies determine the level of performance a unit achieves on the dimensions comprising unit performance. This significantly limits the managerial implications that can be drawn from this specific study.

This study corroborated the findings of Henning *et al*. (2004) and Theron *et al*. (2004) on the nature of the structural relations existing between the unit performance dimensions. The managerial implications that were drawn from those studies therefore again apply here. To achieve long-term success in terms of high positive future growth prospects and high market reputation sustained high-quality and quantity output is required. This in turn depends on a productive clashing of ideas amongst highly engaged unit members focused on the unit vision. How to achieve these conditions through competent unit leadership remains an elusive question? How the wealth of resources the unit has access to, the agility of the unit and the climate in the unit affects the quality and quantity of output remains another unanswered question. How to affect the wealth of resources the unit has access to, the agility of the unit and the climate in the unitthrough competent unit leadership remains an unanswered question.

5.6 Conclusion

As part of on-going research of the leadership-for-performance range of measures designed by Spangenberg and Theron (2004), this study attempted to take the initial steps towards establishing a comprehensive and combined leadership-work unit performance structural model. The objective of the study was to determine the influence leadership competencies have on work-unit performance.

Formulating a model to explain the influence of leadership competencies on work-unit performance was an interesting exercise. The results of the study failed to find support for all the hypotheses related to the influence of leadership on work unit performance. The inability of this study to explain how the various leadership competencies influence work unit performance was rather disappointing. The results, however, justify continuing with research that examines the structural relationships between the latent dimensions of the PI model and the LBI dimensions.

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