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**THE DEVELOPMENT AND EMPIRICAL EVALUATION OF A WORK  
ENGAGEMENT STRUCTURAL MODEL**

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## DECLARATION

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Signed: Megan van Deventer

Date: 19 November 2014

## OPSOMMING

*Werkverbintenis*<sup>1</sup> is een van 'n groot verskeidenheid konstrukte wat deel vorm van die komplekse nomologiese netwerk van konstrukte wat die gedrag van die arbeidende mens onderlê. *Werkverbintenis* word as 'n belangrike konstruk beskou vanuit 'n individuele sowel as vanuit 'n organisatoriese perspektief. Menslike hulpbronsbestuurs-intervensies gerig op die bevordering van *Werkverbintenis* streef daarna om by te dra tot die bereiking van die organisasie se primêre doel sowel as tot die welstand van die organisasie se werknemers. Sodanige intervensies sal waarskynlik ook deur werknemers waardeur word, aangesien sodanige intervensies die kans verhoog dat individue selfvervulling in hul werk sal ervaar omdat die werk hul die geleentheid bied om hulself in hul werk uit te leef. Dit is gevolglik noodsaaklik om 'n geldige begrip te ontwikkel van die *Werkverbintenis*-konstruk en die sielkundige meganisme wat dit onderlê ten einde menslike hulpbronsbestuurs-intervensies te ontwerp wat suksesvol *Werkverbintenis* sal bevorder. Die huidige studie stel die vraag aan die orde waarom variansie in *Werkverbintenis* tussen verskillende werknemers bestaan wat in verskillende organisatoriese kontekste werk. Die navorsingsdoelstelling van die huidige studie is om 'n verklarende *Werkverbintenis*-strukturele model te ontwikkel en te toets wat 'n geldige antwoord op hierdie vraag sal bied.

'n Omvattende *Werkverbintenis* strukturele model is in hierdie studie voorgestel. 'n *Ex post facto* korrelatiewe ontwerp met strukturele vergelykingsmodellering (SVM) as die statistiese ontledingstegniek is gebruik om die substantiewe navorsingshipotese soos voorgestel deur die *Werkverbintenis* strukturele model te toets. Die huidige studie het voorts twee addisionele nouer-fokus strukturele modelle getoets wat die impak van waardekongruensie op *Werkverbintenis* beskryf deur middel van 'n *ex post facto* korrelatiewe ontwerp met polinomiese regressie-ontleding as statistiese ontledingstegniek. 'n Geriefsteekproef van 227 onderwysers wat in openbare skole werkzaam is wat onder die beheer van die Wes Kaapse Department van Onderwys val (WKDO) het aan die studie deelgeneem.

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<sup>1</sup> A suitable and generally accepted Afrikaans term for *Work Engagement* still seems to be lacking.

Die omvattende *Werkverbintenis*-model het redelik goeie pasgehalte getoon. Steun is gevind vir all die voorgestelde teoretiese verwantskappe in die *Werkverbintenis* strukturele model, behalwe vir die invloed van die *Sielkundige kapitaal\*Werk eienskappe*-interaksie-effek op *Betekenisvolheid* en vir drie van die vyf polinomiese latente regressie-terme wat in die model ingesluit is in 'n poging om responsoppervlakte-waardes af te lei. Gemengde resultate is verkry vir die responsoppervlakte-ontleding. Betekenisvolle praktiese aanbevelings is gemaak op grond van die navorsingsresultate.

## ABSTRACT

*Work Engagement* is one construct of many that forms part of the complex nomological network of constructs underlying the behaviour of working man<sup>2</sup>. *Work Engagement* is an important construct both from an individual as well as from an organisational perspective. Human resource management interventions aimed at enhancing *Work Engagement* aspire to contribute to the achievement of the organisation's primary objective and the well-being of the organisation's employees. Such interventions will most likely also be valued by individuals within the workplace, as individuals will be able to experience a sense of personal fulfilment through self-expression at work. It is therefore essential to gain a valid understanding of the *Work Engagement* construct and the psychological mechanism that underpins it, in order to design human resource interventions that will successfully enhance *Work Engagement*. The current study raises the question why variance in *Work Engagement* exists amongst different employees working in different organisational contexts. The research objective of the current study is to develop and empirically test an explanatory *Work Engagement* structural model that will provide a valid answer to this question.

In this study, a comprehensive *Work Engagement* structural model was proposed. An *ex post facto* correlational design with structural equation modelling (SEM) as the statistical analysis technique was used to test the substantive research hypotheses as represented by the *Work Engagement* structural model. Furthermore, the current study tested two additional narrow-focus structural models describing the impact of value congruence on *Work Engagement* by using an *ex post facto* correlational design with polynomial regression as the statistical analysis technique. A convenience sample of 227 teachers working in public sector schools falling under the jurisdiction of the Western Cape Education Department (WCED) participated in the study.

The comprehensive *Work Engagement* model achieved reasonable close fit. Support was found for all of the hypothesised theoretical relationships in the *Work Engagement* structural model, except for the influence of the *PsyCap\*Job*

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<sup>2</sup> The term man is used here in a non-sexist, gender-free sense.

*Characteristics* interaction effect on *Meaningfulness* and for three of the five latent polynomial regression terms added in the model in an attempt to derive response surface test values. The response surface analyses findings were mixed. Based on the obtained results, meaningful practical recommendations were derived.

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## CHAPTER 1

### INTRODUCTORY ARGUMENT

#### 1.1 INTRODUCTION

South Africa faces many challenges. One major challenge is the alleviation of poverty. In order to prevent economic stagnation and poverty, countries need to show consistent economic growth. Consistent economic growth can only be achieved if products and services are produced in an effective, efficient and productive manner (De Goede, 2007). Organisations are responsible for the efficient and effective transformation of scarce factors of production into products and services with maximum economic utility (Burger, 2012). Organisations therefore have to accept co-responsibility for a country's economic situation.

The economic principle, on behalf of society, demands that organisations produce the highest possible output of need satisfying products and services with the lowest possible input. The motivation for the organisation to serve society through the efficient production of need satisfying products and/or services lies in the opportunity to utilise the capital it has to its disposal, via economic activities directed at the creation of need satisfying products and/or services, for its own benefit. The extent to which organisations succeed in earning a profit over a particular period relative to the capital used to generate that profit could be seen as a barometer of the extent to which organisations succeed in serving society<sup>3</sup>. Profit would be negatively affected to the extent that the market does not value the product or service or to the extent that the value of the resources that are combined and transformed to create the product/service exceed the value of the market offering. Both instances would constitute a waste of scarce resources that do not serve the interest of society. The profitable creation of need satisfying products and/or services serves as the primary objective of organisations. Various activities are performed in order to ensure this primary objective is achieved. These activities are classified as a system of inter-

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<sup>3</sup> It needs to be acknowledged that this line of reasoning assumes a knowledgeable consumer that has the long-term interest of the planet at heart.

related functions (Theron, 2012). By committing itself to the organisation's goals, the human resource function can justify its inclusion as a function in the organisational structure.

In order for organisations to achieve their primary goal, namely the maximization of profit, they require competent employees (Burger, 2012). The successful combination and transformation of production factors into products and services with maximum economic utility is significantly dependent on the behaviour of its workforce. Labour therefore serves as the life-giving factor which determines the effectiveness and efficiency with which the other factors of production are utilised (Gibson, Ivancevich & Donnelly, 1997).

Employee performance is interpreted in this study as a construct that encompasses both a behavioural domain as well as an outcome domain and that the content of these two domains are structurally inter-related. Jobs are created to achieve specific outcomes. Specific latent behavioural performance dimensions are instrumental in the achievement of these latent outcome variables. Performance is therefore conceptualised as a structurally interlinked set of latent behavioural performance dimensions and latent outcome variables.

Due to the important role of the worker's performance in achieving the organisation's goals, industrial psychologists need to strive to contribute to the organisation's objective by affecting the behaviour of working man. In order to effectively alter the performance of working man, industrial psychologists need to gain a valid understanding of the complexity of human behaviour and the factors affecting human performance (Saá-Pérez & García-Falcón, 2002). Attempts to affect the work performance of employees through an array of human resource interventions are sanctioned by the assumption that the performance of working man is determined. In terms of the deterministic assumption the level of performance achieved by employees on the structurally interlinked set of latent behavioural performance dimensions and latent outcome variables is the result of a richly interconnected nomological network of latent variables characterising the employee and characterising the work context in which the employee works. The assumption is therefore that the level of performance achieved by employees on the structurally interlinked set of latent behavioural performance dimensions and latent outcome



variables is determined by a psychological mechanism that can be described in terms of structural relations between latent variables characterising the employee and the work situation. Attempts to affect the work performance of employees through an array of human resource interventions are, however, at the same time dependent on the extent to which the psychological mechanism underlying employee performance is validly understood. In spite of the complexities underlying the work-related behaviour of working man, industrial psychologists should therefore attempt to “uncover”<sup>4</sup> this nomological network of constructs and explain performance in terms of the psychological mechanism that underpins it.

*Employee Engagement* is only one construct of many that forms part of this complex network of constructs underlying the behaviour of working man. Recently, there exists a growing interest in *Employee Engagement* by the academic community. Furthermore, it is becoming a popular ‘buzz word’ in the world of work. As stated by Cook (2008), “employee engagement is a much talked about issue at the highest levels in organisations today” (p.1). Macey and Schneider agree with this and mention that “the notion of employee engagement is a relatively new one, one that has been heavily marketed by human resource (HR) consulting firms...” (2008a, p. 3). The question that comes to mind is why there exists such a sudden interest in the *Employee Engagement*?

The general thinking in existing literature with regards to the *Employee Engagement* construct is the notion that engaged employees give more of what they have to offer and as a result, an engaged workforce is simply a more productive one (Macey, Schneider, Barbera & Young, 2009). According to Macey et al. (2009) improving engagement (finding ways to encourage individuals to invest more energy in work) is the single most powerful lever that organisations have to improve productivity. Thus far it has been reasoned that the successful combination and transformation of production factors into products and services with maximum economic utility is significantly dependent on the behaviour of an organisation’s workforce. Therefore, if it is indeed so that *Employee Engagement* is a powerful tool that organisations have

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<sup>4</sup> The term “uncover” is placed in parenthesis to acknowledge the fact that constructs or latent variables are man-made abstract ideas that do not physically exist. The nomological network of latent variables therefore constitutes a representation developed by man of the mechanism that underlies observable phenomena that may be considered valid (i.e., permissible) to the extent that it fits empirical observations made. Strictly speaking there is therefore no nomological network of latent variables to discover.

to improve the productivity of its employees, then this implies that higher levels of *Employee Engagement* could serve as a strategic tool in that it may contribute to the primary goal of the organisation. In other words, it could be expected that those organisations whose employees are highly engaged, should demonstrate superior financial performance (Macey et al., 2009). This proposition seems to be supported by research reported in literature.

A wide variety of research has been conducted across a wide range of industries and countries in order to determine the business benefits of *Employee Engagement* (Cook, 2008). According to Lewis (2011), a large body of evidence exists that supports the notion that there is a significant link between *Employee Engagement* and organisational effectiveness, profitability and productivity. Schneider, Macey, Barbera and Martin (2009) conducted research on the link between *Employee Engagement* and financial performance. An *Employee Engagement* measure was administered to the employees of 65 companies in both the service and manufacturing industries. Financial data was also obtained for the same 65 companies. Financial data was reflected in terms of three indices: return on assets (ROA), profits as a percentage of revenue, and Tobin's  $q$ <sup>5</sup>. The correlations between *Employee Engagement* and the three financial outcomes were all statistically significant. They then calculated the top and bottom 25% of companies in terms of the engagement index and compared the financial consequences of these two groups. The ROA, profitability and shareholders' value differed rather dramatically, with shareholders value being more than double in the top 25%.

The preceding evidence gives credence to the proposition that *Employee Engagement* dramatically affects the financial performance of organisations. Although the foregoing studies did not describe the mechanism that produced the increased financial organisational performance it does not seem unreasonable to argue that employee performance mediated the effect of *Employee Engagement* on the financial outcomes considered in the Schneider et al. (2009) study. This then implies that industrial psychologists can contribute to the primary objective of an organisation by attempting to gain a valid understanding of the *Employee*

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<sup>5</sup> Tobin's  $q$  is an approach commonly used to calculate shareholders' value (Tobin, 1969).

*Engagement* construct and the psychological mechanism that underpins it, in order to be able to control it in the workplace.

Although it has been argued that the importance of gaining a better understanding of *Employee Engagement* and the psychological mechanism that underpins it is due to the fact that such an understanding will allow organisations to control it in the workplace, which will in turn impact on the primary organisational objective of maximising the value of the organisation, it should be noted that *Employee Engagement* is not sought simply as a state that is instrumental in enhancing employee work performance defined in terms of competencies and outcomes. It should furthermore be noted that human resource interventions in the workplace impact on the psychological, physical and social wellbeing of current and prospective employees. This implies that organisations have a moral obligation towards employees to ensure that human resource interventions not only serve the purpose of contributing to an organisation's competitive advantage, but also that such interventions are designed and implemented in such a way that they are able to enhance the wellbeing of employees simply because this is the right thing to do. Therefore, even if *Employee Engagement* did not serve the profit/utility objective of organisations, engagement should still be on HR's agenda simply because it is working man's fundamental human right to do fulfilling, engaging work. Work takes up a significant proportion of working man's life. Work need not be a disagreeable, painful means of earning the income needed to live life after hours and over weekends. Work can and should offer working man the opportunity to also find meaning in work.

From an organisational perspective, it has been argued that the importance of understanding *Employee Engagement* and its underlying determinants is due to the fact that such an understanding can allow an organisation to derive ways in which it can control *Employee Engagement*, which in turn will impact on an organisation's ability to achieve its primary objective. Furthermore it was argued that a moral obligation rests on organisations to implement interventions in the workplace (in this case interventions aimed at increasing *Employee Engagement*) in a manner that will positively impact on the psychological, physical and social wellbeing of employees, simply because it is the right thing to do. It could be argued that organisations, and specifically the human resource function, has in their attempts to enhance *Employee*

*Engagement* a potentially powerful ally in the employee. The moral imperative that rests on the organisation to ensure that employees do meaningful, fulfilling, engaging work arises from employees' fundamental need to actualise themselves<sup>6</sup> in what they do (Maslow, 1943). Employees' will therefore most likely not only value interventions aimed at enhancing *Employee Engagement* but probably will also initiate their own attempts to create conditions conducive to *Engagement* (Bakker, Demerouti & Sanz-Vergel, 2014; Wrzesniewski & Dutton, 2001).

According to May, Gilson and Harter (2004), the human spirit, which in this context refers to a part of the human being which seeks fulfilment through self-expression at work, thrives when individuals are able to completely immerse themselves in their work. In other words, fulfilment through self-expression at work is dependent on the degree to which an individual is able to engage the cognitive, emotional and physical dimensions of themselves in their work. Kahn (1990, p. 694) conceptualised *engagement* at work as the 'harnessing of organisational members' selves to their work roles: in engagement, people employ and express themselves physically, cognitively, and emotionally during role performances.' According to Kahn, self and role therefore 'exist in some dynamic, negotiable relationship in which a person both drives personal energies into role behaviours (self-employment) and displays the self within the role (self-expression)' (1990, p. 700). Kahn's conceptualisation of *Employee Engagement* therefore serves to fulfil the human spirit at work.

It can therefore be concluded that *Employee Engagement* is an important concept, both from an individual as well as organisational perspective. If organisations are able to control *Employee Engagement* in the workplace via a system of integrated human resource interventions this will contribute to the achievement of the organisation's primary objective. Furthermore, organisations that implement interventions aimed at enhancing *Employee Engagement*, will be contributing to the well-being of its employees, and will therefore be fulfilling a moral obligation to society. Such interventions will most likely also be valued by individuals within the workplace, as individuals will be able to experience a sense of personal fulfilment through self-expression at work. A valid understanding of the *Employee Engagement*

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<sup>6</sup> It is thereby not denied that the need to for self-actualization is in itself a variable that varies across individuals under the influence of a nomological net of latent variables. This line of reasoning clearly holds important implications for the psychological mechanism that is assumed to underlie *Employee Engagement*.

construct and the psychological mechanism that underpins it, however, constitutes a necessary precondition to rationally and purposefully design human resource management interventions that will successfully enhance *Employee Engagement*.

## 1.2 RESEARCH OBJECTIVES

The argument presented thus far motivates the necessity of gaining a valid understanding of the psychological mechanism that operates to determine the level of *Employee Engagement* experienced by individual employees. Increasing our understanding of the behaviour of working man through scientific research essentially involves formulating a research initiating question, theorising and empirically testing the hypotheses developed through theorising in response to the research initiating questions. The argument presented thus far culminates into the research initiating question why variance in *Employee Engagement* exists amongst different employees working in different organisational contexts? The research objective is to develop and empirically test an explanatory *Employee Engagement* structural model that will provide a valid answer to the research initiating question.

## 1.3 OUTLINE OF THE STRUCTURE OF THE THESIS

The literature study will be presented in Chapter 2. In the literature study the construct of *Engagement* will be conceptualised. The literature study will culminate in the derivation of an *Employee Engagement* structural model. Chapter 3 will present the research methodology that will be used to empirically test the structural model that was developed via the literature study presented in Chapter 2. Chapter 4 will report on the results of the various statistical analyses performed. The final chapter, Chapter 5, will present the conclusions, discuss the limitations of the study, and make recommendations for future research, as well as discuss practical managerial implications conditional on the research findings.

## CHAPTER 2

### LITERATURE STUDY

#### 2.1 INTRODUCTION

The *Engagement* concept gained its popularity after the turn of the century, as a result of the emergence of the so-called Positive Psychology movement. Seligman and Csikszentmihalyi (2000) state that the purpose of Positive Psychology is “to begin to catalyse a change in the focus of psychology from a pre-occupation only with repairing the worst things in life to also building positive qualities” (p. 5). This therefore suggests that Positive Psychology focuses on human strengths and optimal functioning rather than the more traditional focus on weaknesses and malfunctioning. Positive Psychology does however not replace traditional psychology, but rather compliments it and is an extension to the traditional view of psychology (Peterson, 2000). Bakker and Schaufeli (2008) further support the need for Positive Organisational Behaviour research, a term introduced in order to place Positive Psychology in a work context. Positive Organisational Behaviour is defined as “the study and application of positively oriented human resource strengths and psychological capacities that can be measured, developed, and effectively managed for performance improvement in today’s workplace” (Luthans, 2002, p. 59).

This study responds to the need for a Positive Psychology focus in the work context. More specifically, this study attempts to address the research initiating question why variance in *Employee Engagement* exists amongst employees. The research challenge is therefore to “uncover” the complex nomological structure that underlies *Employee Engagement*. Macey and Schneider (2008a) note that *Engagement* is “a concept with a sparse and diverse theoretical and empirically demonstrated nomological net” (p. 3). This complex nomological net can only be discovered through theorizing, rooted in prior research findings. The following chapter acknowledges the pivotal role of theorising. The aim of this chapter is therefore to attempt to uncover the complex nomological net through theorising, by focusing on a) conceptualising the connotative meaning of the *Engagement* construct, b)

hypothesising the situational and person-centred antecedents of *Engagement* and c) proposing an explanatory structural model that hypothesises the manner in which the antecedents structurally combine to determine the level of *Engagement* that employees experience.

## **2.2 TOWARDS THE CONCEPTUALISATION OF THE ENGAGEMENT CONSTRUCT**

*Engagement* has been defined in a variety of ways by various authors, but they all agree that *Engagement* is desirable, has an organisational purpose, and has both psychological and behavioural facets in that it involves energy, enthusiasm, and focused effort (Macey & Schneider, 2008a). The following section of this chapter focuses on the various definitions of *Engagement* in order to gain a better understanding of the *Engagement* construct. It is hereby, however, not implied that the various definitions refer to qualitatively distinct forms of *Engagement*. Rather, the various definitions of *Engagement* represent different attempts to intellectually tame the same construct. The main focus here is on a) business perspectives on *Engagement*, b) *Personal Engagement*, c) academic perspectives on *Engagement*, and d) a comparison between *Engagement* and *Workholism*. Finally, this section concludes with final remarks on the *Engagement* construct.

### **2.2.1 BUSINESS PERSPECTIVES ON ENGAGEMENT**

The business perspective on *Engagement* focuses on the construct as a psychological state characterising employees as an outcome of conditions describing employees and their work context. The business perspective on *Engagement* moreover argues that appropriate actions can be taken to improve the level of *Engagement* of employees and that doing so would render positive dividends for the organisation (Wefald & Downey, 2009). Almost all major human resource consultancy firms are currently seeking ways of improving levels of *Engagement*. These firms claim that they have found compelling evidence that *Engagement* increases profitability through higher productivity, sales, customer satisfaction, and

employee retention (Schaufeli & Bakker, 2010). In general, these firms are conveying the message to organisations that increasing *Engagement* pays off.

The Gallup Organisations approach to *Engagement* represents the most frequently used business approach. Over the course of 30 years, thousands of investigations of successful employees, managers, and productive work groups were conducted by the Gallup Organisation researchers, which lead to the development of an *Employee Engagement* model (Herbert, 2011). Harter, Schmidt and Hayes (2002) defines *Engagement* as an individual's involvement, satisfaction and enthusiasm for work. A problem with Gallup's definition of *Engagement* is that it clearly overlaps with traditional constructs such as *Job Involvement* and *Job Satisfaction*, which begs the question whether *Engagement* is a unique construct in its own right

### **2.2.2 ACADEMIC PERSPECTIVES ON ENGAGEMENT: PERSONAL ENGAGEMENT**

In contrast to the industry approach to *Engagement* that focuses on *Engagement* as a desirable outcome, the academic perspective focuses on the psychological construct itself and measurement of the specific construct (Wefald & Downey, 2009). In 1990, Kahn was one of the first scholars to conceptualise *Engagement* at work. Kahn (1990) introduced the concepts of *Personal Engagement* and *Personal Disengagement*. *Personal Engagement* and *Personal Disengagement* are defined as: "the behaviours by which people bring in or leave out their personal selves during work role performances" (Kahn, 1990, p. 694). According to Kahn (1990), people are constantly bringing in and leaving out their selves during their work days. In other words, on a daily basis people are constantly fluctuating between moments of *Personal Engagement* and moments of *Personal Disengagement*.

Kahn (1990) further specifically defined *Personal Engagement* as the "harnessing of organisational members' selves to their work roles: in engagement, people employ and express themselves physically, cognitively and emotionally during role performance" (p. 694). A dynamic relationship therefore exists between the person and his/her work role (Kahn, 1990). On the one hand, the person drives physical, cognitive and emotional energies into his/her work role (self-employment). On the



other hand, the work role allows the person to express him/herself (self-expression). In other words, people who are personally engaged keep their selves within a work role, without sacrificing the self for the role or vice versa. Such *Personal Engagement* serves the role of fulfilling the human spirit at work (May et al., 2004). This “human spirit” that May et al. (2004) refers to represents that part within the human that seeks fulfilment through self-expression. Although individuals can be involved in their work roles physically, cognitively or emotionally, Kahn (1992) emphasised that *Personal Engagement* is a unique construct in that it represents maintaining these physical, cognitive and emotional involvements simultaneously in an integrated rather than fragmented manner. In terms of Kahn’s (1990) conceptualisation of the construct, *Engagement* is the abstract theme in a bundle of behaviours through which employees invest themselves (physically, cognitively and emotionally) in their work roles.

Later Kahn (1992) introduced the term *Psychological Presence* (or “being fully there”). *Psychological Presence* occurs when an employee feels, and is, attentive, connected, integrated, and focused in his/her work role (Kahn, 1992). In sum, *Psychological Presence* describes people who are alive, there in the fullest sense and accessible in the given work role. According to Kahn, *Psychological Presence*, an experiential state, is manifested in personally engaging behaviours. He states that “its manifestations flow into those of *Personal Engagement*” (1992, p. 12). A distinction is therefore made between an experiential state (*Psychological Presence*) and the outcome of such an experience, namely engaging behaviours.

According to <http://en.wikipedia.org/wiki/Gear> gear, alternatively known as a cogwheel, refers to a rotating part having cut teeth, or cogs, which mesh with another toothed cog in order to transmit torque. Two or more gears working in tandem can be considered a mechanism that produces a mechanical advantage through a gear ratio. Kahn’s (1990) view of *Personal Engagement* can by way of analogy be interpreted as two psychological cogwheels in the form of the job and the person (behaviourally) engaging, provided there exists *Psychological Presence*. Kahn (1990) further argues that the two gears will only successfully engage if specific prerequisites are satisfied.

Kahn (1990) identifies three prerequisites, referred to as psychological conditions of experience, which describe peoples' experiences of the rational and unconscious elements of their work contexts: *Meaningfulness*, *Safety*, and *Availability*. *Psychological Meaningfulness* is the sense of return on investments of the self-in-role performances, *Psychological Safety* is the sense of being able to show and employ the self without fear of negative consequences to status, career or self-image, and *Psychological Availability* is the sense of possessing the physical, emotional, and psychological resources necessary for investing the self-in-role performances (Kahn, 1990). These three psychological conditions drive the extent to which people are psychologically present (and thus personally engaging in task situations). In sum, "individual and situational factors weave together to create the three central psychological conditions. The extent to which individuals experience the three conditions, taken together, influences how psychologically present (and behaviourally engaged) they are in particular work situations" (Kahn, 1992, p. 12). Kahn (1992) does not, however, clearly explicate the mechanism through which these latent variables combine to affect *Personal Engagement*. Neither is it clear when attempting to explicate the structural relations existing between these latent variables whether *Psychological Presence* should be treated as a separate, distinct latent variable in addition to the three psychological conditions that Kahn (1990) identified as psychological prerequisites for *Personal Engagement* or whether *Psychological Presence* should be seen as a higher-order latent variable representing the three psychological prerequisites. When approached from the former perspective the three psychological conditions determine the level of *Psychological Presence* which in turn determines the level of *Personal Engagement*. When approached from the latter perspective *Psychological Meaningfulness* determines the level of *Personal Engagement* but its influence is moderated by *Psychological Safety* and *Psychological Availability*

### **2.2.3 ACADEMIC PERSPECTIVES ON ENGAGEMENT: ENGAGEMENT VERSUS BURNOUT**

A different approach to Kahn's (1990, 1992) conceptualisation of *Engagement* as behaviours considers *Work Engagement* as the positive antithesis of *Burnout*.

Gonzalez-Roma, Schaufeli, Bakker and Lloret (2006) define *Burnout* as ... “a reaction to chronic occupational stress characterized by emotional exhaustion, cynicism and lack of professional efficacy” (p. 166). There is general agreement in existing literature with regards to the three *Burnout* dimensions; exhaustion, cynicism and lack of efficacy/ineffectiveness. Maslach and Leiter (1997) extended the existing literature on *Burnout* by viewing *Engagement* as the direct opposite of *Burnout* on a bi-polar continuum. *Engagement* is defined as “an energetic experience of involvement with personally fulfilling activities that enhance a staff member’s sense of professional efficacy” (Leiter & Maslach, 1998, p. 351). They consider *Engagement* to be comprising of three dimensions: energy, involvement and efficacy. *Burnout* is therefore redefined as an erosion of *Engagement*. In instances of *Burnout*, it is assumed that “...energy turns into exhaustion, involvement turns into cynicism, and efficacy turns into ineffectiveness” (Maslach & Leiter, 1997, p. 24). *Engagement* and *Burnout* therefore exist in terms of this conceptualisation on a continuum-with *Burnout* (exhaustion, cynicism and inefficacy) on one end of the continuum and *Engagement* (energy, involvement and efficacy) on the other end. At any given time, an employee is thought to be somewhere along this continuum (Herbert, 2011).

Conceptualising *Engagement* as the opposite of *Burnout* implies that *Engagement* can be assessed by the opposite pattern of scores on the three Maslach Burnout Inventory (MBI) dimensions (Maslach & Leiter, 1997). Low scores on exhaustion and cynicism, and high scores on efficacy is therefore indicative of an engaged employee.

Contrary to the view of Maslach and Leiter (1997) is the belief that *Work Engagement* is a conceptually distinct, separate concept that is negatively related to *Burnout* (Bakker, Schaufeli, Leiter, & Taris, 2008). Consequently, *Work Engagement* is defined in its own right as ... “a positive, fulfilling, work-related state of mind that is characterized by vigour, dedication, and absorption” (Schaufeli, Salanova, Gonzalez-Roma, & Bakker, 2002, p. 74). *Vigour* is characterised by high levels of energy and mental resilience while working, the willingness to invest effort in one’s work, and persistence even in the face of difficulties. *Dedication* refers to being highly involved in one’s work, and is characterised by a sense of significance, enthusiasm, inspiration, pride, and challenge. Finally, *Absorption* is being fully concentrated and

deeply engrossed in one's work, whereby time passes quickly and one has difficulties with detaching oneself from work.

From the definition provided by Schaufeli et al. (2002) it is evident that *Work Engagement* is conceptualised as a multi-dimensional affective cognitive state. Furthermore, rather than being a momentary and specific emotional state, *Work Engagement* represents a more persistent and pervasive affective cognitive state (Schaufeli et al., 2002).

Defining *Work Engagement* in its own right implies that it would not be adequate to measure *Engagement* in terms of the opposite profile of MBI scores since this implies that both concepts are compliments of each other, rather than two separate, conceptually distinct, yet negatively related states.

#### **2.2.4 ENGAGEMENT VERSUS WORKHOLISM**

Being engaged in one's work is not the same as being a workaholic. *Workholism* refers to individuals who, when given the discretion to choose whether or not to do so, choose to spend a great deal of time in work activities (Bakker et al., 2008). Workaholics frequently and persistently think about their work even when they are not at work and they are often reluctant to disengage from work activities. Workaholics are viewed as being obsessed with their work and are often referred to as compulsive workers (Scott, Moore & Miceli, 1997). Although this may seem similar to *Engagement*, engaged employees do not have the same compulsive drive and are not addicted to their work, but instead find their work fun. Engaged employees therefore do not work hard because of a strong, irresistible inner drive, but rather they work hard because they find their work challenging and enjoy what they do (Bakker & Demerouti, 2008). *Engagement* should therefore be differentiated from *Workholism*. Macey and Schneider issue a word of caution that highlights the importance of differentiating between *Workholism* and *Engagement*, stating that "we need to be very careful in romancing the notion of engagement when it embraces behaviors more closely aligned with workaholic tendencies that are dysfunctional to the individual and eventually to the organisation (2008b, p. 81).

## 2.2.5 FINAL REMARKS ON THE ENGAGEMENT CONSTRUCT

The aim of this section is to derive a constitutive definition of the *Engagement* construct for the purpose of this research study. Thus far, various definitions of *Engagement* have been explored and it is evident that numerous attempts have been made both by practitioners and academics to intellectually tame the *Engagement* construct and obtain an intellectual grasp on the construct.

The Gallup organisation relies on more traditional constructs (“satisfaction” and “involvement”) to define *Engagement*. Conceptualising *Engagement* in terms of already familiar constructs suggests considerable conceptual overlap between constructs and therefore raises the question of whether or not *Engagement* thus defined represents a distinct and unique construct.

Kahn (1990) was one of the first scholars to introduce the *Engagement* construct, referring to the construct as *Personal Engagement*. Although his initial conceptualisation of *Personal Engagement* contributed to a greater understanding of the construct, his focus was on the work role and on the harnessing of the self-in-role, as opposed to work itself. Furthermore, he conceptualises *Personal Engagement* as those behaviours by which people bring in their personal selves (physically, cognitively and emotionally) into their work roles. In other words, *Personal Engagement* in as Kahn (1990) conceptualises it refers to behaviours.

Taking a rather different approach to that of Kahn (1990, 1992), Maslach and Leiter (1997), and Schaufeli et al. (2002) conceptualise *Engagement* as a psychological state as opposed to behaviours. Maslach and Leiter (1997) conceptualise *Engagement* as a multi-dimensional construct that represents the positive antithesis of *Burnout*. Schaufeli et al. (2002) opposed this view and proposed that *Engagement* should be defined as a psychological state in its own right.

This study supports the conceptualisation of *Engagement* as a specific, well defined, separate and properly operationalised conative-affective-cognitive psychological state with a similar but distinct structure to *Burnout*. Furthermore, Schaufeli et al. (2002) state that rather than being a momentary and specific emotional state, *Engagement* represents a more persistent and pervasive affective cognitive state.

The current study approaches *Engagement* and the process that leads to it as more enduring although it is thereby not denied that fluctuations occur during the day. Despite the fluctuations there are general/typical levels in the components that differ across different employees in different situations. The definition proposed by Schaufeli et al. (2002) is the definition used throughout this study in order to define the *Engagement* construct. Therefore, *Engagement* is for the purpose of this study defined as “a positive, fulfilling, work-related state of mind that is characterised by vigour, dedication, and absorption” (Schaufeli et al., 2002, p. 74). Consequently, *Engagement* is conceptualised as a multi-dimensional construct that is located in a conceptual space comprising a motivational dimension and an attitudinal dimension (Sonnetag, Dormann & Demerouti, 2010). The motivational dimension encompasses an energetic facet and an involvement facet. The attitudinal component encompasses a cognitive facet and affective facet. Behaviours are seen as potential outcomes of *Engagement* and not as a facet of *Engagement*. Therefore, contrary to what Macey and Schneider (2008a) propose, *Engagement* is conceptualised as a psychological state only, and not as an umbrella term that can be used to refer to both state engagement and behavioural engagement that flows from the psychological state.

Numerous studies have identified various behavioural outcomes of *Work Engagement*. The most often included behavioural outcomes of *Work Engagement* are *In-role Performance* and *Extra-role Performance* (Bakker & Demerouti, 2008; Bakker, Demerouti & Verbeke, 2004).<sup>7</sup>

This particular definition of *Engagement* proposed by Schaufeli et al. (2002) refers to the term *Work Engagement*. Typically, the terms *Work Engagement* and *Employee Engagement* are used interchangeably as synonyms to refer to the same construct.

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<sup>7</sup> Although Schaufeli et al. (2002) view behaviours as potential outcomes of *Engagement*, this still raises the question where Kahn's (1990) conceptualisation of *Personal Engagement* as personally engaging behaviours comes into play? Could it be that Kahn's (1990) conceptualisation of *Engagement* (as personally engaging behaviours) can be viewed as an umbrella term to describe these various behavioural outcomes (e.g. *In-role Performance* and *Extra-Role Performance*) that flow from state engagement? Or on the contrary, is Kahn's (1990) *Personal Engagement* instead referring to a separate behavioural construct. The current study holds the assumption that Kahn's (1990) *Personal Engagement* construct does in fact represent a separate behavioural construct. More specifically, the current study holds the assumption that Kahn's separate behavioural construct is an outcome of the psychological state of *Engagement*, and that various behavioural outcomes (e.g. *In-role Performance* and *Extra-Role Performance*) in turn flow from this separate behavioural construct. This separate behavioural construct, which Kahn (1990) termed *Personal Engagement* is yet to be explored in further detail in research studies to follow. The current study does, however, not further explore Kahn's *Personal Engagement* construct.

Schaufeli and Bakker (2010), however, suggest that *Work Engagement* is a more specific term, referring to the relationship of the employee with his/her work. According to Schaufeli and Bakker (2010) the term *Employee Engagement* is less specific, as it may also include the relationship of the employee with the organisation. The focus of this particular study is on the relationship between the employee and his/her work. In other words, this study focuses on employees engaging in their work, as opposed to employees who are engaged in their organisation. The term *Work Engagement* will therefore henceforth be used throughout the remainder of this study to refer to the *Engagement* construct.

One final point needs to be raised with regards to the three psychological conditions of experience identified by Kahn (1990, 1992). Kahn argues that “individual and situational factors weave together to create the three central psychological conditions” and that these three conditions of experience drive the extent to which people are psychologically present and thus behaviourally engaged (1992, p. 12). Stated differently, “people’s experiences of themselves and their work contexts influenced moments of *Personal Engagement* and *Disengagement*” (Kahn, 1990, p. 702). The current study assumes that Kahn’s *Personal Engagement* construct represents a separate behavioural construct that flows from *Work Engagement* (the psychological state of being engaged). Although Kahn (1990; 1992) argues that the three psychological conditions of experience influence *Personal Engagement*, assuming that this separate behavioural construct (*Personal Engagement*) is an outcome of *Work Engagement*, it can therefore be argued that the psychological conditions of experience drive the extent to which people experience *Work Engagement*, which in turn results in the separate behavioural construct (*Personal Engagement*). In sum, the three psychological conditions of experience have important implications for understanding the mechanisms through which various latent variables influence the level of *Work Engagement*.

### **2.3 ANTECEDENTS OF WORK ENGAGEMENT**

The research challenge is to “uncover” the complex nomological net that underlies *Work Engagement*, in order to gain a greater understanding of why variance in *Work*

*Engagement* exists across employees and work contexts. The assumption is made that variance in *Work Engagement* amongst employees is not a random event. In other words, it is not by chance that a particular employee experiences *Engagement* to a greater extent than another employee. Instead, the degree of *Work Engagement* that is experienced by any given employee is the result of the working of a complex nomological network of person-centred and environmental latent variables.

Thus far, attempts have been made to gain a greater understanding of the manner in which the *Engagement* construct is conceptualised. An explicit constitutive definition has in addition been accepted for the purpose of this study. In the following section of this chapter, attempts will be made to understand the identity of the latent variables that shape *Work Engagement* as well as the manner in which these variables combine to constitute the psychological mechanism that determines the level of *Work Engagement*. In other words, the focus is on accurately understanding the complexity of the nomological network of latent variables underlying *Work Engagement*. Before attempting to do so, the question that firstly needs to be asked is in which ways the nomological network underlying *Work Engagement* should be considered to be complex?

There are three ways in which the structural network of influences underlying *Work Engagement* should be considered complex (Smuts, 2011; Theron, 2012). Firstly, the nomological network should be considered complex in the sense that a large number of latent variables determine any given employees level of *Work Engagement*. Secondly, these latent variables are richly causally interconnected in a manner that almost every latent variable is either directly or indirectly affected by every other latent variable. Thirdly, the structural network of influences can be considered complex in that the meaning/explanation of *Work Engagement* is not located at a specific point in the nomological network of determining latent variables, but instead is spread over the whole of the network.

Although the focus is on accurately understanding this complexity of the nomological network of latent variables underlying *Work Engagement*, it is precisely the complexity and vastness that makes it virtually impossible for any one researcher to do so. To gain a complete and accurate understanding of this nomological network of variables and interrelationships between the variables would require an immense



and seemingly impossible investment in terms of time and energy. The aim of this section is therefore to eventually develop an explanatory *Work Engagement* structural model that at least closely approximates reality. The only practically feasible way to do so is through theorising, rooted in prior research findings. The following section of this chapter therefore begins with a discussion on the Job-Demands Resources model (Demerouti, Bakker, Nachreiner & Schaufeli, 2001), which serves as a theoretical starting point. Secondly, the focus shifts toward the development of an explanatory *Work Engagement* structural model. Various antecedents of *Work Engagement* are discussed, as well as the manner in which these latent variables combine to determine *Work Engagement*.

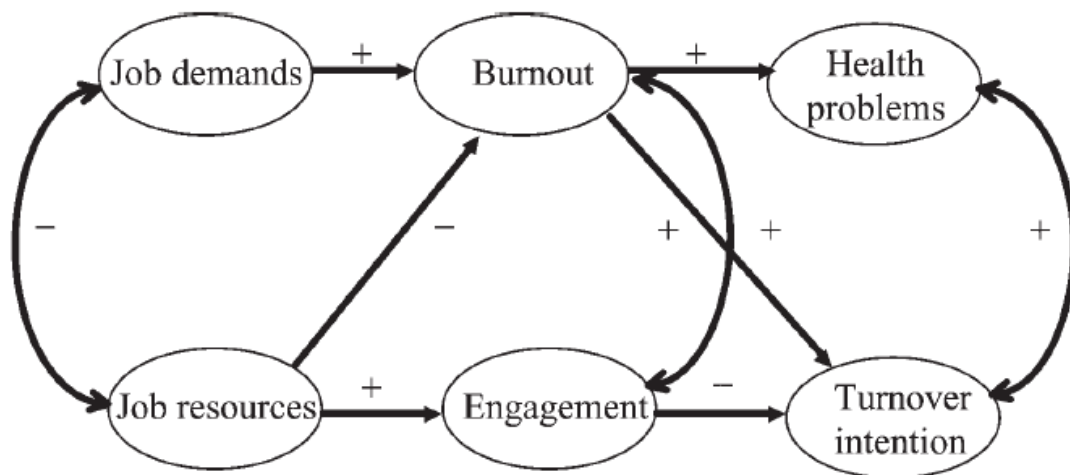
### **2.3.1 THE JOB DEMANDS RESOURCES MODEL: A THEORETICAL FRAMEWORK**

Studies on *Engagement* have applied the Job Demands-Resources (JD-R) model as the theoretical framework more often than any other theory or model (Hakanen & Roodt, 2010). The JD-R model was originally introduced by Demerouti and her colleagues (Demerouti et al., 2001). The original model proposed that working conditions can be categorised into two broad categories, namely job demands and job resources. These two categories of work conditions were found to predict particular components of *Burnout*, irrespective of the type of occupation.

Job demands are defined as “those physical, social, or organisational aspects of the job that require sustained physical and/or psychological (i.e. cognitive and emotional) effort on the part of the employee, and are therefore associated with certain physiological and/or psychological costs” (Demerouti et al., 2001, p. 501). Job resources, on the other hand, are defined as “those physical, psychological, social, or organisational aspects of the job that may a) reduce job demands and the associated physiological and psychological costs, b) are functional in achieving work goals, and c) stimulate personal growth, learning and development” (Demerouti et al., 2001, p. 501).

The original model did not include the *Engagement* construct, but instead included *Disengagement* as an outcome of job resources (Demerouti et al., 2001). Schaufeli

and Bakker (2004a) were the first to test a comprehensive JD-R model, which included both *Engagement* and *Burnout*. *Engagement* and *Burnout* were not interpreted as two states characterising the poles of a single continuum. Instead, in their comprehensive JD-R model, Schaufeli and Bakker (2004a) view *Engagement* as a separate concept that is negatively related to *Burnout*. The comprehensive JD-R model assumes that job demands and job resources evoke two psychological processes: (1) a health impairment process, and (2) a motivational process (Bakker & Demerouti, 2007; Schaufeli & Bakker, 2004a). In the health impairment process high job demands exhaust employees' mental and physical resources, therefore leading to *Burnout* and eventually health problems. On the other hand, in the motivational process job resources have motivational potential and therefore foster *Engagement*. This comprehensive JD-R model is depicted in Figure 2.1.



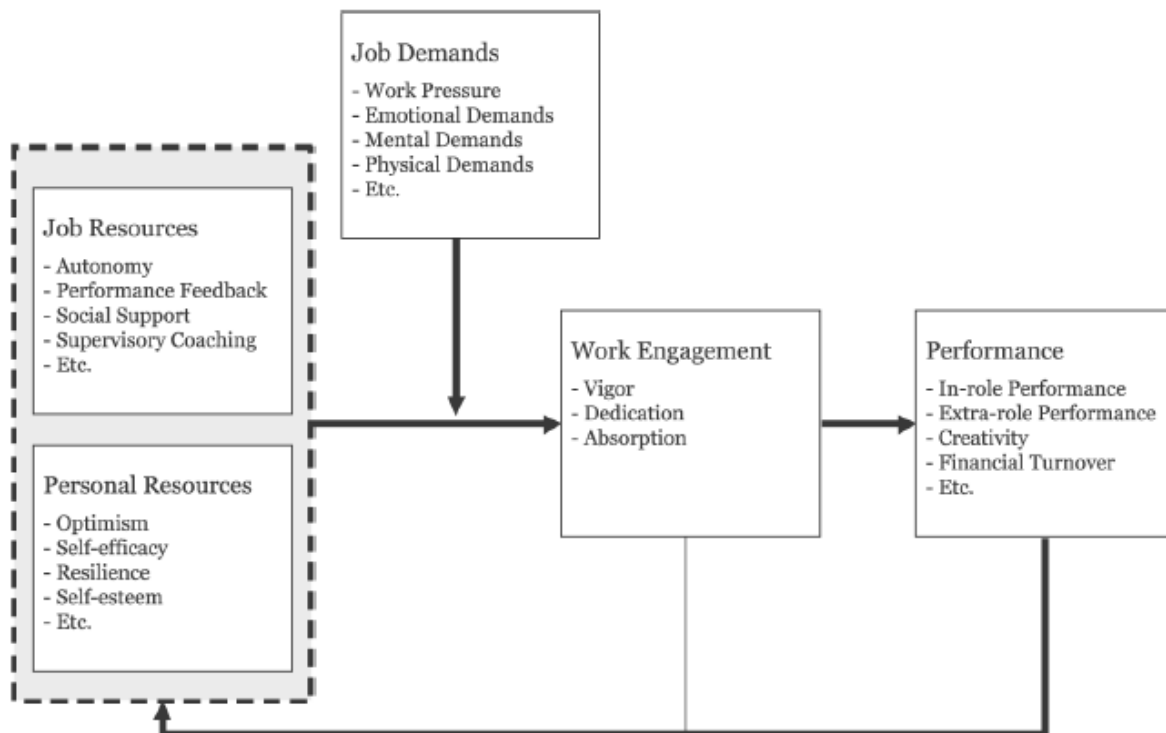
**Figure 2.1. The Comprehensive JD-R Model**

(Schaufeli & Bakker, 2004a, p. 297)

Given that the following study is concerned only with *Engagement*, the focus is on the motivational process. As follows from the earlier definition, job resources may play either an intrinsic motivational role or an extrinsic motivational role. Job resources are intrinsically motivating in that they foster employees' growth, learning, and development, thereby fulfilling basic human needs. Job resources play an extrinsic motivational role because they are necessary for dealing with job demands and are instrumental in achieving work goals (Bakker & Demerouti, 2007; Schaufeli & Bakker, 2004a). Irrespective of whether job resources play an intrinsic motivational

role or extrinsic motivational role, the outcome can be expected to be positive, provided the employee possesses the job competency potential required to display the required behaviour. *Engagement* is likely to occur only if the employee has the requisite characteristics that will allow him/her to effectively use the job resources to respond to the job demands and that will allow him/her to harvest the growth opportunities offered by the job resources.

Various studies have focused solely on the motivational process (i.e. job resources → engagement → positive outcome). Although it makes sense to argue that job resources are a necessary condition for *Engagement*, it seems somewhat of an oversimplification to argue that the mere presence of job resources will be sufficient to elicit *Engagement*. One study investigated the role of personal resources, in addition to job resources and job demands, in the JD-R model (Xanthopoulou, Bakker, Demerouti & Schaufeli, 2007). Personal resources are positive self-evaluations that are generally linked to resiliency and refer to an individual's sense of his/her ability to control and impact upon their environment successfully (Hobfoll, Johnson, Ennis & Jackson, 2003). Assuming that these self-evaluations are reasonably accurate, personal resources then also implies that an employee possess the requisite job competency potential that will allow him/her to effectively use the job resources to respond to the job demands and that will allow him/her to harvest the growth opportunities offered by the job resources. Findings supported the authors' hypothesis that personal resources influence *Engagement* (Xanthopoulou et al., 2007). Personal resources are therefore, in addition to job resources, assumed to have motivational potential and have since been included in subsequent JD-R models. Based on evidence from research studies on *Engagement* and the JD-R model, a more focused JD-R model was proposed to explain variance in *Engagement* (Bakker & Demerouti, 2008). The JD-R model of *Work Engagement* firstly proposes that job resources activate a motivational process that leads to *Work Engagement*. Secondly, the model postulates that job resources become more salient and gain their motivational potential when employees are confronted with higher job demands. Finally, the model draws from the work of Xanthopoulou et al. (2007) and therefore suggests that personal resources independently or in combination with job resources explain variance in *Work Engagement*. The JD-R model of *Work Engagement* is shown in Figure 2.2.



**Figure 2.2. The JD-R Model of Work Engagement**

(Bakker & Demerouti, 2008, p. 218)

In sum, the JD-R model of *Work Engagement* highlights the important role that resources play in *Work Engagement*. More particularly, it is clear that both job resources and personal resources foster *Work Engagement*.

### 2.3.2 TOWARDS THE DEVELOPMENT OF AN EXPLANATORY WORK ENGAGEMENT STRUCTURAL MODEL

The degree of *Work Engagement* that is experienced by any given employee is not a random event, but instead is the result of the working of a complex nomological network of person-centred and environmental latent variables. The JD-R model, as discussed in the previous section, clearly supports this line of reasoning. Job resources and personal resources are not latent variables that can be meaningfully incorporated in an explanatory structural model. They are not meaningful quantities

that vary in magnitude and that can as such be meaningfully hypothesised to structurally relate to other latent variables. Job resources represent a category of particular environmental latent variables that have been shown to play a role in the psychological mechanism that determines the level of *Work Engagement* that employees' experience. On the other hand, personal resources represent another category of particular person-centred latent variables that have also been shown to play a role in the psychological mechanism that determines the level of *Work Engagement* that employees' experience. The JD-R model therefore serves as a conceptual starting point towards the development of an explanatory *Work Engagement* structural model. To make meaningful progress towards the development of such an explanatory structural model the two categories of latent variables, however, have to be dissected/deconstructed into its component parts.

A wide variety of specific job resources have been studied as possible latent variables that could play a role in the psychological mechanism that determines the level of *Work Engagement*. Amongst the most often included job resources are *Autonomy, Feedback, Task Significance, Task Identity, Skill Variety* and *Social Support* from supervisors and colleagues (Bakker & Demerouti, 2007; Bakker & Demerouti, 2008; Hakanen & Roodt, 2010). Previous studies (Bakker, Demerouti & Schaufeli, 2003; Bakker et al., 2004; Schaufeli & Salanova, as cited in Bakker & Demerouti, 2008; Schaufeli, Bakker & Van Rhenen, 2009) have consistently shown that these job resources are positively associated with *Work Engagement*. That, however, still leaves the question unanswered through which psychological process/mechanism they affect *Work Engagement*. In terms of personal resources, the focus has most often been on *Optimism, Self-efficacy, Resiliency* and *Self-esteem* as possible latent variables that could play a role in the psychological mechanism that determines the level of *Work Engagement* (Bakker & Demerouti, 2008). Previous studies (Bakker, Gierveld & Van Rijswijk, as cited in Bakker & Demerouti, 2008; Xanthopoulou et al., 2007) have likewise shown that these personal resources are positively associated with *Work Engagement*. Again this still leaves the question unanswered through which psychological process/mechanism they affect *Work Engagement*.

The current research study is in no way bound to the JD-R model. The idea is not to contribute to the existing literature on the JD-R model *per se*. Instead, the aim is to

develop an explanatory *Work Engagement* structural model that validly approximates the psychological mechanism that operates to determine the level of *Work Engagement* of employees. The JD-R model does however play an important role in that it identifies various latent variables (resources) that serve as important antecedents of *Work Engagement*. It therefore serves as a theoretical/conceptual stepping stone in the process of uncovering the nomological network underlying *Work Engagement*.

In order to control *Work Engagement* through human resource interventions, a valid understanding is required as to why variance in *Work Engagement* exists. It is thereby essential but not sufficient to understand the identity of these latent variables that shape *Work Engagement* but also the manner in which these latent variables structurally combine to form the psychological mechanism that determines the level of *Work Engagement*. Therefore, in the discussion that follows in the remainder of this section on “Antecedents of Work Engagement”, the manner in which specific job and personal resources are hypothesised to act as components in the psychological mechanism that determines the level of *Work Engagement* are argued and a rationale is then presented for the proposed structural relationships between the specific antecedent and *Work Engagement*. Furthermore, the discussion will not simply assume that direct relationships will exist between each antecedent and *Work Engagement*, but rather attempt to introduce some of the more critical latent variables that are thought to mediate or moderate the effect of the specific job and personal resources on *Work Engagement*. To empower the human resource function with the ability to control the level of *Work Engagement* a valid close approximation of the psychological mechanism underpinning *Work Engagement* is required. To achieve this, the literature study should attempt to isolate via a logical argument the elements comprising the psychological process through which resources impact on *Work Engagement* and also on the various ways in which these elements are assumed to be structurally interconnected.

*Work Engagement* is a function of both the person and the environment. The state of *Work Engagement* is experienced by employees partly as a result of a response to the context within which employees work. The work context comprises of various factors, including the characteristics of the employee’s job. Jobs, defined as employees’ specific work and task activities in an organisation, are considered the

micro-structural element to which employees most directly relate. Jobs in an organisation are the basic building blocks defining an organisation's structure and are designed to make a contribution to the organisation's overall mission and goals (Quick & Nelson, 2011). It therefore seems reasonable to argue that the characteristics of an employee's job represent an essential variable in the employee's work context that is likely to influence the employee's attitudes, motivation and behaviour at work. In the following section, the possibility of *Job Characteristics* as an antecedent of *Work Engagement* is considered and explored in greater detail.

### 2.3.2.1 JOB CHARACTERISTICS

Job resources were defined earlier within the context of the JD-R model as "those physical, psychological, social, or organisational aspects of the job that may a) reduce job demands and the associated physiological and psychological costs, b) are functional in achieving work goals, and c) stimulate personal growth, learning and development" (Demerouti et al., 2001, p. 501). The JD-R model frequently includes *Job Characteristics* as job resources (Bakker & Demerouti, 2008). Job Characteristics Theory (Hackman & Oldham, 1980) emerged much earlier than the JD-R model from early motivation and job enrichment research. The Job Characteristics Model suggests that five core job dimensions, referred to as *Job Characteristics* determine the motivation potential of a job. The five core job dimensions are *Autonomy*, *Feedback*, *Skill Variety*, *Task Identity* and *Task significance* (Hackman & Oldham, 1980). *Autonomy* is the (perceived) degree to which the job allows an individual the freedom to make decisions about the way work will be carried out. *Feedback* refers to the (perceived) extent to which the job itself provides the employee with clear information regarding his/her performance effectiveness. *Skills variety* is the (perceived) degree to which the job requires different activities when carrying out the work, which includes the variety of talents and skills required. *Task identity* refers to the (perceived) degree to which the job requires the completion of a whole piece of work from beginning to end. Finally, *Task Significance* is the (perceived) extent to which the job has an important impact

on the lives of other people inside or outside the organisation (Quick & Nelson, 2011).

The current study proposes that *Job Characteristics* positively influences *Work Engagement*. This still leaves the question unanswered through which psychological process/mechanism *Job Characteristics* affects *Work Engagement*. Job Characteristics Theory proposes that *Job Characteristics* foster internal work motivation (Hackman & Oldham, 1980). According to the Job Characteristics Model (Hackman & Oldham, 1975), the five core job characteristics interact to determine the motivating potential of a job by affecting three critical psychological states: 1) experienced meaningfulness of the work, 2) experienced responsibility of outcomes of the work, and 3) knowledge of the actual results of the work activities. In other words, the model proposes that when the core job characteristics (and thus also the three critical psychological states) are high, the employee will experience a high level of internal work motivation. This internal work motivation refers to the degree to which the employee is self-motivated to perform effectively on the job (Hackman & Oldham, 1975).

In addition to Hackman and Oldham's (1975) reference to the psychological experience of *Meaningfulness* in the Job Characteristics Model, Kahn (1990) proposes that *Psychological Meaningfulness* represents a psychological condition of experience that acts as a prerequisite for *Engagement* in the Kahn (1990) sense of the term to occur (i.e. that acts as prerequisites for personally engaging behaviours to occur). Although the current study does not support Kahn's conceptualisation of *Engagement* as behaviours, nevertheless, his reference to the *Meaningfulness* construct proves to be valuable in light of the argument in support of the proposed influence of *Job Characteristics* on *Work Engagement*.

Hackman and Oldham define *Meaningfulness* as "the degree to which the employee experiences the job as one which is generally meaningful, valuable and worthwhile" (1975, p. 162). Hackman and Oldham (1980) further define *Meaningfulness* as the value of a work goal or purpose, which is judged in terms of an employee's personal ideals and standards. Kahn (1990) defines *Meaningfulness* as the sense of return on investments of the self-in-role performances. Kahn (1990) argues that people experience *Meaningfulness* when they feel useful, valuable or worthwhile (Kahn,



1990). There is agreement between Hackman and Oldham (1975, 1980) and Kahn (1990) as to what *Meaningfulness* represents. This study therefore endorses the *Hackman-Oldham-Kahn definition of Meaningfulness*. Kahn (1990) furthermore proposes that *Meaningfulness* can be achieved from tasks that provide challenging work, variety, allow the use of different skills, personal discretion, and the opportunity to make important contributions. In other words, he proposes that the *Job Characteristics* of an employee's job could influence the degree of *Meaningfulness* an employee experiences at work. This is in line with the earlier discussion on Job Characteristics Theory, which proposes that *Job Characteristics* have motivating potential, due to the fact that *Job Characteristics* affect experienced *Meaningfulness* at work (Hackman & Oldham, 1980). In other words, both Hackman and Oldham (1980) and Kahn (1990) agree that *Job Characteristics* influence the degree to which an employee experiences *Meaningfulness*.

Frankl (1992) argues that employees have a primary motive to seek meaning in life and therefore also in their work. In other words, employees are likely to be motivated in those work activities which they believe are personally meaningful. This is in line with the Job Characteristics Model, which proposes that *Job Characteristics* have motivating potential, due to the fact that *Job Characteristics* affect experienced *Meaningfulness* (Hackman & Oldham, 1980). Furthermore, Frankl (1992) argues that this motivation (as a result of work activities which employees experience as personally meaningful) is expressed in the form of being highly involved and engrossed in one's work. In other words, this motivation is expressed in the form of *Work Engagement*<sup>8</sup>. Meaningful work scholars agree with this line of reasoning, suggesting that experienced *Meaningfulness* is central to the experience of *Engagement* (Chalofsky, 2010; Fairlie, 2011).

In sum, employees are motivated in work activities that provide meaning (Frankl, 1992; Hackman & Oldham, 1980). Work that is perceived as *Meaningful* is characterised by higher levels of the five core job characteristics (Hackman &

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<sup>8</sup> *Work Engagement* is a multi-dimensional construct that comprises a motivational dimension (encompassing an energetic and involvement facet) and an attitudinal dimension (encompassing a cognitive and affective facet; Sonnentag, Dormann & Demerouti, 2010). Frankl (1992) argues that motivation (as a result of work activities which employees experience as personally meaningful) is expressed in the form of being highly involved and engrossed in one's work. *Dedication* is defined as being highly involved in one's work. *Absorption* represents being fully engrossed. Therefore, it is reasoned that this motivation is expressed in the form of *Work Engagement*.

Oldham, 1980; Kahn, 1990). The presence of these *Job Characteristics* therefore motivates employees. This motivation is expressed in the form of higher levels of *Work Engagement*.

This intrinsic motivational potential of *Job Characteristics* is also recognized by the JD-R model (Schaufeli & Bakker, 2004a). The JD-R model argues that job resources (which include *Job Characteristics*) play an intrinsic motivational role in that they foster employees' growth, learning and development, thereby fulfilling basic human needs, such as the need for autonomy and competence (Deci & Ryan, 1985). For example, feedback fosters learning, thereby fulfilling the human need of competence (Bakker & Demerouti, 2008). In addition to being intrinsically motivating, job resources may also play an extrinsic motivational role in that they are instrumental in achieving work goals (Schaufeli & Bakker, 2004a). In sum, the JD-R model proposes that irrespective of whether job resources play an intrinsic motivational role or extrinsic motivational role, employees are likely to experience "a positive, fulfilling, work-related state of mind that is characterized by vigour, dedication, and absorption" (Schaufeli et al., 2002, p. 74).

Based on the above discussion, the current study proposes that experienced *Meaningfulness* mediates the positive relationship between *Job Characteristics* and *Work Engagement*. This leads to the formulation of the following hypotheses:

***Hypothesis 2<sup>9</sup>: In the proposed Work Engagement structural model it is hypothesised that Job Characteristics positively influences Meaningfulness.***

***Hypothesis 3: In the proposed Work Engagement structural model it is hypothesised that Meaningfulness positively influences Work Engagement.***

Finally, it should be noted that the degree to which these five characteristics are present in a particular job is not objectively determined, but rather is a reflection of an employee's perception of the presence of *Job Characteristics*. In other words, it is not the objective reality which affects *Work Engagement*, but rather the individual's psychological interpretation of that reality. Therefore in the following study, any

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<sup>9</sup> Hypotheses 1 represents the overarching substantive research hypotheses, namely that the *Work Engagement* structural model provides a valid account of the psychological process that determines the levels of *Work Engagement*. Hypothesis 1 can be dissected into more detailed, direct-effect substantive research hypotheses. Therefore, the first path specific substantive research hypothesis in actual fact represents the second substantive research hypothesis formulated thus far (i.e. hypothesis 2).

reference to *Job Characteristics* refers to employees' perceptions of *Job Characteristics*.

In an earlier discussion it was mentioned that *Work Engagement* is a function of both the person and the environment. The assumption that the characteristics of the job represent a key variable in an employee's work context that is likely to influence an employee's attitudes, motivation and behaviour led to the exploration of *Job Characteristics* as a possible key antecedent of *Work Engagement*. Given that *Job Characteristics*, an environmental variable, has been explored in greater detail the question which key person-centred latent variables are likely to influence the level of *Work Engagement* experienced by an employee arises. This leads to the consideration of a particular higher-order latent variable, *Psychological Capital*, as a possible key antecedent of *Work Engagement*.

### **2.3.2.2 PSYCHOLOGICAL CAPITAL**

Personal resources, as already mentioned in the earlier discussion on the JD-R model, represent a category of particular person-centred latent variables that have been shown to play a role in the psychological mechanism that determines the level of *Work Engagement* that employees' experience (Xanthopoulou, et al., 2007). Various authors have since investigated this proposed influence of personal resources on *Work Engagement*. Xanthopoulou et al. (2007) examined the role that *Self-efficacy*, organisational based *Self-esteem*, and *Optimism* play in explaining variance in *Work Engagement*. In their study among highly skilled Dutch employees, results indicated that engaged employees believe they are able to meet the demands they face in various contexts (they are highly self-efficacious). Engaged employees also possessed the tendency to believe that they will generally experience good outcomes in life (*Optimistic*) and that they are able to satisfy their needs by participating in roles within the organisation (organisation-based *Self-Esteem*). More support for the hypothesised relationship between personal resources and *Work Engagement* can be found in a study amongst female school principals (Bakker, Gierveld & Van Rijswijk, as cited in Bakker & Demerouti, 2008). Results indicated that those principals with the highest levels of personal resources

scored highest on *Work Engagement*. In particular, it was found that *Resilience*, *Optimism* and *Self-Efficacy* were the three personal resources able to explain unique variance in *Work Engagement* scores. The fact that these and other personal resources explain variance in *Work Engagement*, however, still leaves the question unanswered through which psychological process/mechanism they affect *Work Engagement*.

In the current study, the focus is on four particular personal resources, namely *Self-Efficacy*, *Optimism*, *Resiliency* and *Hope*. *Self-Efficacy* is drawn from Bandura's (1997) Social Learning Theory. Bandura (1997) defines *Self-Efficacy* as "...beliefs in one's capabilities to organise and execute the courses of action required to produce given attainments" (p. 3). The current study focuses on job-specific *Self-Efficacy*, rather than general *Self-Efficacy*. Applied to the work context, *Self-efficacy* is defined as "the employee's conviction or confidence about his or her abilities to mobilize the motivation, cognitive resources or courses of action needed to successfully execute a specific task within a given context" (Stajkovic & Luthans, 1998, p. 66). It has been clearly demonstrated that greater efficacy is related to becoming absorbed in the task as well as to expending higher levels of effort and energy to complete a task (Bandura, 1997).

*Optimism* is referred to as a positive assessment of one's social or material future (Tiger, 1979). Put simply, optimists expect good things to happen to them (Carver & Scheier, 2002). In addition to defining optimism in terms of an expectancy framework, Seligman (1998) states that *Optimism* represents an explanatory style used by individual in response to events. Optimists' explanatory style is characterised by ascribing positive outcomes of events to internal, permanent causes and ascribing negative outcomes of events to external, temporary causes. In other word, optimists believe that they are responsible for the positive events in their lives. In general, the optimistic employee will continue to believe in their positive potential regardless of previous experiences (Avey, Wernsing & Luthans, 2008). Optimists are more likely to choose to be psychologically available to the task at hand, as a result of their expectation of a positive outcome (Sweetman & Luthans, 2010). According to Kahn (1990), *Psychological Availability* represents one of the three psychological conditions that influence *Personal Engagement*. As mentioned, although the current study does not support Kahn's conceptualisation of

*Engagement* as personally engaging behaviours (i.e. *Personal Engagement*), the current study assumes that *Personal Engagement* flows from *Work Engagement*. It is therefore assumed that the experience of *Psychological Availability* influences *Work Engagement*.

*Resiliency* refers to an individual's ability to deal with adversity or even dramatic positive events (Luthans, 2002). Resilient individuals are able to 'bounce-back' and adapt after experiencing a disappointing outcome, failure or positive event. The outcome of *Resiliency* is therefore the continuance toward pursuit of a goal (Sweetman & Luthans, 2010). *Resiliency* therefore reduces the likelihood that a stressful event, failure or challenging situation will result in a setback or disengagement from work. In other words, the employee will remain engaged in the task at hand, despite stumbling stones that he/she may come across in the journey toward the pursuit of a particular goal at hand.

*Hope* is defined as a "positive motivational state that is based on an interactively derived sense of successful (1) agency (goal-directed energy) and (2) pathways (planning to meet goals)" (Snyder, Irving & Anderson, 1991, p. 287). In other words, *Hope* involves two components: the motivation to achieve goals (willpower), as well as being able to devise plans to achieve these goals (waypower). According to Sweetman and Luthans (2010), the motivated, persistent pursuit of goals and proactively determined pathways to the goals (i.e. *Hope*) results in an individual who is vigorously dedicated to the goal at hand.

*Self-Efficacy*, *Optimism*, *Resiliency* and *Hope* are unique in their own right, but also share common underlying characteristics. These common characteristics present in all four personal resources are represented by a core, higher-order motivational propensity known as *Psychological Capital (PsyCap)* (Luthans, Avolio, Avey & Norman, 2007a). *PsyCap* is defined as "an individual's positive psychological state of development and it is characterised by: (1) having confidence (*Self-Efficacy*) to take on and put in the necessary effort to succeed at challenging tasks; (2) making a positive attribution (*Optimism*) about succeeding now and in the future; (3) persevering towards goals, and when necessary, redirecting paths to goals (*Hope*) in order to succeed; and (4) when beset by problems and adversity, sustaining and

bouncing back even beyond (*Resiliency*) to attain success” (Luthans, Youssef & Avolio, 2007b, p. 3).

Luthans et al. (2007a) demonstrated that *PsyCap* is more strongly related to desirable outcomes than the individual constructs (*Self-Efficacy*, *Optimism*, *Hope* and *Resiliency*) of which it is comprised. In other words, the combined motivational effects have a greater impact than any one of the constructs individually. Sweetman and Luthans (2010) explain this combined motivational effect by means of an example, stating that if an employee is resiliently able to bounce back from a setback, while also being optimistic, hopeful, and efficacious, the individual will be more motivated to persist and be successful beyond the level at which they were before the adverse event.

The current study therefore proposes that although it has been explained in the earlier discussion that each of the four individual constructs are likely to foster *Work Engagement*, the combined motivational effect (represented by *PsyCap*) is likely to have a greater influence on *Work Engagement* than any one of the constructs individually. The question still remains through which mechanism *PsyCap* affects *Work Engagement*. From the discussions on each of the individual constructs (*Self-Efficacy*, *Optimism*, *Resiliency*, and *Hope*) it is deduced that *PsyCap* is likely to directly influence *Work Engagement*. In addition, however, it is deduced that *PsyCap* is likely to moderate the effect of *Job Characteristics* on *Work Engagement*. It should be noted that although a particular individual construct may have a greater direct influence on *Work Engagement* compared to the other three individual constructs, and although yet another particular individual construct may have a greater influence as a moderator variable compared to the other three constructs, the focus remains on the combined influence of *PsyCap* (which is still likely to be greater than any one of the constructs individually). However, in order to provide a rationale for the propositions made namely that *PsyCap* directly influences *Work Engagement* as well as moderates the effect of *Job Characteristics* on *Work Engagement*, the individual constructs are again discussed, in order to clarify the rationale for the propositions made.

Firstly, the focus is on the proposed direct relationship between *PsyCap* and *Work Engagement*. The first individual construct that serves as an example of the manner

in which *PsyCap* directly influences *Work Engagement* is *Hope*. *Hope* involves two components: the motivation to achieve goals (willpower), as well as being able to devise plans to achieve these goals (waypower). According to Sweetman and Luthans (2010), the motivated, persistent pursuit of goals and proactively determined pathways to the goals (i.e. *Hope*) results in an individual who is vigorously dedicated to the goal at hand (i.e. an individual who is *Engaged*). Secondly, *Resiliency* implies that an individual is likely to remain engaged at the task at hand despite challenges that he/she may come across in the pursuit of a particular goal at hand. These two constructs serve as examples of how the various constructs comprising *PsyCap* may explain why *PsyCap* directly influences *Work Engagement*.

Judge, Bono, Erez and Locke (2005) state that the higher an employee's personal resources (in this case *PsyCap*), the more positive the employee's self-regard and the more goal self-concordance is likely to be experienced. Individuals with goal self-concordance are intrinsically motivated to pursue their goals (Luthans & Youssef, 2007). Intrinsically motivated individuals are likely to express this motivation in the form of increased levels of *Work Engagement*.

The current study therefore proposes that a relationship exists between *PsyCap* and *Work Engagement* as follows:

***Hypothesis 4: In the proposed Work Engagement structural model it is hypothesised that PsyCap positively influences Work Engagement.***

Secondly, the focus is on the proposed moderating effect of *PsyCap*, namely that *PsyCap* is likely to moderate the effect of *Job Characteristics* on *Work Engagement*<sup>10</sup>. It has been argued that a job high on *Job Characteristics* offers potential benefits like experiencing *Meaningfulness*. However, employees will only experience this *Meaningfulness* if they psychologically embrace/accept the offer made by the characteristics of the job (e.g. the offer to have greater *Autonomy* in a particular job). In the current study it is argued that employees will only embrace the offer of increased *Autonomy*, *Feedback*, *Skill Variety*, *Task Identity* and *Task significance* on the job if they perceive that they possess the personal resources that

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<sup>10</sup> Given that *Meaningfulness* is hypothesised to mediate the relationship between *Job Characteristics* and *Work Engagement*, it cannot simply be argued that *PsyCap* moderates the effect of *Job Characteristics* on *Work Engagement*. Instead it needs to be argued whether *PsyCap* moderates the effect of *Job Characteristics* on *Meaningfulness*, or whether *PsyCap* moderates the effect of *Meaningfulness* on *Work Engagement*.

will allow them to effectively use the *Job Characteristics* to respond to the job demands and that will allow them to harvest the growth opportunities offered by the *Job Characteristics*. In other words, employees will only embrace the *Job Characteristics* if they perceive that they have high levels of *PsyCap*. For example, an employee who is self-efficacious is confident about his/her abilities to mobilize the resources or courses of action needed to successfully execute a task. In other words, the employee is confident that he/she possesses the abilities to embrace the offer made by the *Job Characteristics* (e.g. the offer of increased autonomy). Furthermore, for example, an optimist is more likely to choose to be psychologically available to the task at hand, as a result of their expectation of a positive outcome (Sweetman & Luthans, 2010). Being psychologically available is the sense of possessing, amongst others, the psychological resources necessary for investing/embracing the task at hand.

The current study therefore proposes that *PsyCap* acts as a moderator in the *Work Engagement* structural model as follows:

***Hypothesis 5: In the proposed Work Engagement structural model it is hypothesised that the interaction effect between PsyCap and Job Characteristics (PsyCap\*Job Characteristics) positively influences Meaningfulness.***

Thus far, the current study proposes that both *Job Characteristics* and *PsyCap* positively influence *Work Engagement*. The possibility of reciprocal relationships has not yet been considered. Empirical evidence exists in support of a reciprocal relationship between job resources and personal resources (Llorens, Schaufeli, Bakker & Salanova, 2007; Xanthopoulou et al., 2007; Xanthopoulou, Bakker, Demerouti, Schaufeli, 2009). The rationale for the reciprocal relationship between job resources and personal resources is grounded in Conservation of Resources (COR) theory.

The basic tenet of COR theory is that individuals are motivated to obtain, retain and build resources (Hobfoll, 1989). The accumulation of resources is therefore considered to be a pivotal drive that initiates and maintains individual behaviour (Salanova, Schaufeli, Xanthopoulou & Bakker, 2010). In essence, COR theory therefore proposes a model of human motivation. COR theory has two main



assumptions: 1) individuals invest their resources in order to deal with threatening conditions and prevent themselves from negative outcomes, and 2) individuals strive to not only protect their resources, but also to accumulate more resources (Hobfoll, 1989). Furthermore, Hobfoll (2002) states that the existence of current resources tends to generate additional resources. According to Xanthopoulou et al. (2007), if the second assumption of COR theory is implemented in the JD-R model, it can be assumed that the availability of resources would lead to an accumulation of more resources. More specifically, the availability of job resources may lead to the accumulation of more personal resources and the availability of personal resources may also lead to a greater availability of job resources. The current study proposes that a reciprocal relationship exists between *Job Characteristics* and *PsyCap*. This begs the question how characteristics of the job can affect characteristics of the employee? Furthermore, this begs the question how characteristics of the employee can affect characteristics of the job? Firstly, a rationale is presented in support of the influence of *Job Characteristics* on *PsyCap*. Secondly, a rationale is presented in support of the influence of *PsyCap* on *Job Characteristics*.

According to Luthans, Avey, Avolio, Norman and Combs (2006), a resourceful work environment (i.e. an environment that is characterised by high levels of *Job Characteristics*) activates employees' *PsyCap*. The reason for this is that the perceived presence of *Job Characteristics* may lead to employees experiencing a sense of significance; they may feel efficacious, important to the organisation and optimistic about their future. In other words, employees working in a resourceful work environment are likely to feel more competent and valued (and therefore experience enhanced levels of *PsyCap*; Xanthopoulou et al., 2007). This leads to the formulation of the following research hypothesis:

***Hypothesis 6: In the proposed Work Engagement structural model it is hypothesised that Job Characteristics positively influences PsyCap.***

Thus far, a rationale for the influence of *Job Characteristics* on *PsyCap* has been discussed. A rationale for the influence of *PsyCap* on *Job Characteristics* is presented in the discussion to follow. Kohn and Schooler (1982) argue that positive self-evaluations will lead to the conception or formation of more resourceful work environments. In other words, positive self-evaluations (which are the result of high

levels of *PsyCap*) may influence the way in which individuals perceive and react to the work environment. It is important to recall that earlier it was noted that *Job Characteristics* are not objectively determined, but instead represent an employee's perception of the presence of the five core job dimensions. Therefore, if positive self-evaluations may influence the way in which employees perceive their work environment, then positive self-evaluations may influence the perception of the presence of the five core job dimensions. For example, an individual who forms positive evaluations about themselves may believe that they are more capable of controlling their work environment and may have higher levels of *Self-Efficacy*. As a result they may for example perceive the work environment as providing them with more *Autonomy*. This leads to the formulation of the following research hypothesis:

***Hypothesis 7: In the proposed Work Engagement structural model it is hypothesised that PsyCap positively influences Job Characteristics.***

Every employee, equipped with varying degrees of personal resources, is expected to perform the tasks of their particular job. Every job has a set of characteristics, which is likely to influence the employee's attitudes, motivation and behaviour. More specifically, the characteristics of the job and personal resources of the employee are likely to play an important role in the psychological mechanism that determines the level of *Work Engagement*. The question what other key variables exist in the work context that are also likely to influence the level of *Work Engagement* present arises. Robbins and Judge (2010) mention that an organisation needs effective leadership in order to optimise effectiveness. Furthermore, they mention that leaders, and more specifically transformational leaders, are capable of having a profound effect on their followers (Robbins & Judge, 2010). This leads to the consideration and exploration of *Transformational Leadership* as a possible antecedent of *Work Engagement*.

### **2.3.2.3 TRANSFORMATIONAL LEADERSHIP**

Burns (1978) first introduced the concept *Transformational Leadership* to describe the behaviour of political leaders. *Transformational Leadership* in this context was seen as the interplay between leaders and followers, in which each party manages

to increase the others levels of ethics, morality and motivation. Transformational leaders are able to articulate a vision of a “better world” and in doing so they lead followers to believe that they can each make an individual difference and that they should forget about working towards their own rewards, but instead that they should join together in an effort to achieve that “better world”. Transformational leaders therefore inspire followers to be better than they are.

Bass (1985) used Burn’s *Transformational Leadership* concept to describe industrial leaders, rather than political leaders. In the organisational context, transformational leaders are defined as those leaders who inspire followers to transcend their own self-interests for the good of the organisation and who are capable of having a profound effect on their followers (Robbins & Judge, 2010). In sum, it has been argued that *Transformational Leadership* motivates followers to perform beyond expectations (Bass & Bass, 2008). Bass’ (1985) conceptualisation of *Transformational Leadership*, which is the most widely used Transformational Leadership model, involves four sub-dimensions referred to as the 4I’s. These four behaviours that comprise *Transformational Leadership* are as follows: *Idealised Influence*, *Inspirational Motivation*, *Intellectual Stimulation* and *Individualised Consideration*.

*Idealised Influence* refers to the personal charisma the leader possesses and exhibits. *Idealised Influence* centres on leaders who do not act according to self-interest, but rather behave in a manner that is best for the organisation. These behaviours involve providing a vision for the future and a collective sense of purpose. Transformational leaders who exhibit *Idealised Influence* are perceived by their followers as role models who epitomise the vision, goals, and values they promote. Such behaviours inspire followers to trust and identify with the leader. Walumba & Hartnell (2011) agree, stating that *Idealised Influence* behaviours result in followers forming an emotional attachment to and relational identification with the leader. *Inspirational Motivation* involves setting high, yet realistic goals and expressing confidence that followers can achieve these goals. These behaviours lead followers to believe that they can overcome challenges and setbacks and foster *Resiliency* and *Self-Efficacy* beliefs in followers. In other words, *Inspirational Motivation* encourages employees to achieve above and beyond what is expected of them. *Intellectual Stimulation* is the capacity to be able to challenge followers to think

for themselves, take risks and to proactively and innovatively solve problems. The leader is able to do so by enhancing the follower's "conceptualization, comprehension, and discernment of the nature of the problems they face, and their solutions" (Bass, 1985, p. 99). The *Intellectual Stimulation* dimension of *Transformational Leadership* therefore appeals to followers' rational outlook on their work goals, tasks, and problems (Shuck & Herd, 2012). Finally, *Individualised Consideration* is the extent to which leaders pay attention to followers' personal need for achievement, identify with followers, treat them uniquely and provide the necessary compassion and empathy. In doing so, leaders are able to provide the necessary emotional support to help followers develop their potential and are able to establish a personal relationship with their followers. According to Bass (1985), exhibiting *Individualised Consideration* behaviours involves providing individual attention to each follower as well as a developmental/mentoring orientation. In sum, the leader therefore coaches and mentors followers in order to help them continuously achieve their full potential and develop (Shuck & Herd, 2012).

The basic premise underlying *Transformational Leadership* theory is that leaders can arouse followers to high levels of performance by appealing to their values, emotions, attitudes and behaviours (Bass, 1985). *In-Role Performance* and *Extra-Role Performance* represent the most often included behavioural outcomes of *Work Engagement* (Bakker & Demerouti, 2008). The possibility therefore exists that transformational leaders are able to influence followers' levels of *Work Engagement* and as a result arouse followers to high levels of *In-Role Performance* and *Extra-Role Performance*. Various studies have suggested that *Transformational Leadership* has a key role to play in *Work Engagement* (Alban-Metcalf & Alimo-Metcalf, 2008; Macey & Schneider, 2008a). The current study proposes that *Transformational Leadership* influences *Work Engagement*. This still begs the question through which psychological process/mechanism *Transformational Leadership* affects *Work Engagement*.

Kahn (1990) proposes that *Psychological Safety* represents a psychological condition of experience that is a prerequisite for *Engagement* in the Kahn (1990) sense of the term to occur (i.e. that is a prerequisites for personally engaging behaviours to occur). *Psychological Safety* is defined as "feeling able to show and employ one's self without fear of negative consequences to self-image, status, or

career” (Kahn, 1990, p. 708). In other words, employees feel safe when they perceive that they will not suffer for expressing their true selves at work. According to Kahn (1990), employees experience *Psychological Safety* as a result of a supportive and trusting relationship with supervisors in the organisation. May et al., (2004) conducted a research study and found support for this notion. The results of their study demonstrated that supervisors who foster a supportive work environment and who are perceived by followers as trustworthy influenced employees experience of *Psychological Safety*.

Supervisors who foster a supportive work environment typically display concern for their employees’ needs and feelings and encourage employees to develop new skills and solve work-related problems (Deci & Ryan, 1987). A concern for employees’ needs and feelings is characteristic of a leader who displays *Individualised Consideration* (Bass, 1985). Encouraging employees to develop new skills and solve work related problems is characteristic of a leader who displays intellectually stimulating behaviours (Bass, 1985). Therefore, it can be argued that *Transformational Leadership* behaviours will result in a supportive work environment. Furthermore, in terms of trustworthy behaviours, *Transformational Leadership* is highly correlated with trust in the leader (Dirks & Ferrin, 2002). It can therefore be concluded that the relationship between transformational leaders and their followers is one that is characterised by support and trust. In sum, the argument is therefore as follows: Employees experience *Psychological safety* as a result of supportive and trustworthy relationships with supervisors. More specifically, the relationship between transformational leaders and their followers is characterised by support and trust. Therefore, it can be argued that employees experience *Psychological Safety* as a result of *Transformational Leadership*.

According to Kahn (1990) the experience of *Psychological Safety* represents a psychological condition of experience that is a prerequisite for *Engagement* in the Kahn (1990) sense of the term to occur (i.e. that is a prerequisite for personally engaging behaviours to occur). The current study assumes that Kahn’s *Personal Engagement* construct represents a separate behavioural construct that flows from *Work Engagement* (the psychological state of being engaged). Therefore, although Kahn (1990; 1992) argues that *Psychological Safety* influences *Personal Engagement*, assuming that this separate behavioural construct (*Personal*

*Engagement*) is an outcome of *Work Engagement*, it can be argued that *Psychological Safety* drives the extent to which people experience *Work Engagement*, which in turn results in the separate behavioural construct (*Personal Engagement*).

In sum, the above discussion firstly argues that employees experience *Psychological Safety* as a result of *Transformational Leadership*. Secondly, the above discussion argues that *Psychological Safety* influences *Work Engagement*. The current study therefore proposes that *Psychological Safety* mediates the relationship between *Transformational Leadership* and *Work Engagement*. This leads to the formulation of the following hypotheses:

***Hypothesis 8: In the proposed Work Engagement structural model it is hypothesised that Transformational Leadership positively influences Psychological Safety<sup>11</sup>***

***Hypothesis 9: In the proposed Work Engagement structural model it is hypothesised that Psychological Safety positively influences Work Engagement.***

In order to validly understand the structure of the psychological mechanism that creates variance in *Work Engagement*, it is essential to not only understand the relationship between each proposed antecedent and *Work Engagement*, but also to explore the various ways in which these antecedents are richly causally interconnected. *Transformational Leadership* does not only positively influence the level of *Work Engagement* of employees, via *Psychological Safety*. Instead, in addition, the current study proposes that *Transformational Leadership* influences employees' levels of *PsyCap*, which in turn influences *Work Engagement*. In a study conducted by Gooty, Gavin, Johnson, Frazier and Snow (2009), results supported the relationship between followers' perceptions of *Transformational Leadership* and *PsyCap*. In another research study conducted amongst nurses in different health services, results demonstrated that a direct relationship existed between

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<sup>11</sup> As noted in the discussion on *Job Characteristics* (in section 2.3.2.1), it should also be noted here that *Transformational Leadership* is a reflection of an employee's perceptions of *Transformational Leadership*. It is therefore not the objective reality that is important here, but instead the employee's psychological interpretation of reality. Therefore, any reference to *Transformational Leadership* implies followers' perceptions of *Transformational Leadership*.

*Transformational Leadership* and *Work Engagement* (Salanova, Lorente, Chambel and Martinez, 2011). Furthermore, the results revealed that *Transformational Leadership* enhanced nurses' *Self-Efficacy*, which represents one of the four constructs comprising *PsyCap*.

In essence, transformational leaders are able to articulate a vision for the future and provide a higher sense of purpose in their followers. A powerful vision can enable followers to work towards specific goals and believe that they can achieve those goals (*Hope*), form positive evaluations about their future (*Optimism*), have confidence in their own ability to be able to successfully perform those tasks that are tied to the vision (*Self-Efficacy*), and lastly a powerful vision encourages followers to bounce back from adversity because of the belief that a favourable future lies ahead (*Resiliency*) (Gooty, Gavin, Johnson, Frazier & Snow, 2009). This therefore suggests that *Transformational Leadership* positively influences *PsyCap*. In support of this notion, two examples are presented in order to illustrate how various *Transformational Leadership* behaviours are likely to influence *PsyCap*.

The first example focuses on the transformational leader's role modelling behaviour. Transformational leaders who exhibit *Idealised Influence* are perceived by their followers as role models who epitomise the vision, goals, and values they promote (Bass, 1985). Role-modelling demonstrates to followers which behaviours are desirable in order to achieve specific goals, thereby influencing followers *Hope*. Such role modelling further helps to build followers' confidence in their own skills, thereby influencing *Self-Efficacy* beliefs. Followers are also more confident that they will be able to overcome obstacles due to the fact that they have a role-model who can provide them with direction and support in challenging situations. This therefore also enhances followers' *Resiliency*.

The second example focuses on the fact that transformational leaders set high-performance expectations. The *Inspirational Motivation* component of *Transformational Leadership* specifically involves setting high, yet realistic goals and expressing confidence that followers can achieve these goals (Bass, 1985). According to Locke and Latham (1990), challenging goals have a higher motivating potential than unchallenging goals. The motivation to achieve goals (the willpower) represents a component of *Hope*. Leaders who set challenging goals therefore foster

followers *Hope*. Furthermore, a leader who sets high expectations demonstrates that they have confidence in followers' ability to achieve challenging goals and to be able to cope with obstacles that such goals may present. This fosters *Resiliency* and *Self-Efficacy* beliefs in their followers. This in turn influences followers' sense of self-worth, which results in followers forming positive evaluations about their current and future situation (*Optimism*).

These two examples of *Transformational Leadership* behaviours, namely *Idealised Influence* and *Inspirational Motivation*, demonstrate how transformational leaders can increase followers' levels of *Hope*, *Optimism*, *Resiliency* and *Self-Efficacy* (*PsyCap*). This results in the formulation of the following research hypothesis:

***Hypothesis 10: In the proposed Work Engagement structural model it is hypothesised that Transformational Leadership positively influences PsyCap***

Thus far besides for *Transformational Leadership*, the current study has discussed two other latent variables, namely *Job Characteristics* and *PsyCap*, which serve as important antecedents of *Work Engagement*. Furthermore, attempts have been made to explore the various ways in which these latent variables are causally interconnected. The focus is currently on *Transformational Leadership* as an antecedent of *Work Engagement*. It is proposed that *Transformational Leadership* influences *Work Engagement* via *Psychological Safety* (i.e. that *Psychological Safety* mediates the relationship between *Transformational Leadership* and *Work Engagement*). Furthermore, it is proposed that *Transformational Leadership* positively influences *PsyCap*. In addition, the current study proposes that *Transformational Leadership* influences *Job Characteristics*.

In the earlier discussion on *Job Characteristics* as an antecedent of *Work Engagement*, it was noted that *Job Characteristics* in this particular study refers to the employees' perception of the presence/ absence of the five core job dimensions. Griffin (1981) stated that although perceptions of core job characteristics are clearly dependent on structural aspects of the job, job perceptions do not depend exclusively on this. Instead he argued that job perceptions depend on social constructions of the information available to workers at the time they make judgements. Furthermore, he proposed that leaders, in addition to organisational structure, are an important source of information from which job perceptions stem.



Griffin's (1981) argument is clearly in line with Salanick and Pfeffer's (1978) social information processing theory, which proposes that characteristics of a job are "not given but constructed" (p. 227). Salanick and Pfeffer (1987) also noted that supervisors serve as an important source of social information, and that they have a considerable effect on employees' attitudes about their jobs and task.

A limited number of studies have investigated the influence of *Leadership* on perceptions of the job. In the current study, it is proposed that *Transformational Leadership* influences perceptions of the core job dimensions (*Job Characteristics*). Piccolo and Colquitt (2006) conducted a research study in which they found that *Transformational leadership* is indeed associated with the way followers view their jobs in terms of the five core job characteristics. In a similar study, Purvanova, Bono, and Dzieweczynski (2006) also suggested that transformational leaders influence the way followers think about their job in terms of the five core dimensions. Results confirmed the proposed link between *Transformational Leadership* behaviours and employees' perceptions of their jobs.

The four sub-dimension behaviours comprising *Transformational Leadership* may have direct implications for the levels of perceived core characteristics, and can therefore serve as an explanation for the proposed influence of *Transformational Leadership* on *Job Characteristics*. Leaders who challenge followers to think for themselves and innovatively solve problems, which are characteristic behaviours of *Intellectual Stimulation*, are likely to enhance followers' perceptions of *Autonomy* and *Skill Variety*. Leaders who display *Individualised Consideration* behaviours, which involve a developmental/mentoring orientation, are likely to influence employees' perceptions of *Feedback*. Furthermore, leaders who engage in *Idealised Influence* and *Inspirational Motivation* (i.e. leaders who provide a vision for the future, a collective sense of purpose and who express confidence in followers' ability to achieve goals) may enhance followers' perceptions of *Task Significance* (Piccolo & Colquitt, 2006).

It is therefore proposed that *Transformational Leadership* influences *Job Characteristics*. This leads to the formulation of the following research hypothesis:

***Hypothesis 11: In the proposed Work Engagement structural model it is hypothesised that Transformational Leadership positively influences Job Characteristics.***

The current study rests on the assumption that *Work Engagement* is the result of the working of a complex nomological network of person-centred and environmental latent variables. Various person-centred latent variables (*PsyCap*) and environmental latent variables (*Job Characteristics* and *Transformational Leadership*) have been explored as key antecedents of *Work Engagement*. Furthermore, the current study acknowledges that the person and the environment do not explain the level of *Work Engagement* in isolation, but instead that the person interacts with his/her environment. From an interactional viewpoint, this then raises the question whether or not the degree of fit between the person and his/her environment would have an influence on *Work Engagement*? A particular fit construct, *Value Congruence*, is considered relevant in understanding the level of *Work Engagement* present. In the following section *Value Congruence* is explored in greater detail.

#### **2.3.2.4 VALUE CONGRUENCE**

The Person-Environment (P-E) fit theory has been refined to include various forms of fit. Generally, researchers agree that P-E fit consists of four categories of fit: Person-Organisation (P-O) fit, Person-Job (P-J) fit, Person-Group (P-G) fit, and Person-Vocation (P-V) fit (Kristof, 1996). Kristof (1996) noted that P-O fit is broadly defined as the compatibility between individuals and organisations. The importance of P-O fit theory rests on the assumption that when compatibility does indeed exist between a person and an organisation, the person is likely to exhibit more positive attitudes and behaviours (Amos & Weathington, 2008).

Two traditions of research exist with regards to P-O fit. The first tradition focuses on complimentary fit, defined as an occasion when the person's strengths provides what the organisation needs/wants, or vice versa. The second tradition focuses on supplementary fit, which exists when a person and an organisation possess characteristics which are similar or matching (Muchinsky & Monahan, 1987).

Research on supplementary fit is generally concerned with the measurement of the similarity between fundamental characteristics of people and organisations. The most frequently examined fundamental characteristic is *Values* (Kristof, 1996). Many aspects of people and organisations are important in determining behaviour, but *Values* are particularly significant in that they represent a fundamental, relatively stable and enduring aspect of people and organisations (Rokeach, 1973; Chatman, 1989).

*Values* are defined as basic convictions that “a specific mode of conduct or end-state of existence is personally or socially preferable to an opposite or converse mode of conduct or end-state of existence (Rokeach, 1973, p. 5). A similar definition is provided by Schwartz and Bilsky (1987), who define *Values* as “ concepts or beliefs, about desired end states or behaviors, that transcend specific situations, guide selection or evaluation of behavior and events, and are ordered by relative importance” (p. 551). The concept that values are ranked by relative importance is referred to as an individual’s value system (Robbins & Judge, 2010). Cable and Edwards (2004) further add to an understanding of individual values, suggesting that individual values reflect those behavioural standards and desires that are involved in an individual’s self-image. In sum, individual values serve as standards that individuals learn to employ across situations in order to guide their decisions and behaviours. Organisational values on the other hand, demonstrate to employees which behaviours are appropriate and expected in their specific work role within the organisation (Chatman, 1989). Different organisations form around different clusters of values. When an employee’s individual values are similar to (fit) the cultural value system of an organisation, *Value Congruence* exists (Chatman, 1989, Kristof, 1996).

Various research studies have contributed to a greater understanding of *Value Congruence*, and more specifically, its positive effects on attitudes and behaviour. For example, *Value Congruence* has been found to be positively related to employees’ *Job Satisfaction* and *Organisational Commitment* (Amos & Weathington, 2008; Edwards & Cable, 2009; Ostroff, Shin & Kinicki, 2005) and negatively related to *Turnover Intention* (O’Reilly, Chatman & Caldwell, 1991). In spite of the fact that past research has greatly contributed to a better understanding of the *Value Congruence* construct and its positive effects, it appears that research is beset with conceptual as well as methodological problems. Firstly, there appears to be a lack of

consensus with regards to a dominant value framework and more specifically, the content dimensions of values. A second problem relates to the operationalisation and measurement of *Value Congruence*. The current study therefore had to address these challenges.

Schwartz (1992, 1994) proposed a theory of the structure and content of basic individual values. The theory of basic individual values proposes a universal taxonomy of values that distinguishes among ten value types. According to Ros, Schwartz and Surkiss (1999), the typology of values was derived from the following line of reasoning: “in order to cope with the challenges inherent in human existence, groups and individuals translate the needs and demands they experience into concepts about which they can communicate, expressing them in the language of values (p. 51). Furthermore, Schwartz (1992) pointed out that there exist three universal needs/challenges with which all individuals and societies must cope: 1) the needs of individuals as biological organisms, 2) requisites of coordinated social interaction, and 3) the need for the smooth functioning and survival of groups. In other words, values represent responses to or are rooted in these three fundamental individual needs. The ten distinct value types that were derived from these three fundamental human needs, as well as a definition of each value type, are listed in Table 2.1 below.

**Table 2.1*****Definitions of Schwartz's 10 Value Types***

Power	Social status and prestige, control or dominance over people and resources.
Achievement	Personal success through demonstrating competence according to social standards
Hedonism	Pleasure and sensuous gratification for oneself
Stimulation	Excitement, novelty and challenge in life
Self-Direction	Independent thought and action-choosing, creating, exploring
Universalism	Understanding, appreciation, tolerance and protection for the welfare of all people and for nature
Benevolence	Preservation and enhancement of the welfare of people with whom one is in frequent contact
Tradition	Respect, commitment and acceptance of the customs and ideas that traditional culture or religion provides
Conformity	Restraint of actions, inclinations and impulses likely to upset or harm others and violate social expectations or norms
Security	Safety, harmony and stability of society, of relationships, and of self

(Ros, Schwartz & Surkiss, 1999, p. 52)

The total value structure consisting of the ten universal types is organised into two sets of opposing higher-order value types: 1) *Openness to Change* versus *Conservation*, and 2) *Self-Transcendence* versus *Self-Enhancement* (Schwartz, 1992). The first higher-order dimension, *Openness to Change* versus *Conservation*, represents values that emphasise independent action and thought and a readiness for new experiences and change (which consists of *Self-Direction* and *Stimulation* value types) opposed to values that emphasise self-restriction, protection of stability and preservation of order and traditional practices (which consists of *Security*, *Tradition* and *Conformity* value types) The second higher-order dimension, *Self-Transcendence* versus *Self-Enhancement*, represents values that emphasise acceptance of others as equals and concern for the interests and welfare of others (which consists of *Universalism* and *Benevolence* value types) opposed to values that emphasise pursuit of one's self interest and dominance over others (which consists of *Power*, *Achievement*, and *Hedonism* value types).

Initially, the basic individual values theory was derived using data from 40 samples in 20 countries (Schwartz, 1992). Various research studies have since validated the

value taxonomy on the basis of empirical evidence. For example, Schwartz and Sagiv (1995) tested the propositions of the theory of basic universal individual values by examining 88 samples of data from 40 countries. Results revealed that support was found for the 10 value types. In general, various research studies provide substantial support for all ten of the proposed value types, suggesting that they are indeed discriminated in the vast majority of cultures. Furthermore, the four higher-order value types organise values in virtually all societies studied (Ros et al., 1999).

Earlier in this discussion it was mentioned that there appears to be a lack of consensus with regards to a dominant value framework and more specifically, the content dimensions of values. The above discussion on Schwartz's value model seems to contradict this earlier statement, given that empirical findings suggest otherwise, namely that substantial support exists for the universality of the ten basic individual values and the four higher-order value types. Edwards and Shipp (2007) seem to agree on this, pointing out that the value set proposed by Schwartz (1992) is believed to be nearly comprehensive, and as a result it is unlikely that important values will be overlooked while investigating the relationships among values and other variables. However, keeping in mind that the focus of the current study is on *Work Engagement*, it is essential to note that the point made in the earlier discussion with regards to the need for conceptual clarity of *Values*, and more specifically with regards to content dimensions of *Values*, was made with reference to the work context. Although Schwartz's (1992) value model identifies basic individual values, it is a model that has originally been developed for application in the political, religious and environmental domains. In other words, it has been applied in contexts outside of the world of work. For example, research studies have used this value theory to predict and explain how whole value systems relate to various attitudes and behaviours such as religiosity and contact with out-groups (Sagiv & Schwartz, 1995; Schwartz & Huisman, 1995).

Cable and Edwards (2004) agree with the above line of reasoning, mentioning that "although the Schwartz's value scale is useful because it identifies humans' basic values, we could not use it in its original form..." (p. 825). Furthermore, they state that the reason for this is because they sought to study individuals in an organisational context, and Schwartz's scale deals with many dimensions that are not applicable to work organisations (e.g., sample items include 'a spiritual life,'

“national security,” “mature love,” “family security,” and “honouring parents and elders”). In the research conducted by Cable and Edwards (2004), they instead rely on the Work Values Survey (WVS). Likewise, the WVS is utilised in further research on *Value Congruence* (Edwards & Cable, 2009).

The WVS is based on Schwartz’s (1992) value model. The WVS model is organised around the same four higher-order value types (*Openness to Change, Conservation, Self-Transcendence and Self-Enhancement*) identified by Schwartz (1992). However, drawing from the ten universal value types, Edwards and Cable (as cited in Cable & Edwards, 2004) identified eight core work values. These eight values are *Altruism, Relationships with Others, Pay, Prestige, Security, Authority, Variety and Autonomy*. The mapping of Schwartz’s (1992) ten values onto the WVS model values is depicted in Table 2.2 below:

**Table 2.2**

***Mapping of Schwartz’s (1992) Values Model onto the Work Value Survey Model***

Schwartz’s 4 higher-order values	Schwartz’s 10 universal values	8 work values of the WVS
<b>Self-Transcendence</b>	Universalism	Altruism
	Benevolence	Relationships with others
<b>Self-Enhancement</b>	Achievement / Hedonism	Pay
	Power	Prestige
<b>Conservation</b>	Security	Security
	Conformity / Tradition	Authority
<b>Openness to change</b>	Stimulation	Variety
	Self-direction	Autonomy

(Cable & Edwards, 2004)

At the start of this section on *Value Congruence*, the question was raised of whether or not the degree of fit between the person and his/her environment would have an influence on *Work Engagement*, and more specifically the focus then shifted to whether or not *Value Congruence* would have an influence on *Work Engagement*.

However, it was pointed out that in order to explore the possibility of a link between *Value Congruence* and *Work Engagement*, the current study first had to address two challenges/problems with regards to the *Value Congruence* construct. The first challenge was to address conceptual issues. More specifically, the need existed to search for a comprehensive typology of values that would be appropriate in the current work-focussed research study, in order to ensure that only values are included in the taxonomy that are applicable to the world of work. It appears that too many researchers choose to use the Schwartz (Schwartz, 1992) value content dimensions in research on work attitudes and work behaviour without much theoretical and practical consideration as to the pertinence of these dimensions.

Secondly, as already pointed out, existing research on *Value Congruence* is plagued with methodological problems. Thus far, attempts have been made to address issues pertaining to the conceptualisation of *Value Congruence*. Attempts will now be made to address the methodological problems pertaining to the *Value Congruence* construct.

Based on existing fit studies, it is evident that fit/congruence can be assessed in three different ways, resulting in three different types of fit: a) perceived fit, b) subjective fit, and c) objective fit. Perceived fit is assessed when an individual is asked to directly judge the compatibility between himself/herself and the organisation (Kristof-Brown, Zimmerman & Johnson, 2005). An example item of a research study assessing perceived fit is as follows: “the things that I value in life are very similar to those that my organisation values” (Peng, Lee & Tseng, 2014). In other words, in terms of the current study, employees would be asked to directly rate the degree of congruence between their values and the values of the organisation with regards to different salient value dimensions. Secondly, Kristof-Brown et al. (2005) state that subjective fit is when fit is assessed indirectly through the comparison of a person and an organisation as reported by the same person. For example, an employee would be asked to rate how important a particular value is to them and then to separately rate how important they perceive the value to be to the organisation. The fit can then be calculated by comparing the two ratings. Finally, objective fit is when fit is assessed indirectly through the comparison of a person and an organisation as reported by different sources (Kristof-Brown et al., 2005). For example, an employee would be asked to rate how important a particular value is to them and then a



separate source (for example, a leader) would be asked to rate how important the value is to the organisation. Fit can then be calculated by comparing the two ratings.

The first methodological challenge is therefore to decide on the applicable type of fit when assessing *Value Congruence* in the current study. Endler and Magnusson (1976) stated that individual perceptions of a situation are more important and more closely related to attitudes and behaviours than an actual/objective situation. This premise was applied to *Job Characteristics* as well as *Transformational Leadership*, when it was noted that it is not so much the objective reality that is important, but instead the employee's psychological interpretation of reality<sup>12</sup>. It was therefore concluded that in the current study, any reference to *Job Characteristics* or *Transformational Leadership* implies the employee's perception of the presence of these variables. The same assumption therefore applies to *Value Congruence*, which therefore rules out the option of relying on objective fit in the current study. Cable and Edwards (2004) agree, noting that they based their research study on an individual's perceptions of their organisations' values because it can be assumed that individuals can only respond to fit/misfit when they are in fact aware that such misfit exists. Given that objective fit has been ruled out, the decision about the applicable type of fit in the current study is therefore between perceived fit and subjective fit.

In the current study, *Value Congruence* will be assessed using subjective fit. The reason for this is because subjective fit allows for theorising about the nature of congruence. The nature of *Value Congruence* refers to the notion that congruence can exist due to the fact that both the individual's values and organisation's values are high or *Value Congruence* can exist due to the fact that both the individual's values and organisation's values are low (Ostroff, et al., 2005). Ostroff et al. (2005) highlight the importance of considering the nature of congruence, stating that "there is no reason to expect that attitudes like job satisfaction would be just as high when both individual and organisational values are high compared to when they are both low" (p. 595). The same reasoning applies to the current study - there is no reason to expect that *Work Engagement* would be just as high when both individual values and

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<sup>12</sup> It is thereby not denied that the objective reality is not important. The fundamental assumption is that the employee's perception of the objective reality is to some degree an accurate assessment of the reality but that the evaluation of that reality can be significantly different across individuals.

organisational values are high compared to when they are both low. This concept has implications for the method of analysis, and will therefore be discussed in greater detail in the discussion below on the appropriate method of data analysis

The second methodological issue relates to the method of data analysis. The traditional approach to studying the effect of congruence on outcome variables involves operationalising the *Congruence* latent variable by means of difference scores. Under the difference score approach a single latent variable *Congruence* is assumed that is measured by a difference score. The effect of *congruence* on an outcome variable is then studied by studying the relationship between *Congruence* and the outcome variable. Researchers typically rely on simple linear regression analysis as the method of data analysis to determine the amount of variance explained in the outcome variable by the *Congruence* variable (operationalised in terms of a difference score). Edwards and Parry (1993) state that, “for decades research in this area has relied on difference scores, which introduces numerous substantive and methodological problems” (p. 1608). Furthermore, they mention that fortunately procedures such as polynomial regression with response surface analysis are now available that avoid many problems with difference scores. Polynomial regression with response surface analysis is a sophisticated statistical approach that allows researchers to examine the extent to which combinations of two predictor variables relate to an outcome variable (Shanock, Baran, Gentry, Pattison & Heggstad, 2010). Polynomial regression has more explanatory potential and many advantages over traditional difference scores. When studying the effect of congruence between two predictor latent variables from the same domain via polynomial regression the latent variable *Congruence* is no longer measured. Rather the response of an outcome variable to a representative sample of combinations of levels of two latent predictor variables is described via a response surface. The effect of congruence (and incongruence) on an outcome variable is then studied by examining the nature of the response surface in specific regions of the three-dimensional space.

The first disadvantage of using difference scores is that they tend to be less reliable than the scores from which they were calculated. An explanation for this is based on Classic Measurement Theory, which holds the premise that an observed score  $X$  consists of two components, namely a true score and a random error score. The use

of difference scores implies that one would subtract  $X_1$  from  $X_2$ . The implication of this is that the two true score components “cancel each other out” and the relative presence of random error becomes bigger. Based on the above explanation, it is therefore likely that polynomial regression (which allows for a regression analysis using  $X_1$  and  $X_2$ , as opposed to the difference between  $X_1$  and  $X_2$ ) is a more reliable technique (Theron, 2013).

A second, and more important, disadvantage is that difference scores assume that incongruence is the opposite of congruence, rather than arguing that *Congruence* and *Incongruence* are two separate latent variables with separate and possibly differential effects on the outcome variable (Theron, 2013). In other words, difference scores assume that congruence and incongruence lie along a single continuum, whereas polynomial regression assumes two continua (a continuum from ++ congruence to - - congruence and a second continuum from +- incongruence to -+ incongruence). In the above discussion the difference scores assumption that “congruence and incongruence are in fact opposites” is referred to as a disadvantage, in comparison to the polynomial regression assumption that “congruence and incongruence are not opposites.” It has however not been explained why the latter assumption is necessarily superior to the former assumption. In other words, the question is: what are the implications of the assumptions held by each of the two techniques that would justify why one could conclude that the polynomial regression assumption renders the technique superior to the difference scores technique?

The problem with the difference scores assumption is that this assumption implies that whether the congruence exists because the  $X_1$  and  $X_2$  predictor variables are both high (++), or whether it exists because the  $X_1$  and  $X_2$  predictors are both low(- -) does not have a differential effect on the outcome variable. Secondly, this assumption implies that whether the incongruence is because  $X_1$  is substantially larger than  $X_2$  (+-) or whether it is due to  $X_1$  being substantially smaller than  $X_2$  (-+) does not have a differential effect on the outcome variable. These assumptions unnecessarily constrain and simplify the psychological dynamics underpinning the variables that are hypothesised to be affected by congruence. Unlike the difference scores assumption, the polynomial regression assumption implies that the nature of the congruence that exists between  $X_1$  and  $X_2$  can have a differential effect on the

outcome variable (i.e. the effect of ++ is not necessarily the same as --). The assumption further implies that the nature of the incongruence that exists between  $X_1$  and  $X_2$  can have a differential effect on the outcome variable (i.e. the effect of +- is not necessarily the same as -+).

Congruence could be studied by describing the manner in which the outcome variable responds to the correspondence in the levels of  $X_1$  and  $X_2$  via a linear multiple regression equation. The response surface that maps the “behaviour” of the outcome variable in response to the correspondence (or lack of it) in the levels of  $X_1$  and  $X_2$  would then be assumed to be linear. That would, however, unnecessarily constrain the “behaviour” of the outcome variable. The advantage of polynomial regression is that it offers the possibility of describing more intricate response surfaces.

In sum, polynomial regression with response surface analysis represents one of the more fruitful and sensible approaches to study the effect of congruence between two (related) variables on a third outcome variable. This is not only due to the fact that this technique is likely to be a more reliable technique than difference scores, but also because this technique can examine the manner in which different combinations of two predictor variables (++, --, +-, -+) relate to an outcome variable<sup>13</sup>

Besides for the decision on the applicable type of congruence when assessing *Value Congruence* (objective vs. subjective vs. perceived fit) and the decision with regards to the method of analysis (difference scores with simple linear regression analysis vs. polynomial regression with response surface analysis), a final methodological issue still needs to be addressed. This issue relates to the decision of whether to aggregate the various value measures to obtain a total/aggregated score or whether to study each value separately. Stated differently, the researcher has two options: a) to study the effect of *Value Congruence* and *Value Incongruence* on *Work Engagement* where  $X_1$  and  $X_2$  represent overall value indices (total or aggregated scores) based on a number of values, b) to study the effect of *Value Congruence* and *Value Incongruence* on *Work Engagement* separately for each individual value

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<sup>13</sup> In an earlier discussion on the manner in which congruence is assessed, it was decided that in the current study *Value Congruence* will be assessed using subjective fit (as opposed to perceived fit, given that objective fit had already been ruled out). The reason for this relates to this point made here. Subjective fit will allow the researcher to examine the manner in which different combinations of two predictor variables (++, --, +-, -+) relate to an outcome variable. This is not possible when assessing Value Congruence based on perceived fit.<sup>13</sup>

(i.e. to study the effect of *Value Congruence* and *Value Incongruence* on value 1 on *Work Engagement*, the effect of *Value Congruence* and *Value Incongruence* on value 2 on *Work Engagement*, and so forth). Dyląg, Jaworek, Karwowski, Kożusznik and Marek (2013) mention that researchers often use an overall index to measure values based on the aggregation of values. This is a major flaw, as it fails to acknowledge the possibility of differences between particular values with regards to the influence on the outcome variable. In the current study, an overall index will therefore not be calculated for the work values, based on the assumption that each of the value types can potentially influence *Work Engagement* in different ways (i.e., the *Work Engagement* response surface could be different for each value type).

From the discussion thus far, it is evident that the *Value Congruence* construct does indeed pose a number of conceptual and methodological challenges that should not be overlooked. After due consideration, the following has been decided in response to the various challenges: 1) the WVS model (comprising of eight work value types and four higher-order value types) will serve as the value framework in the current study, 2) the current study will rely on subjective fit when assessing *Value Congruence*, 3) the current study will utilise the polynomial regression with response surface analysis technique as the preferred method of data analysis when studying the effect of *Value Congruence* and *Value Incongruence* on *Work Engagement*, and 4) in the current study an overall fit index will not be calculated, but instead the effect of congruence will be studied separately for a particular value type. Finally the focus of this discussion can now shift back to the initial question of whether or not the degree of fit between the person and his/her organisation would have an influence on *Work Engagement*, and more specifically whether or not *Value Congruence* would have an influence on *Work Engagement*.

As mentioned, organisational values demonstrate to employees which behaviours are appropriate and expected in their specific work role within the organisation (Chatman, 1989). In addition however, employees also hold their own beliefs about desired end states or behaviours (i.e. individual values). Cable and Edwards (2004) added that these behavioural standards and desires of the individual (the individual's values) are involved in an individual's self-image. Therefore, when employees perceive that their individual values are congruent with their organisation's values, they perceive that those behaviours that are seen as appropriate and expected by

the organisation in a specific work role are congruent with their own preferred self-images. In other words, if the behaviours that is an authentic expression of the self are in agreement with the behaviours that are seen as appropriate and expected by the organisation, the demonstration of the requisite behaviours becomes a natural expression of the self. According to Kahn (1992), when employees perceive that their work requires certain behaviours which are congruent with how they like to see themselves (i.e. when their work requires behaviours that are a natural expression of the self), it is more likely that they will find their work worthwhile and valuable. It seems reasonable to argue that employees who find their work worthwhile and valuable will be more likely to be willing to invest effort and become involved and engrossed in their work (i.e. *Work Engagement*).

Based on the foregoing line of reasoning, the temptation exists to follow conventional logic and to hypothesise that *Value Congruence* has a positive impact on *Work Engagement*. A hypothesis reflecting such a conventional logic would, however, not reflect the various conceptual and methodological decisions that were made with regards to the manner in which the effect of *Value Congruence* and *Value Incongruence* on *Work Engagement* should be studied.

Firstly, such a hypothesis does not reflect the decision to study the effect of congruence and incongruence separately for each value. The current study conceptualises work values in terms of 8 values and four higher-order value types (i.e. the current study relies on the WVS model framework). The ideal would be to study the congruence between perceived organisational endorsement of a particular value and the employee's endorsement of a particular value, for each of the 8 values. However, due to various constraints (time, model complexity and the implication of model complexity on sample size required), this ideal is not possible in the current study. Nevertheless, the solution is not to resort to the calculation of an overall value index based on the 8 values as this would ignore the assumption made in the current study, namely that each of the values is likely to influence *Work Engagement* in varying degrees. Taking the above into consideration, it was decided that the current study would investigate the effect of congruence and incongruence between the perceived organisational endorsement of one particular higher-order value type and the employee's endorsement of this particular higher-order value type.

The argument has been made that collectively *Value Congruence* is likely to have a positive impact on *Work Engagement*. It should be noted that it is with regret that the impact of each of the higher-order value types on *Work Engagement* cannot be studied. The decision that the current study would investigate the effect of congruence and incongruence between the perceived organisational endorsement of one particular higher-order value type and the employee's endorsement of this particular higher-order value type is, in a sense, a decision that is forced on the study by methodology. It should be made clear that it is not on conceptual grounds first and foremost that a choice is made to study a particular higher-order value in the sense that the other higher-order values are not relevant. However, given the "forced" choice (due to practical constraints such as time, model complexity and the implication of model complexity on sample size required) to restrict the current study to investigating the impact of one higher-order value type on *Work Engagement*, it was decided to focus on the *Self-Transcendence* higher-order value type<sup>14</sup>.

*Self-Transcendence* seems highly appropriate to *Work Engagement*, not to say that the other three higher-order value types are inappropriate. *Self-Transcendence* represents values that emphasise acceptance of others as equals and concern for the interests and welfare of others opposed to values that emphasise pursuit of one's self interest and dominance over others (i.e. *Self-Enhancement*). *Altruism* and *Relationships with others* represent the two first-order values loading on *Self-Transcendence*. Employees/organisations value *Altruism* if the following is important to employees/the organisation: 1) making the world a better place, 2) being of service to society, and 3) contributing to humanity. Furthermore, employees/organisations value *Relationships with others* if the following is important to employees/the organisation: 1) forming relationships with co-workers, 2) getting to know your fellow workers quite well, and 3) developing close ties with co-workers (Cable & Edwards, 2004)

*Work Engagement* has been argued as a result of employees finding meaning in what they do. Frankl (1992) argues that employees have a primary motive to seek

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<sup>14</sup> This decision only has a bearing on the *Work Engagement* structural model. Subsequent analyses will probe the effect of congruence and incongruence on the two first-order values (*Altruism* and *Relationships with others*) loading on the higher-order *Self-Transcendence* on *Work Engagement*.

meaning in life and therefore also in their work. Kahn (1990) stated that people experience *Meaningfulness* when they feel useful and valuable. It seems reasonable to argue that contributing to humanity and making the world a better place is more likely to contribute to feeling useful and valuable, than pursuing one's self interest. Furthermore, Kahn (1990) mentions that employees are likely to experience *Meaningfulness* when their work includes rewarding interpersonal interactions with co-workers. In sum, *Engagement* has been argued as a result of finding meaning (i.e. feeling useful and valuable) in one's work, which seems more likely to be experienced not because of *Self-Enhancement*, but instead because of *Self-Transcendence*.

The argument presented earlier on the role of *Value Congruence* in the psychological mechanism underpinning *Work Engagement* still applies. Organisational values demonstrate to employees which behaviours are appropriate and expected in their specific work role (Chatman, 1989). An organisation that values *Self-Transcendence* is therefore demonstrating to employees that they expect them to behave in a manner that portrays an acceptance of others as equals and that shows that employees have a concern for the interests and welfare of others. As argued, when employees perceive that their work requires certain behaviours which are congruent with their preferred self-images (i.e. when their work requires behaviours that are a natural expression of the self) they are likely to perceive their work as worthwhile and valuable. In other words, employees will perceive their work as worthwhile and valuable when they too, in addition to their organisation, personally value *Self-Transcendence*. Furthermore, it was argued that employees who find their work worthwhile and valuable will be more likely to be willing to invest effort and become involved and engrossed in their work (i.e. *Work Engagement*). Based on the above line of reasoning, the temptation again arises to follow conventional logic and to hypothesise that *Self-Transcendence Congruence* has a positive impact on *Work Engagement*.

The hypothesis should, however, not only reflect the decision to study the effect of congruence and incongruence separately for a particular higher-order value type (*Self-Transcendence*), but more importantly also the fact that *Self-Transcendence Congruence* as such will not be treated as a latent variable but that the response of *Work Engagement* to combinations of levels of the organisations perceived



endorsement of the *Self-Transcendence* value and the employee's endorsement of the same value is described via a response surface.

Latent variable polynomial regression analysis with response surface analysis (i.e. SEM with response surface analysis) allows the researcher to examine the extent to which combinations of two predictor latent variables relate to an outcome latent variable. In the case of congruence, this implies that instead of a single *Congruence* latent variable (*Self-Transcendence Congruence*), two separate predictor latent variables (*Employee Endorsement of Self-Transcendence* and *Perceived Organisational Endorsement of Self-Transcendence*) are hypothesised to influence an outcome variable (*Work Engagement*). The manner these two predictor latent variables affect *Work Engagement* is, however, assumed to be non-linear. To create a non-linear model of the manner these two predictor latent variables affect *Work Engagement* three additional terms have to be created to form the polynomial regression equation, as depicted in equation 1 below:

$$E[\eta_1|\eta_4, \xi_2] = b_0 + b_1\eta_4 + b_2\xi_2 + b_3\eta_4^2 + b_4\eta_4\xi_2 + b_5\xi_2^2 \quad [1]^{15}$$

where:

- $\eta_1$  represents *Work Engagement*;
- $\eta_4$  represents *Employee Endorsement of Self-Transcendence*; and
- $\xi_2$  represents *Perceived Organisational Endorsement of Self-Transcendence*.

Equation 1 represents the hypothesis that the level of *Work Engagement* experienced by employees depends on five effects that each explains unique variance in *Work Engagement* that is not explained by the other four latent effects. Each of the five terms in the above equation therefore represents a separate latent

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<sup>15</sup> The symbols in equation 1 reflect the notation used in the *Work Engagement* structural model. If the concept of polynomial regression with latent variables would be treated in isolation then the latent variables would have been interpreted as two exogenous latent variables. In this case however, the polynomial regression model with latent variables is approached from the perspective of the *Work Engagement* structural model that has been derived from the literature study in which the polynomial regression model is embedded. Since *Employee Endorsement of Self-Transcendence* will subsequently be hypothesised to be influenced by *Transformational Leadership* in the proposed *Work Engagement* structural model, this particular exogenous latent variable (i.e. *Employee Endorsement of Self-Transcendence*) becomes an endogenous latent variable ( $\eta_4$ ).

variable in the proposed *Work Engagement* structural model. Equation 1 clearly indicates that the level of *Work Engagement* is a linear function of these five latent effects. Five separate path-specific substantive hypotheses should therefore be formulated to satisfactorily capture the preceding reasoning rather than the single hypothesis that traditionally would have been formulated (i.e. that *Self-Transcendence Congruence* has a positive impact on *Work Engagement*). The following five path-specific substantive hypotheses are therefore formulated:

***Hypothesis 12: In the proposed Work Engagement structural model it is hypothesised that Employee Endorsement of Self-Transcendence positively influences Work Engagement.***

***Hypothesis 13: In the proposed Work Engagement structural model it is hypothesised that Perceived Organisational Endorsement of Self-Transcendence positively influences Work Engagement.***

***Hypothesis 14: In the proposed Work Engagement structural model it is hypothesised that Squared Employee Endorsement of Self-Transcendence positively influences Work Engagement.***

***Hypothesis 15: In the proposed Work Engagement structural model it is hypothesised that Employee Endorsement of Self-Transcendence\* Perceived Organisational Endorsement of Self-Transcendence positively influences Work Engagement.***

***Hypothesis 16: In the proposed Work Engagement structural model it is hypothesised that Squared Perceived Organisational Endorsement of Self-Transcendence positively influences Work Engagement.***

As mentioned, latent variable polynomial regression with response surface analysis is a technique that allows the researcher to examine the manner in which different combinations of two predictor latent variables (++, --, +-, -+) relate to an outcome latent variable. In other words, this technique allows one to take a closer look at the manner in which *Work Engagement* responds to combinations of levels of the organisations perceived endorsement of the *Self-Transcendence* value and the employee's endorsement of the same value (i.e. to "zoom in" on the nature of *Work Engagement* response surface) in order to paint a more detailed picture (on a 3-

dimensional response surface graph) of the influence of congruence and incongruence between the organisation's perceived endorsement of the *Self-Transcendence* value and the employee's endorsement of the same value on *Work Engagement*. It is more specifically the response surface analysis that permits the more detailed examination of the manner *Work Engagement* responds to combinations of levels of the organisations perceived endorsement of the *Self-Transcendence* value and the employee's endorsement of the same value. The core of the response surface analysis is firstly to plot the response surface in three-dimensions (which produces a response surface graph/pattern) and secondly to calculate four response surface test values ( $a_1 - a_4$ ; Shanock et al., 2010). The characteristics of the response surface, which represents a 3-dimensional detailed picture of the influence of congruence and incongruence between the organisation's perceived endorsement of the *Self-Transcendence* value and the employee's endorsement of the same value on *Work Engagement*, is examined in terms of the response surface test values ( $a_1-a_4$ ).

Four characteristics of the response surface are of particular interest: 1) the slope of the line of congruence ( $a_1$ ), 2) the curvature along the line of congruence ( $a_2$ ), 3) the slope of the line of incongruence ( $a_3$ ), and 4) the curvature along the line of incongruence ( $a_4$ ; Shanock et al., 2010). The slope of the line of congruence indicates the direction of the response (positive or negative) of an outcome variable (*Work Engagement*) to changes in congruence along the line of congruence from - - congruence to ++ congruence. The curvature along the line of congruence indicates the nature of the response (convex or concave) of *Work Engagement* to changes in congruence along the line of congruence from 00 outward to - - congruence and from 00 outward to ++ congruence. The slope of the line of incongruence indicates the direction of the response of *Work Engagement* to changes in incongruence along the line of incongruence from - + incongruence to +- incongruence. The curvature along the line of incongruence indicates the nature of the response of *Work Engagement* to changes in incongruence along the line of incongruence from 00 outward to +- incongruence and from 00 outward to +- incongruence (Theron, 2013). Therefore, in addition to investigating the influence of congruence and incongruence between the organisation's perceived endorsement of the *Self-Transcendence* value and the employee's endorsement of the same value on *Work Engagement* in the

proposed *Work Engagement* structural model by testing hypotheses 12, 13, 14, 15, and 16, this influence is further investigated by testing hypotheses on the slope and the curvature of the *Work Engagement* response surface along the lines of congruence and incongruence.

*Work Engagement* has been hypothesised in terms of earlier theorising to be high when the employee perceives the organisation to endorse the *Self-Transcendence* value and the employee also endorses the value. No explicit consideration has been given to the - - scenario where employee and organisation are in concord in their opposition of the *Self-Transcendence* value. A dog-eats-dog environment in which the pursuit of one's self interest and dominance over others (i.e. *Self-Enhancement*) is accepted as the norm does not at first glance appear to be conducive to high *Work Engagement*. It could, however, be argued that essentially the same psychological mechanism that operates in the ++ scenario also operates in the - - scenario. If the behaviours that is an authentic expression of the self are in agreement with the behaviours that are seen as appropriate and expected by the organisation, the demonstration of the requisite behaviours becomes a natural expression of the self. It therefore seem reasonable to argue that investing the self in work (i.e., *Work Engagement*) therefore becomes more likely as the degree of fit or congruence between the values that define the self and the values that define the organisation increases. However, it seems likely that *Work Engagement* would be higher when both the employee and the organisation endorse *Self-Transcendence* than when the employee and the organisation oppose *Self-Transcendence* (i.e. endorse *Self-Enhancement*). This argument lies in the merits of the value itself (i.e. lies in the benefits of endorsing *Self-Transcendence*). In terms of earlier theorising, *Work Engagement* has been argued as a result of employees finding meaning (i.e. feeling useful and valuable) in their work, which seems more likely to be experienced not because of valuing *Self-Enhancement*, but instead because of valuing *Self-Transcendence*. The dog-eats-dog environment in which the pursuit of one's self interest and dominance over others (i.e. *Self-Enhancement*) is accepted as the norm appears to create conditions that seem less optimal for *Work Engagement* to occur. Neither has explicit consideration been given to the - + and + - scenarios where employee and organisation are in discord in their endorsement of the *Self-Transcendence* value. When the employee endorses the *Self-Transcendence* value

but the organisation is perceived not to endorse the same value, *Work Engagement* should be at its lowest (the + - scenario). If the behaviours that are seen as appropriate and expected by the organisation conflict with the behaviours that are an authentic expression of the self, investing the self in work (i.e., *Work Engagement*) therefore becomes very unlikely. When the organisation is perceived to endorse the *Self-Transcendence* value but the employee does not (the - + scenario), *Work Engagement* should be low but not as low as under the + - scenario.

This line of reasoning suggests a *Work Engagement* response surface that for which the following two hypotheses are true:

***Hypothesis 17: In the proposed Work Engagement structural model it is hypothesised that a) Work Engagement changes positively along the line of congruence as congruence moves from low Employee Endorsement of Self-Transcendence and low Perceived Organisational Endorsement of Self-Transcendence to high Employee Endorsement of Self-Transcendence and high Perceived Organisational Endorsement of Self-Transcendence, and b) Work Engagement changes convexly along the line of congruence as congruence moves from 00 outwards to low Employee Endorsement of Self-Transcendence and low Perceived Organisational Endorsement of Self-Transcendence and from 00 outward to high Employee Endorsement of Self-Transcendence and high Perceived Organisational Endorsement of Self-Transcendence.***

***Hypothesis 18: In the proposed Work Engagement structural model it is hypothesised that a) Work Engagement changes negatively along the line of incongruence as incongruence moves from low Employee Endorsement of Self-Transcendence and high Perceived Organisational Endorsement of Self-Transcendence to high Employee Endorsement of Self-Transcendence and low Perceived Organisational Endorsement of Self-Transcendence, and b) Work Engagement changes concavely along the line of incongruence as incongruence moves from 00 outward to low Employee Endorsement of Self-Transcendence and high Perceived Organisational Endorsement of Self-Transcendence and from 00 outward to high Employee Endorsement of Self-***

### ***Transcendence and low Perceived Organisational Endorsement of Self-Transcendence.***

In the current study the focus in the *Work Engagement* structural model is only on the influence of congruence and incongruence in *Self-Transcendence* on *Work Engagement*. *Self-Transcendence* represents values that emphasise acceptance of others as equals and concern for the interests and welfare of others (which consists of *Altruism* and *Relationships with others* values; Cable & Edwards, 2004). In order to gain a greater understanding of the relationship between congruence and incongruence in *Self-Transcendence* and *Work Engagement*, the current study attempts to paint a more detailed picture (on a 3-dimensional response surface graph) of this relationship. In order to do so, it was decided that polynomial regression with response surface analysis will be conducted for each of the two first-order values (*Altruism* and *Relationships with others*) loading on the higher-order *Self-Transcendence* value type.

In sum, this study therefore involves testing three structural models. Although the primary focus is on the development and empirical testing of a comprehensive explanatory *Work Engagement* structural model, two additional structural models with a narrower focus will also be tested. The first narrow-focus structural model depicts the manner in which the congruence and incongruence in the employee's perception of the degree to which the organisation endorses the *Altruism* value and the employees own endorsement of the *Altruism* value affects *Work Engagement*. The second narrow-focus structural model depicts the manner in which the congruence and incongruence in the employee's perception of the degree to which the organisation endorses the *Relationships with others* value and the employees own endorsement of the *Relationships with others* value affects *Work Engagement*.

Therefore, in addition to testing hypotheses on the slope and the curvature of the *Work Engagement* response surface along the lines of *Self-Transcendence* congruence and *Self-Transcendence* incongruence, the influence of congruence and incongruence in the employee's perception of the degree to which the organisation endorses the *Altruism* value and the employee's own endorsement of the *Altruism* value on *Work Engagement* is investigated by testing hypotheses on the slope and curvature of the *Work Engagement* response surface along the lines of *Altruism*

congruence and *Altruism* incongruence. Furthermore, the influence of congruence and incongruence in the employee's perception of the degree to which the organisation endorses the *Relationships with others* value and the employee's own endorsement of the *Relationships with others* value on *Work Engagement* is investigated by testing hypotheses on the slope and curvature of the *Work Engagement* response surface along the lines of *Relationships with others* congruence and *Relationships with others* incongruence.

The line of reasoning presented above that lead to the formulation of hypotheses on the slope and curvature of the *Work Engagement* response surface along the lines of *Self-Transcendence* congruence and *Self-Transcendence* incongruence still applies. *Work Engagement* has been hypothesised in terms of earlier theorising to be high when the employee perceives the organisation to endorse the *Self-Transcendence* value and the employee also endorses the value. Given that *Altruism* and *Relationships with others* represent the two first-order values that load on the higher-order *Self-Transcendence* value type, it seems reasonable to hypothesise that *Work Engagement* will be high when the employee perceives the organisation to endorse the *Altruism/Relationships with others* value and the employee also endorses the value. Furthermore, it is argued that the same psychological mechanism that operates in the ++ scenario also operates in the - - scenario. In other words, if the organisation is perceived not to endorse *Altruism/Relationships with others* and the employee also does not endorse *Altruism/Relationships with others*, the behaviours that are an authentic expression of the self are still in agreement with the behaviours that are seen as appropriate and expected by the organisation. *Work Engagement* therefore becomes more likely as the degree of fit of congruence between the values that define the self and the values that define the organisation increases. However, it seems likely that *Work Engagement* would be higher when both the employee and the organisation endorse *Altruism/Relationships with others* than when the employee and the organisation oppose *Altruism/Relationships with others*. This assumption is based on earlier theorising about the benefits of endorsing the *Altruism* value and *Relationships with others* value. In terms of earlier theorising, *Work Engagement* has been argued as a result of employees finding meaning (i.e. feeling useful and valuable) in their work. It seems reasonable to argue that contributing to humanity and making the world a better place (i.e. *Altruism*) is more likely to contribute to

feeling useful and valuable, than pursuing one's self interest. Furthermore, Kahn (1990) argues that employees are likely to experience *Meaningfulness* when their work includes rewarding interpersonal interactions with co-workers. In other words, it seems reasonable to argue that valuing *Relationships with others* is more likely to contribute to feeling useful and valuable, than valuing dominance over other people. A situation in which neither the organisation is perceived to value *Altruism/Relationships with others* or the employee values *Altruism/ Relationships with others* (the - - scenario) therefore appears to create conditions that seem less optimal for *Work Engagement* to occur than a situation in which both the employee and the organisation is perceived to endorse *Altruism/Relationships with others*.

Explicit consideration must also be given to the - + and + - scenarios where employee and organisation are in discord in their endorsement of the *Altruism/Relationships with others* value. When the employee endorses the *Altruism/Relationships with others* value but the organisation is perceived not to endorse the same value, *Work Engagement* should be at its lowest (the + - scenario). If the behaviours that are seen as appropriate and expected by the organisation conflict with the behaviours that are an authentic expression of the self, investing the self in work (i.e., *Work Engagement*) therefore becomes very unlikely. When the organisation is perceived to endorse the *Altruism/Relationships with others* value but the employee does not (the - + scenario), *Work Engagement* should be low but not as low as under the + - scenario.

This line of reasoning suggests a *Work Engagement* response surface that for which the following four hypotheses are true:

***Hypothesis 20<sup>16</sup>: In the proposed Altruism Value Congruence Work Engagement structural model it is hypothesised that a) Work Engagement changes positively along the line of congruence as congruence moves from low Employee Endorsement of Altruism and low Perceived Organisational Endorsement of Altruism to high Employee Endorsement of Altruism and high***

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<sup>16</sup> The numbering of hypothesis 20 does not sequentially follow the previous hypothesis (hypothesis 18). The reason for this is due to the fact that hypothesis 19 represents the overarching substantive research hypotheses namely that the *Altruism Value Congruence Work Engagement* structural model provides a valid account of the psychological process that determines the levels of *Work Engagement*.



***Perceived Organisational Endorsement of Altruism, and b) Work Engagement changes convexly along the line of congruence as congruence moves from 00 outwards to low Employee Endorsement of Altruism and low Perceived Organisational Endorsement of Altruism and from 00 outward to high Employee Endorsement of Altruism and high Perceived Organisational Endorsement of Altruism.***

***Hypothesis 21: In the proposed Altruism Value Congruence Work Engagement structural model it is hypothesised that a) Work Engagement changes negatively along the line of incongruence as incongruence moves from low Employee Endorsement of Altruism and high Perceived Organisational Endorsement of Altruism to high Employee Endorsement of Altruism and low Perceived Organisational Endorsement of Altruism, and b) Work Engagement changes concavely along the line of incongruence as incongruence moves from 00 outward to low Employee Endorsement of Altruism and high Perceived Organisational Endorsement of Altruism and from 00 outward to high Employee Endorsement of Altruism and low Perceived Organisational Endorsement of Altruism.***

***Hypothesis 23<sup>17</sup>: In the proposed Relationships with others Value Congruence Work Engagement structural model it is hypothesised that a) Work Engagement changes positively along the line of congruence as congruence moves from low Employee Endorsement of Relationships with others and low Perceived Organisational Endorsement of Relationships with others to high Employee Endorsement of Relationships with others and high Perceived Organisational Endorsement of Relationships with others, and b) Work Engagement changes convexly along the line of congruence as congruence moves from 00 outwards to low Employee Endorsement of Relationships with others and low Perceived Organisational Endorsement of Relationships with others and from 00 outward to high Employee Endorsement of Relationships***

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<sup>17</sup> The numbering of hypothesis 23 does not sequentially follow the previous hypothesis (hypothesis 21). The reason for this is due to the fact that hypothesis 22 represents the overarching substantive research hypotheses namely that the *Relationships with others Value Congruence Work Engagement* structural model provides a valid account of the psychological process that determines the levels of *Work Engagement*.

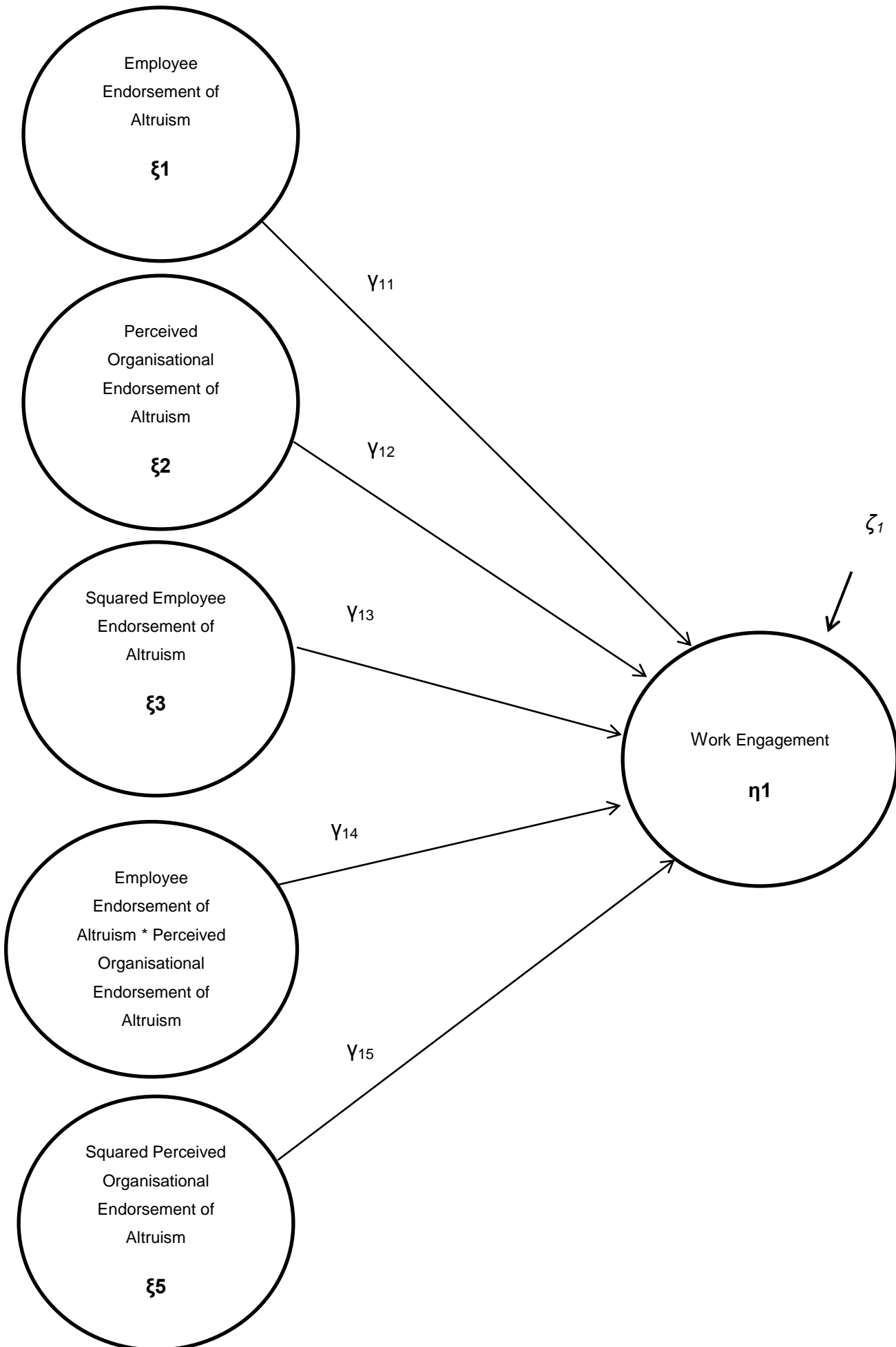
***with others and high Perceived Organisational Endorsement of Relationships with others.***

***Hypothesis 24: In the proposed Relationships with others Value Congruence Work Engagement structural model it is hypothesised that a) Work Engagement changes negatively along the line of incongruence as incongruence moves from low Employee Endorsement of Relationships with others and high Perceived Organisational Endorsement of Relationships with others to high Employee Endorsement of Relationships with others and low Perceived Organisational Endorsement of Relationships with others, and b) Work Engagement changes concavely along the line of incongruence as incongruence moves from 00 outward to low Employee Endorsement of Relationships with others and high Perceived Organisational Endorsement of Relationships with others and from 00 outward to high Employee Endorsement of Relationships with others and low Perceived Organisational Endorsement of Relationships with others.***

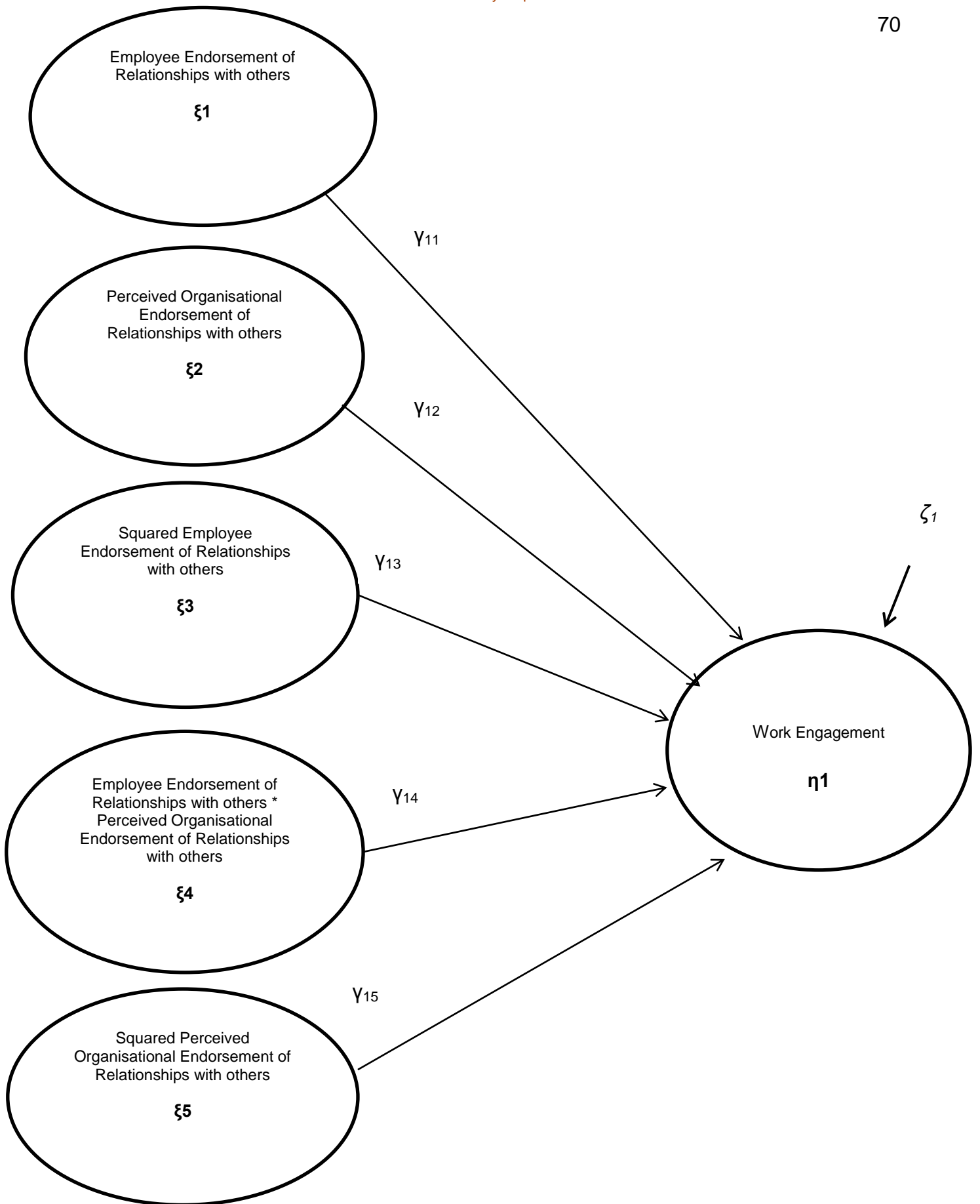
The two narrow-focus structural models are depicted in Figure 2.3 and Figure 2.4. The current study was forced to evaluate separate structural models because of the statistical power and sample size implications if the first-order values were simultaneously included in the comprehensive structural model. The explanatory *Work Engagement* structural model will be tested via structural equation modelling (SEM) and response surface analysis. The two narrow-focus structural models will be tested via polynomial regression with response surface analysis<sup>18</sup>. Structural equation modelling and polynomial regression with response surface analysis will be discussed in detail in Chapter 3.

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<sup>18</sup> If the explanatory *Work Engagement* structural model will be tested via structural equation modelling (SEM) and response surface analysis, the question arises why not test the two narrow-focus structural models via polynomial regression with response surface analysis as well as via SEM with response surface analysis. It is not denied that fitting structural equation models yet again (in addition to fitting the explanatory *Work Engagement* structural model via SEM) for the two narrow-focus models would be the more meaningful route to go. Even more so, it is recommended that subsequent research should consider testing the two narrow-focus structural models via polynomial regression with response surface analysis as well as via SEM with response surface analysis. However, the current study is quite extensive as it is. Therefore due to practical considerations, the two narrow-focus structural models will not be tested via SEM and response surface analysis in addition to testing the narrow-focus structural models via polynomial regression with response surface analysis, in an attempt to restrict the study to manageable terms.<sup>18</sup>



**Figure 2.3.**The Altruism Value Congruence Work Engagement Structural Model



**Figure 2.4. The Relationships with others Value Congruence Work Engagement Structural Model**

Thus far, this section on *Value Congruence* has focused on the influence of *Value Congruence* on *Work Engagement*. In addition, the current study proposes that *Transformational Leadership* influences the employee's endorsement of the *Self-Transcendence* value and through that the extent to which the employee's endorsement of this value is congruent with the employee's perception of the extent to which the organisation endorses the value. A rationale is presented in support of the proposed link.

*Value Congruence* may be the outcome of an organisation's recruitment and selection of personnel or alternatively *Value Congruence* may also develop during the time in which an employee gradually socialises into an organisation (Verplanken, 2004). In the current study, it is proposed that transformational leaders play an important role in the latter process, namely in the development of *Value Congruence* between employees and the organisation over time. Transformational leaders are perceived by their followers as role models who epitomise the vision, goals, and values they promote (Bass, 1985). Furthermore, transformational leaders do not act according to self-interest, but rather behave in a manner that is best for the organisation. If transformational leaders epitomise the values they promote, and furthermore if they act in a manner that is best for the organisation rather than acting according to self-interest, then it can be assumed that these values that they promote are indeed in line with the values of the organisation.

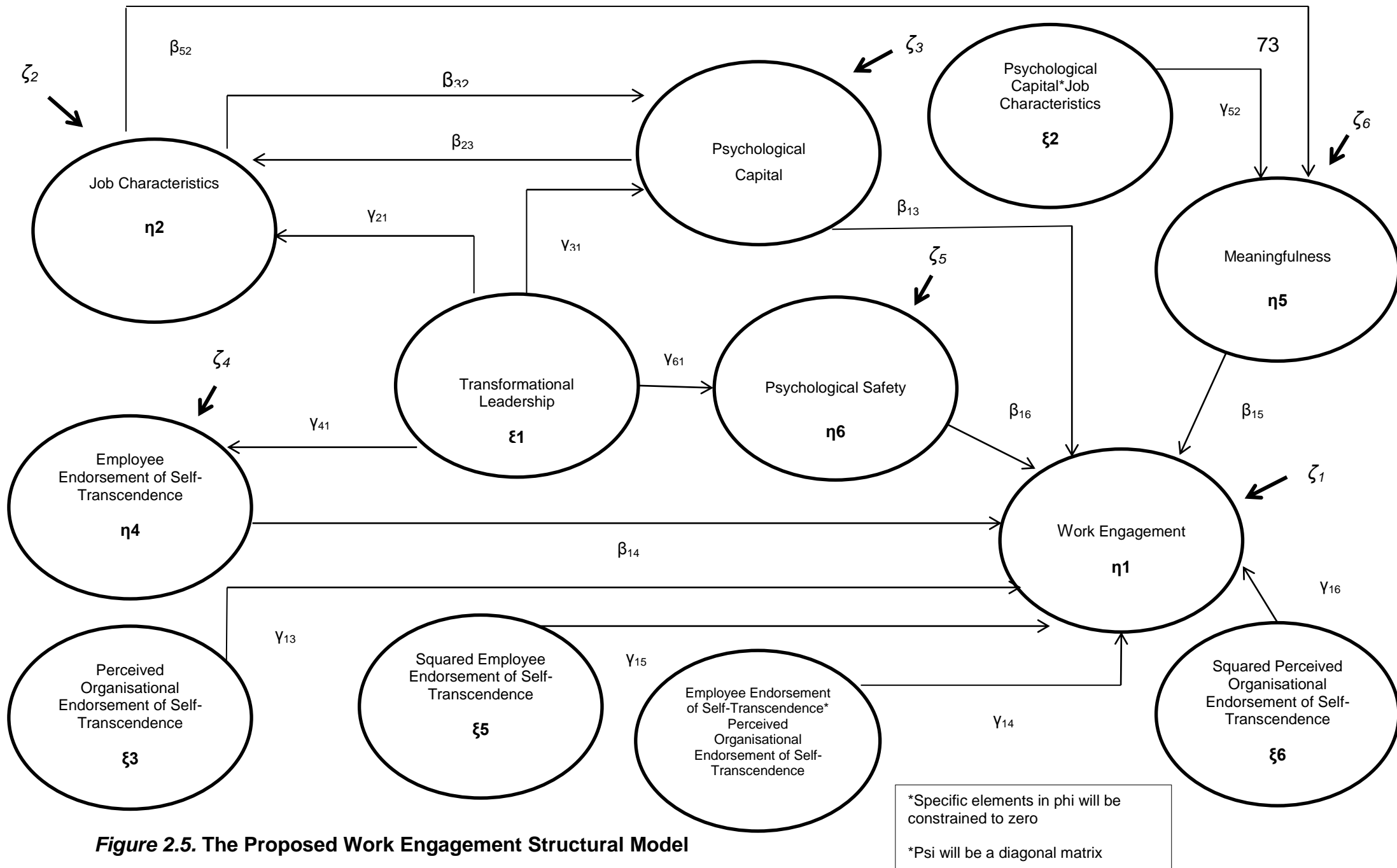
Bass (1985) suggests that transformational leaders are able to arouse followers to greater levels of performance by appealing to their values, emotions, attitudes and behaviours. This highlights the assumption that transformational leaders have a certain influence on followers' values. According to Jung and Avolio (2000), transformational leaders transfer their collective-focused values to followers. In other words, followers of transformational leaders are likely to align their own values with those of the leader. It has however been reasoned that it can be assumed that transformational leaders' values are in line with the organisation's values. Therefore it can be concluded that if followers of transformational leaders are likely to align their own values with those of the leader, then in essence they are in fact aligning their own values with the values of the organisation.

Based on the above line of reasoning, it is proposed that *Transformational Leadership* is positively related to *Employees Endorsement of Self-Transcendence*. This therefore leads to the formulation of the following research hypothesis:

***Hypothesis 25: In the proposed Work Engagement structural model it is hypothesised that Transformational Leadership positively influences Employee Endorsement of Self-Transcendence.***

## **2.4 THE PROPOSED WORK ENGAGEMENT STRUCTURAL MODEL**

The literature study presented above culminates into a structural model, which represents a schematic representation of the hypotheses that have been constructed as an answer to the research initiating question through theorising. The proposed structural model assumes that *Work Engagement* is a specific affective-cognitive psychological state that is related to specific antecedents. The model identifies specific antecedents that are hypothesised to underlie *Work Engagement* and hypothesises the manner in which they structurally combine to form the psychological mechanism that determines the level of *Work Engagement* that employees achieve. Once the latent variables are operationalised the model allows for the formulation and empirical testing of specific hypotheses. If close fit is obtained for the model (i.e. that the model at least closely approximates reality), the model serves as a guideline for designing and implementing practical human resource interventions aimed at enhancing employees' levels of *Work Engagement*. The proposed *Work Engagement* structural model is depicted in Figure 2.5 below:



**Figure 2.5. The Proposed Work Engagement Structural Model**

## CHAPTER 3

### RESEARCH METHODOLOGY

#### 3.1 INTRODUCTION

“In the world of science our aim is to generate truthful (valid/plausible) descriptions and explanations of the world” (Babbie & Mouton, 2001, p. 7). This striving to find valid and credible (truthful) explanations of phenomena in nature represents the epistemic ideal of science.

The literature study in Chapter 2 presented a systematic, reasoned argument through theorising in response to the research initiating question formulated in Chapter 1. The literature study culminated in an answer to the research initiating question in the form of a *Work Engagement* structural model, presented in Figure 2.5. The structural model is a schematic representation of the overarching substantive hypothesis and the path-specific substantive hypotheses that have been constructed as a tentative answer in response to the research initiating question through theorising. Science insists that the predictions made by the research hypotheses (schematically depicted in the form of a structural model) should be empirically tested in order to establish their validity. The structural model can be considered valid (i.e. permissible) to the extent that the comprehensive model closely fits the available empirical data<sup>19</sup>. The current study therefore intends to empirically test the proposed *Work Engagement* structural model. The validity and credibility of the implicit claim of the study to come to the correct verdict on the fit of the structural model does however depend on the methodology used to arrive at the verdict. The research methodology should therefore be designed in such a manner to serve the epistemic ideal of science. Objectivity and rationality are two characteristics of science that serve the epistemic ideal. Science is objective in the

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<sup>19</sup> This inference is dependent on a finding that the operationalisation of the latent variables comprising the structural model was successful. The operationalisation of the latent variables comprising the structural model will be considered successful if the measurement model fits the data, the factor loadings are statistically significant ( $p < .05$ ) and large and the measurement error variances are small albeit statistically significant.



sense that it is explicitly and purposely focused on the reduction of error. Science is rational in the sense that it insists on methodological choices been opened up to careful inspection by knowledgeable peers (Babbie & Mouton, 2001). The aim of the current chapter, Research Methodology, is firstly to derive a research method through which the explanatory *Work Engagement* structural model will be empirically tested that minimises the chances of coming to an incorrect verdict on the research hypotheses that emanated via theorising from the literature study. The aim of the current chapter is, however, also to provide a sufficiently detailed description of the methodological choices that were made and the arguments underpinning these choices to allow scientific rationality to operate. If very little of the methodology used is explicitly stated, then there is no way of evaluating the merits of the researcher's conclusions with regards to the extent to which the structural model closely fits the empirical data. As a result, the epistemic ideal of science suffers (Babbie & Mouton, 2001).

However, although the primary focus of the current study is on the development and empirical testing of a comprehensive explanatory *Work Engagement* structural model, two additional structural models with a narrower focus will also be tested. In the *Work Engagement* structural model the focus is on the manner in which congruence and incongruence in *Self-Transcendence* affects *Work Engagement* when forming part of a larger explanatory structural model including other latent variables hypothesised to influence *Work Engagement*. In order to gain a greater understanding of the manner in which congruence and incongruence in *Self-Transcendence* affects *Work Engagement* when included in a larger structural model, the current study attempts to paint a more detailed picture (on a 3-dimensional response surface graph) of this relationship. In addition, it was decided that observed score polynomial regression with response surface analysis will be conducted for each of the two first-order values (*Altruism* and *Relationships with others*) loading on the higher-order *Self-Transcendence* value type. The current study was forced to evaluate separate structural models because of the statistical power and sample size implications if the first-order values were simultaneously included in the comprehensive *Work Engagement* structural model.

In sum, the current study therefore involves testing three structural models: 1) the comprehensive *Work Engagement* structural model, 2) the narrow-focus *Altruism*

*Value Congruence Work Engagement* structural model, and 3) the narrow-focus *Relationships with others Value Congruence Work Engagement* structural model. The current chapter will therefore attempt to comprehensively describe and motivate the research methodology used in the current study to test all three structural models. This will allow knowledgeable peers to identify methodological flaws and to point out the implications of these for the validity of conclusions. More specifically, the focus of this chapter is on a) clearly stating the substantive research hypotheses, b) deciding on an appropriate choice of research design, c) developing statistical hypotheses, d) deciding on an appropriate sampling size and sampling procedure, e) choosing appropriate measurement instruments with which to operationalise the latent variables, f) deciding on the manner in which the items of the chosen measuring instruments will represent the latent variables via indicator variables, and g) discussing the appropriate statistical analyses.

### **3.2 SUBSTANTIVE RESEARCH HYPOTHESES**

The positivistic interpretation of scientific research insists that substantive hypotheses should be subjected to empirical testing. This implies that if a scientist holds a particular belief that something is indeed so, then this belief must be checked against objective reality (i.e. the belief must be subjected to empirical testing; Kerlinger & Lee, 2000). However, in order to empirically test this belief, the scientist needs to make known what it is that he/she believes. This highlights the importance of hypotheses, which represent tentative predictions/propositions (“beliefs”) about the relation between two or more phenomena or variables. In other words, formulating and clearly stating hypotheses is an essential part of science in that it allows the scientist to empirically test his/her beliefs. Kerlinger and Lee (2000) state that “it is hard to conceive modern science in all its rigorous and disciplined fertility without the guiding light and power of hypotheses” (p. 34).

The proposed *Work Engagement* structural model presented in Figure 2.5 schematically portrays the hypotheses developed through theorising in Chapter 2. These hypotheses, formulated in terms of latent variables, are substantive research hypotheses. Substantive research hypotheses, strictly speaking, are not testable.

Substantive research hypothesis must first be translated into operational terms. Developing substantive research hypotheses through theorising is however an essential first step toward the empirical testing of the *Work Engagement* structural model.

The first over-arching substantive research hypothesis (**Hypothesis 1**) in the current study is that the *Work Engagement* structural model depicted in Figure 2.5 provides a valid account of the psychological process that determines the levels of *Work Engagement*. This first over-arching substantive research hypothesis can be dissected into the following more detailed, specific direct-effect substantive research hypotheses:

**Hypothesis 2:** In the proposed *Work Engagement* structural model it is hypothesised that *Job Characteristics* positively influences *Meaningfulness*.

**Hypothesis 3:** In the proposed *Work Engagement* structural model it is hypothesised that *Meaningfulness* positively influences *Work Engagement*.

**Hypothesis 4:** In the proposed *Work Engagement* structural model it is hypothesised that *PsyCap* positively influences *Work Engagement*.

**Hypothesis 5:** In the proposed *Work Engagement* structural model it is hypothesised that the interaction effect between *PsyCap* and *Job Characteristics* ( $PsyCap * Job\ Characteristics$ ) positively influences *Meaningfulness*.

**Hypothesis 6:** In the proposed *Work Engagement* structural model it is hypothesised that *Job Characteristics* positively influences *PsyCap*.

**Hypothesis 7:** In the proposed *Work Engagement* structural model it is hypothesised that *PsyCap* positively influences *Job Characteristics*.

**Hypothesis 8:** In the proposed *Work Engagement* structural model it is hypothesised that *Transformational Leadership* positively influences *Psychological Safety*.

**Hypothesis 9:** In the proposed *Work Engagement* structural model it is hypothesised that *Psychological Safety* positively influences *Work Engagement*.

**Hypothesis 10:** In the proposed *Work Engagement* structural model it is hypothesised that *Transformational Leadership* positively influences *PsyCap*.

**Hypothesis 11:** In the proposed *Work Engagement* structural model it is hypothesised that *Transformational Leadership* positively influences *Job Characteristics*.

**Hypothesis 12:** In the proposed *Work Engagement* structural model it is hypothesised that *Employee Endorsement of Self-Transcendence* positively influences *Work Engagement*.

**Hypothesis 13:** In the proposed *Work Engagement* structural model it is hypothesised that *Perceived Organisational Endorsement of Self-Transcendence* positively influences *Work Engagement*.

**Hypothesis 14:** In the proposed *Work Engagement* structural model it is hypothesised that *Squared Employee Endorsement of Self-Transcendence* positively influences *Work Engagement*.

**Hypothesis 15:** In the proposed *Work Engagement* structural model it is hypothesised that *Employee Endorsement of Self-Transcendence\* Perceived Organisational Endorsement of Self-Transcendence* positively influences *Work Engagement*.

**Hypothesis 16:** In the proposed *Work Engagement* structural model it is hypothesised that *Squared Perceived Organisational Endorsement of Self-Transcendence* positively influences *Work Engagement*.

**Hypothesis 17:** In the proposed *Work Engagement* structural model it is hypothesised that a) *Work Engagement* changes positively along the line of congruence as congruence moves from low *Employee Endorsement of Self-Transcendence* and low *Perceived Organisational Endorsement of Self-Transcendence* to high *Employee Endorsement of Self-Transcendence* and high *Perceived Organisational Endorsement of Self-Transcendence*, and b) *Work Engagement* changes convexly along the line of congruence as congruence moves from 00 outwards to low *Employee Endorsement of Self-Transcendence* and low *Perceived Organisational Endorsement of Self-Transcendence* and from 00 outward

to high *Employee Endorsement of Self-Transcendence* and high *Perceived Organisational Endorsement of Self-Transcendence*.

**Hypothesis 18:** In the proposed *Work Engagement* structural model it is hypothesised that a) *Work Engagement* changes negatively along the line of incongruence as incongruence moves from low *Employee Endorsement of Self-Transcendence* and high *Perceived Organisational Endorsement of Self-Transcendence* to high *Employee Endorsement of Self-Transcendence* and low *Perceived Organisational Endorsement of Self-Transcendence*, and b) *Work Engagement* changes concavely along the line of incongruence as incongruence moves from 00 outward to low *Employee Endorsement of Self-Transcendence* and high *Perceived Organisational Endorsement of Self-Transcendence* and from 00 outward to high *Employee Endorsement of Self-Transcendence* and low *Perceived Organisational Endorsement of Self-Transcendence*.

**Hypothesis 25:** In the proposed *Work Engagement* structural model it is hypothesised that *Transformational Leadership* positively influences *Employee Endorsement of Self-Transcendence*.

In addition to the *Work Engagement* structural model, the *Altruism Value Congruence Work Engagement* structural model presented in Figure 2.3 and the *Relationships with others Value Congruence Work Engagement* structural model presented in Figure 2.4 schematically portrays additional substantive research hypotheses developed through theorising in Chapter 2 as follows:

The second over-arching substantive research hypothesis (**Hypothesis 19**) in the current study is that the *Altruism Value Congruence Work Engagement* structural model depicted in Figure 2.3 provides a valid account of the psychological process that determines the levels of *Work Engagement*. This second over-arching substantive research hypothesis can be dissected into the following two more detailed, specific direct-effect substantive research hypotheses<sup>20</sup>:

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<sup>20</sup> Although in the proposed *Work Engagement* structural model substantive research hypotheses were formulated about path specific relations between the five polynomial latent effects and *Work Engagement*, in the case of the *Altruism Value Congruence Work Engagement* structural model this will not be done because the

**Hypothesis 20:** In the proposed *Altruism Value Congruence Work Engagement* structural model it is hypothesised that a) *Work Engagement* changes positively along the line of congruence as congruence moves from low *Employee Endorsement of Altruism* and low *Perceived Organisational Endorsement of Altruism* to high *Employee Endorsement of Altruism* and high *Perceived Organisational Endorsement of Altruism*, and b) *Work Engagement* changes convexly along the line of congruence as congruence moves from 00 outwards to low *Employee Endorsement of Altruism* and low *Perceived Organisational Endorsement of Altruism* and from 00 outward to high *Employee Endorsement of Altruism* and high *Perceived Organisational Endorsement of Altruism*.

**Hypothesis 21:** In the proposed *Altruism Value Congruence Work Engagement* structural model it is hypothesised that a) *Work Engagement* changes negatively along the line of incongruence as incongruence moves from low *Employee Endorsement of Altruism* and high *Perceived Organisational Endorsement of Altruism* to high *Employee Endorsement of Altruism* and low *Perceived Organisational Endorsement of Altruism*, and b) *Work Engagement* changes concavely along the line of incongruence as incongruence moves from 00 outward to low *Employee Endorsement of Altruism* and high *Perceived Organisational Endorsement of Altruism* and from 00 outward to high *Employee Endorsement of Altruism* and low *Perceived Organisational Endorsement of Altruism*.

The third over-arching substantive research hypothesis (**Hypothesis 22**) in the current study is that the *Relationships with others Value Congruence Work Engagement* structural model depicted in Figure 2.4 provides a valid account of the psychological process that determines the levels of *Work Engagement*. This third over-arching substantive research hypothesis can be dissected into the following two more detailed, specific direct-effect substantive research hypotheses<sup>21</sup>:

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decision was taken to analyse the model using observed score polynomial regression analysis in which typically the statistical significance of the partial regression coefficients are not considered prerequisites for calculating and interpreting the surface test values ( $a_1$ - $a_4$ ).

<sup>21</sup> In the *Relationships with others Value Congruence Work Engagement* structural model hypotheses will not be formulated about path specific relationships between the five polynomial latent effects and *Work Engagement* because the decision was taken to analyse the model using observed score polynomial regression analysis in

**Hypothesis 23:** In the proposed *Relationships with others Value Congruence Work Engagement* structural model it is hypothesised that a) *Work Engagement* changes positively along the line of congruence as congruence moves from low *Employee Endorsement of Relationships with others* and low *Perceived Organisational Endorsement of Relationships with others* to high *Employee Endorsement of Relationships with others* and high *Perceived Organisational Endorsement of Relationships with others*, and b) *Work Engagement* changes convexly along the line of congruence as congruence moves from 00 outwards to low *Employee Endorsement of Relationships with others* and low *Perceived Organisational Endorsement of Relationships with others* and from 00 outward to high *Employee Endorsement of Relationships with others* and high *Perceived Organisational Endorsement of Relationships with others*.

**Hypothesis 24:** In the proposed *Relationships with others Value Congruence Work Engagement* structural model it is hypothesised that a) *Work Engagement* changes negatively along the line of incongruence as incongruence moves from low *Employee Endorsement of Relationships with others* and high *Perceived Organisational Endorsement of Relationships with others* to high *Employee Endorsement of Relationships with others* and low *Perceived Organisational Endorsement of Relationships with others*, and b) *Work Engagement* changes concavely along the line of incongruence as incongruence moves from 00 outward to low *Employee Endorsement of Relationships with others* and high *Perceived Organisational Endorsement of Relationships with others* and from 00 outward to high *Employee Endorsement of Relationships with others* and low *Perceived Organisational Endorsement of Relationships with others*.

### 3.3 RESEARCH DESIGN

The prediction made by the overarching substantive research hypotheses, as well as the array of specific direct-effect substantive research hypotheses should ideally be

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which typically the statistical significance of the partial regression coefficients are not considered prerequisites for calculating and interpreting the surface test values ( $a_1$ - $a_4$ ).

tested in such a way that the findings will provide unambiguous, empirical evidence for or against the hypotheses under evaluation. The method through which the validity of the substantive research hypotheses is tested is known as the research design. In other words, a research design represents a plan/strategy that will guide the gathering of empirical evidence to test the hypotheses. Babbie and Mouton (2001) define the research design as a plan/blueprint of how one intends on conducting the research. The degree of unambiguousness of the empirical findings depends on the research design's ability to control variance. The control of variance refers to the maximisation of systematic variance, the minimisation of error variance and the controlling of extraneous variance (Kerlinger & Lee, 2000).

In explanatory research, a distinction can be made between two broad categories of research designs, namely experimental designs and *ex post facto* designs. The most important difference between the two designs is that in the former design the researcher experimentally manipulates one or more independent latent variable and randomly assigns research participants to experimental treatments, whereas in the later design the researcher does not have manipulative control over at least one of the independent variables either because their manifestations have already occurred or because they inherently cannot be manipulated (Kerlinger & Lee, 2000). The degree of unambiguousness of the empirical findings depends on the research design's ability to control variance. The inability of the researcher to manipulate the independent variable in an *ex post facto* design is therefore a major limitation. However, most of the research in the social sciences studies variables that cannot be manipulated. *Ex post facto* research designs are therefore valuable because most research problems in the social sciences do not lend themselves to experimental enquiry.

Various factors need to be considered when deciding on the appropriate choice of research design. Firstly, the choice of research design depends on whether or not the exogenous latent variables in the hypothesised structural model can be experimentally manipulated. Secondly, the number of exogenous latent variables and endogenous latent variables in the structural model also needs to be considered. Finally, consideration needs to be given to whether or not causal linkages are hypothesised between the endogenous latent variables in the structural model. A complex explanatory hypothesis in which causal paths are hypothesised



between endogenous latent variables can only be tested as an integrated whole via structural equation modelling (SEM). The alternative would be to dissect the comprehensive model into a number of separate multiple regression models. That is, however, a less attractive option because it fails to acknowledge that the explanation of *Work Engagement* lies in the whole integrated explanatory model. Combining the need for structural equation modelling with the fact that the exogenous latent variables cannot be manipulated points to the need for an *ex post facto* correlational research design (Theron, 2012).

Given that the following study involves testing three structural models, namely the comprehensive *Work Engagement* structural model and two narrow-focus structural models, the decision on appropriate choice of research design (taking into consideration the above mentioned factors) needs to be made for each of the three structural models.

### **3.3.1 RESEARCH DESIGN: THE WORK ENGAGEMENT STRUCTURAL MODEL**

The first consideration is whether or not the exogenous latent variables in the *Work Engagement* structural model can be experimentally manipulated. Experimental manipulation of the exogenous latent variables (i.e. *Transformational Leadership*, *Perceived Organisational Endorsement of Self-Transcendence*, *Squared Employee Endorsement of Self-Transcendence*, *Employee Endorsement of Self-Transcendence\*Perceived Organisational Endorsement of Self-Transcendence*, *Squared Perceived Organisational Endorsement of Self-Transcendence*, and *PsyCap\*Job Characteristics*) in the *Work Engagement* structural model is not possible. In terms of the second consideration, there are six exogenous latent variables and six endogenous latent variables in the *Work Engagement* structural model in Figure 2.5. Finally, causal linkages are indeed hypothesised between the various endogenous latent variables in the *Work Engagement* structural model.

Based on research design rules of thumb, if the structural model contains more than one endogenous latent variable that are affected by more than one exogenous latent variables and causal relations are hypothesised between the endogenous latent

variables and the exogenous latent variable cannot be experimentally manipulated, as is the case in the *Work Engagement* structural model, then an *ex post facto* correlational design should be used with two or more indicators per latent variable<sup>22</sup> with structural equation modelling (SEM) as the statistical analysis technique (Theron, 2012). The *ex post facto* correlational design used in this study to test the overarching and specific direct effect substantive research hypotheses is schematically depicted in Figure 3.1 below:

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<sup>22</sup> The requirement of two or more indicator variables per latent variable is imposed in an attempt to ensure that the comprehensive LISREL model will be identified with positive degrees of freedom (Diamantopoulos & Sigauw, 2000).

[X <sub>11</sub> ]	[X <sub>12</sub> ]	[X <sub>13</sub> ]	...	[X <sub>1i</sub> ]	...	[X <sub>143</sub> ]
[X <sub>21</sub> ]	[X <sub>22</sub> ]	[X <sub>23</sub> ]	...	[X <sub>2i</sub> ]	...	[X <sub>243</sub> ]
[X <sub>31</sub> ]	[X <sub>32</sub> ]	[X <sub>33</sub> ]	...	[X <sub>3i</sub> ]	...	[X <sub>343</sub> ]
...	...	...	...	...	...	...
[X <sub>i1</sub> ]	[X <sub>i2</sub> ]	[X <sub>i3</sub> ]	...	[X <sub>ii</sub> ]	...	[X <sub>i43</sub> ]
...	...	...	...	...	...	...
[X <sub>n1</sub> ]	[X <sub>n2</sub> ]	[X <sub>n3</sub> ]	...	[X <sub>ni</sub> ]	...	[X <sub>n43</sub> ]

**Figure 3.1.** Ex Post Facto Correlational Design used for the Work Engagement Structural Model

In terms of the logic of the *ex post facto* correlational design with multiple indicators per latent variable with SEM as the statistical analysis technique, the researcher calculates the covariance between the observed variables in the study (known as the observed covariance matrix). Estimates for the freed comprehensive LISREL model<sup>23</sup> are obtained in an iterative fashion with the purpose of reproducing the observed covariance matrix as accurately as possible (Diamantopoulos & Siguaaw, 2000). If the fitted model fails to accurately reproduce the observed covariance matrix, it can be concluded that the hypothesised structural model does not provide an acceptable explanation for the observed covariance matrix. If, however, the covariance matrix derived from the estimated model parameters closely corresponds to the observed covariance matrix it would not imply that the psychological processes prophesised by the structural model *necessarily* produced the observed covariance matrix. It can therefore not be concluded that the processes depicted in the *Work Engagement* structural model *necessarily* must have produced the levels of *Work Engagement* observed in the sample. A high degree of fit between the observed and estimated covariance matrices would only imply that processes portrayed in the structural model provide one plausible explanation for the observed covariance matrix (Theron, 2012).

### 3.3.2 RESEARCH DESIGN: THE TWO NARROW-FOCUS STRUCTURAL MODELS

In terms of the first consideration, experimental manipulation of the exogenous latent variables (*Employee Endorsement of Altruism*, *Perceived Organisational Endorsement of Altruism*, *Squared Employee Endorsement of Altruism*, *Employee Endorsement of Altruism\*Perceived Organisational Endorsement of Altruism*, and *Squared Perceived Organisational Endorsement of Altruism*) in the *Altruism Value Congruence Work Engagement* structural model is not possible. Neither is it possible to experimentally manipulate exogenous latent variables (*Employee Endorsement of Relationships with others*, *Perceived Organisational Endorsement of Relationships*

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<sup>23</sup> The comprehensive LISREL model refers to the combined measurement and structural models. The measurement model specifies the structural relations that are hypothesised to exist between the latent variables and the indicator variables and the structural model describes the structural relations that are hypothesised to exist between the latent variables.

with others, Squared Employee Endorsement of Relationships with others, Employee Endorsement of Relationships with others\*Perceived Organisational Endorsement of Relationships with others, and Squared Perceived Organisational Endorsement of Relationships with others) in the Relationships with others Value Congruence Work Engagement structural model. Secondly, there are five exogenous latent variables and one endogenous latent variable in the Altruism Value Congruence Work Engagement structural model in Figure 2.3 and also five exogenous latent variables and one endogenous latent variable in the Relationships with others Value Congruence Work Engagement structural model in Figure 2.4. Given that only one endogenous latent variable exists in both narrow-focus models, the final consideration of causal linkages between various endogenous latent variables does not apply in these two cases.

Based on research design rules of thumb, if the structural model contains one endogenous latent variable that is affected by more than one exogenous latent variables and the exogenous latent variables cannot be experimentally manipulated, as is the case in both narrow-focus structural models, then an *ex post facto* correlational design should be used with a single indicator per latent variable with multiple regression analysis as analysis technique (Theron, 2012). In this case polynomial regression analysis was used in acknowledgement of the hypotheses that the response of *Work Engagement* to value congruence and incongruence is not linear. The *ex post facto* correlational design used in this study to test the substantive research hypotheses schematically portrayed in the two narrow-focus structural models is depicted in Figure 3.2 and Figure 3.3 below:

[X <sub>11</sub> ]	[X <sub>12</sub> ]	[X <sub>13</sub> ]	[X <sub>14</sub> ]	[X <sub>15</sub> ]	[Y <sub>11</sub> ]
[X <sub>21</sub> ]	[X <sub>22</sub> ]	[X <sub>23</sub> ]	[X <sub>24</sub> ]	[X <sub>25</sub> ]	[Y <sub>21</sub> ]
[X <sub>31</sub> ]	[X <sub>32</sub> ]	[X <sub>33</sub> ]	[X <sub>34</sub> ]	[X <sub>35</sub> ]	[Y <sub>31</sub> ]
...	...	...	...	...	...
[X <sub>i1</sub> ]	[X <sub>i2</sub> ]	[X <sub>i3</sub> ]	[X <sub>i4</sub> ]	[X <sub>i5</sub> ]	[Y <sub>i1</sub> ]
...	...	...	...	...	...
[X <sub>n1</sub> ]	[X <sub>n2</sub> ]	[X <sub>n3</sub> ]	[X <sub>n4</sub> ]	[X <sub>n5</sub> ]	[Y <sub>n1</sub> ]

**Figure 3.2. Ex Post Facto Correlational Design used for the Altruism Value Congruence Work Engagement Structural Model**

where:

- $X_1$  represents the total score on *Employee Endorsement of Altruism*;
- $X_2$  represents the total score on *Perceived Organisational Endorsement of Altruism*;
- $X_3$  represents the total score on *Squared Employee Endorsement of Altruism*;
- $X_4$  represents the total score on *Employee Endorsement of Altruism\*Perceived Organisational Endorsement of Altruism*;
- $X_5$  represents the total score on *Squared Perceived Organisational Endorsement of Altruism*; and
- $Y_1$  represents the total score on *Work Engagement*

[X <sub>11</sub> ]	[X <sub>12</sub> ]	[X <sub>13</sub> ]	[X <sub>14</sub> ]	[X <sub>15</sub> ]	[Y <sub>11</sub> ]
[X <sub>21</sub> ]	[X <sub>22</sub> ]	[X <sub>23</sub> ]	[X <sub>24</sub> ]	[X <sub>25</sub> ]	[Y <sub>21</sub> ]
[X <sub>31</sub> ]	[X <sub>32</sub> ]	[X <sub>33</sub> ]	[X <sub>34</sub> ]	[X <sub>35</sub> ]	[Y <sub>31</sub> ]
...	...	...	...	...	...
[X <sub>i1</sub> ]	[X <sub>i2</sub> ]	[X <sub>i3</sub> ]	[X <sub>i4</sub> ]	[X <sub>i5</sub> ]	[Y <sub>i1</sub> ]
...	...	...	...	...	...
[X <sub>n1</sub> ]	[X <sub>n2</sub> ]	[X <sub>n3</sub> ]	[X <sub>n4</sub> ]	[X <sub>n5</sub> ]	[Y <sub>n1</sub> ]

**Figure 3.3. Ex Post Facto Correlational Design used for the Relationships with others Value Congruence Work Engagement Structural Model**

where:

- $X_1$  represents the total score on *Employee Endorsement of Relationships with others*;
- $X_2$  represents the total score on *Perceived Organisational Endorsement of Relationships with others*;
- $X_3$  represents the total score on *Squared Employee Endorsement of Relationships with others*;
- $X_4$  represents the total score on *Employee Endorsement of Relationships with others \*Perceived Organisational Endorsement of Relationships with others*;

- $X_5$  represents the total score on *Squared Perceived Organisational Endorsement of Relationships with others*; and
- $Y_1$  represents the total score on *Work Engagement*

In terms of the logic of the *ex post facto* correlational design with a single indicator per latent variable with multiple regression analysis as analysis technique, the researcher attempts to find estimates for the five partial regression coefficients in Equation 2 and Equation 3 that minimises the sum of the squared deviation of the estimated *Work Engagement* scores from the observed *Work Engagement* measures.

$$E[Y|X_i] = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 \quad (2)$$

where:

- $X_1$  represents the total score on *Employee Endorsement of Altruism*;
- $X_2$  represents the total score on *Perceived Organisational Endorsement of Altruism*;
- $X_3$  represents the total score on *Squared Employee Endorsement of Altruism*;
- $X_4$  represents the total score on *Employee Endorsement of Altruism\*Perceived Organisational Endorsement of Altruism*;
- $X_5$  represents the total score on *Squared Perceived Organisational Endorsement of Altruism*; and
- $Y_1$  represents the total score on *Work Engagement*

$$E[Y|X_i] = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 \quad (3)$$

where:

- $X_1$  represents the total score on *Employee Endorsement of Relationships with others*;
- $X_2$  represents the total score on *Perceived Organisational Endorsement of Relationships with others*;
- $X_3$  represents the total score on *Squared Employee Endorsement of Relationships with others*;
- $X_4$  represents the total score on *Employee Endorsement of Relationships with others \*Perceived Organisational Endorsement of Relationships with others*;

- $X_5$  represents the total score on *Squared Perceived Organisational Endorsement of Relationships with others*; and
- $Y_1$  represents the total score on *Work Engagement*

The partial regression coefficients estimates reflect the average change in *Work Engagement* associated with one unit change in the predictor ( $X_i$ ) whilst holding the other predictors constant. The partial regression coefficients estimates therefore reflect the extent to which each of the five polynomial regression effects explain unique variance in *Work Engagement*.

### 3.4 STATISTICAL HYPOTHESES

In the previous section, an argument was presented in an attempt to justify the choice of research design. The logic underlying the proposed research design, as well as the nature of the envisaged statistical analyses will determine the appropriate format of the statistical hypotheses. The current study relies on structural equation modelling (SEM) to evaluate the validity of the proposed *Work Engagement* structural model via the *ex post facto* correlation design. The notational system used in the formulation of these statistical hypotheses follows the conventional LISREL notational system (Du Toit & Du Toit, 2000; Jöreskog & Sörbom, 1996). Furthermore, the current study relies on SEM with response surface analysis (i.e. latent variable polynomial regression with response surface analysis) to test hypotheses 17 and hypothesis 18. Observed score polynomial regression analysis with response surface analysis was used to test the hypotheses (hypotheses 19-24) schematically portrayed in the two narrow-focus structural models in Figure 2.3 and Figure 2.4.

#### 3.4.1 STATISTICAL HYPOTHESES: SEM

The first overarching substantive research hypothesis (**Hypothesis 1**) states that the *Work Engagement* structural model depicted in Figure 2.5 provides a valid account of the psychological process that determines the level of *Work Engagement*. If this



first overarching substantive research hypothesis is interpreted to mean that the structural model provides a perfect account of the psychological dynamics underlying *Work Engagement*, then the overarching substantive research hypothesis can be translated into the following exact fit null hypothesis (**Hypothesis 1a**):

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

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

Structural models are however only approximations of reality and therefore rarely exactly fit the population. If it is then rather interpreted that this first overarching research hypothesis implies that the structural model provides an approximate account of the psychological dynamics underlying *Work Engagement*, then the overarching substantive research hypothesis can be translated into the following close fit null hypothesis (**Hypothesis 1b**):

$$H_{01b}: RMSEA \leq .05$$

$$H_{a1b}: RMSEA > .05$$

In addition to the overall fit hypotheses the following specific path coefficient hypotheses were formulated and tested if the model fits the data at least reasonably well:

**Hypothesis 2:** In the proposed *Work Engagement* structural model it is hypothesised that *Job Characteristics* positively influences *Meaningfulness*.

$$H_{02}: \beta_{52} = 0$$

$$H_{a2}: \beta_{52} > 0$$

**Hypothesis 3:** In the proposed *Work Engagement* structural model it is hypothesised that *Meaningfulness* positively influences *Work Engagement*.

$$H_{03}: \beta_{15} = 0$$

$$H_{a3}: \beta_{15} > 0$$

**Hypothesis 4:** In the proposed *Work Engagement* structural model it is hypothesised that *PsyCap* positively influences *Work Engagement*.

$$H_{04}: \beta_{13} = 0$$

$$H_{a4}: \beta_{13} > 0$$

**Hypothesis 5:** In the proposed *Work Engagement* structural model it is hypothesised that the interaction effect between *PsyCap* and *Job Characteristics* (*PsyCap\*Job Characteristics*) positively influences *Meaningfulness*.

$$H_{05}: \gamma_{52} = 0$$

$$H_{a5}: \gamma_{52} > 0$$

**Hypothesis 6:** In the proposed *Work Engagement* structural model it is hypothesised that *Job Characteristics* positively influences *PsyCap*.

$$H_{06}: \beta_{32} = 0$$

$$H_{a6}: \beta_{32} > 0$$

**Hypothesis 7:** In the proposed *Work Engagement* structural model it is hypothesised that *PsyCap* positively influences *Job Characteristics*.

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

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

**Hypothesis 8:** In the proposed *Work Engagement* structural model it is hypothesised that *Transformational Leadership* positively influences *Psychological Safety*.

$$H_{08}: \gamma_{61} = 0$$

$$H_{a8}: \gamma_{61} > 0$$

**Hypothesis 9:** In the proposed *Work Engagement* structural model it is hypothesised that *Psychological Safety* positively influences *Work Engagement*.

$$H_{09}: \beta_{16} = 0$$

$$H_{a9}: \beta_{16} > 0$$

**Hypothesis 10:** In the proposed *Work Engagement* structural model it is hypothesised that *Transformational Leadership* positively influences *PsyCap*.

$$H_{010}: \gamma_{31} = 0$$

$$H_{a10}: \gamma_{31} > 0$$

**Hypothesis 11:** In the proposed *Work Engagement* structural model it is hypothesised that *Transformational Leadership* positively influences *Job Characteristics*.

$$H_{011}: \gamma_{21} = 0$$

$$H_{a11}: \gamma_{21} > 0$$

**Hypothesis 12:** In the proposed *Work Engagement* structural model it is hypothesised that *Employee Endorsement of Self-Transcendence* positively influences *Work Engagement*.

$$H_{012}: \beta_{14} = 0$$

$$H_{a12}: \beta_{14} > 0$$

**Hypothesis 13:** In the proposed *Work Engagement* structural model it is hypothesised that *Perceived Organisational Endorsement of Self-Transcendence* positively influences *Work Engagement*.

$$H_{013}: \gamma_{13} = 0$$

$$H_{a13}: \gamma_{13} > 0$$

**Hypothesis 14:** In the proposed *Work Engagement* structural model it is hypothesised that *Squared Employee Endorsement of Self-Transcendence* positively influences *Work Engagement*.

$$H_{014}: \gamma_{15} = 0$$

$$H_{a14}: \gamma_{15} > 0$$

**Hypothesis 15:** In the proposed *Work Engagement* structural model it is hypothesised that *Employee Endorsement of Self-Transcendence\* Perceived Organisational Endorsement of Self-Transcendence* positively influences *Work Engagement*.

$$H_{015}: \gamma_{14} = 0$$

$$H_{a15}: \gamma_{14} > 0$$

**Hypothesis 16:** In the proposed *Work Engagement* structural model it is hypothesised that *Squared Perceived Organisational Endorsement of Self-Transcendence* positively influences *Work Engagement*.

$$H_{016}: \gamma_{16} = 0$$

$$H_{a16}: \gamma_{16} > 0$$

**Hypothesis 25:** In the proposed *Work Engagement* structural model it is hypothesised that *Transformational Leadership* positively influences *Employee Endorsement of Self-Transcendence*.

$$H_{025}: \gamma_{41} = 0$$

$$H_{a25}: \gamma_{41} > 0$$

### 3.4.2 STATISTICAL HYPOTHESES: SEM WITH RESPONSE SURFACE ANALYSIS

**Hypothesis 17:** In the proposed *Work Engagement* structural model it is hypothesised that a) *Work Engagement* changes positively along the line of congruence as congruence moves from low *Employee Endorsement of Self-Transcendence* and low *Perceived Organisational Endorsement of Self-Transcendence* to high *Employee Endorsement of Self-Transcendence* and high

*Perceived Organisational Endorsement of Self-Transcendence*, and b) *Work Engagement* changes convexly along the line of congruence as congruence moves from 00 outwards to low *Employee Endorsement of Self-Transcendence* and low *Perceived Organisational Endorsement of Self-Transcendence* and from 00 outward to high *Employee Endorsement of Self-Transcendence* and high *Perceived Organisational Endorsement of Self-Transcendence*.

$$H_{017a}: a_1 = 0$$

$$H_{a17a}: a_1 > 0$$

$$H_{017b}: a_2 = 0$$

$$H_{a17b}: a_2 > 0$$

**Hypothesis 18:** In the proposed *Work Engagement* structural model it is hypothesised that a) *Work Engagement* changes negatively along the line of incongruence as incongruence moves from low *Employee Endorsement of Self-Transcendence* and high *Perceived Organisational Endorsement of Self-Transcendence* to high *Employee Endorsement of Self-Transcendence* and low *Perceived Organisational Endorsement of Self-Transcendence*, and b) *Work Engagement* changes concavely along the line of incongruence as incongruence moves from 00 outward to low *Employee Endorsement of Self-Transcendence* and high *Perceived Organisational Endorsement of Self-Transcendence* and from 00 outward to high *Employee Endorsement of Self-Transcendence* and low *Perceived Organisational Endorsement of Self-Transcendence*.

$$H_{018a}: a_3 = 0$$

$$H_{a18a}: a_3 < 0$$

$$H_{018b}: a_4 = 0$$

$$H_{a18b}: a_4 < 0$$

The specific response surface hypotheses formulated in section 3.4.2 ( $H_{017a} - H_{018b}$ ) were tested via SEM with response surface analysis. The manner in which this is done is discussed in section 3.9.3.8.

### 3.4.3 STATISTICAL HYPOTHESES: POLYNOMIAL REGRESSION ANALYSIS WITH RESPONSE SURFACE ANALYSIS

The second overarching substantive research hypothesis (**Hypothesis 19**) states that the *Altruism Value Congruence Work Engagement* structural model depicted in Figure 2.3 provides a valid account of the psychological process that determines the level of *Work Engagement*.

$$H_{019}: \rho = 0^{24}$$

$$H_{a19}: \rho > 0$$

In addition to the overall fit hypotheses the following specific response surface hypotheses were formulated and tested if the model fits the data statistically significantly ( $p < .05$ ):

**Hypothesis 20:** In the proposed *Altruism Value Congruence Work Engagement* structural model it is hypothesised that a) *Work Engagement* changes positively along the line of congruence as congruence moves from low *Employee Endorsement of Altruism* and low *Perceived Organisational Endorsement of Altruism* to high *Employee Endorsement of Altruism* and high *Perceived Organisational Endorsement of Altruism*, and b) *Work Engagement* changes convexly along the line of congruence as congruence moves from 00 outwards to low *Employee Endorsement of Altruism* and low *Perceived Organisational Endorsement of Altruism* and from 00 outward to high *Employee Endorsement of Altruism* and high *Perceived Organisational Endorsement of Altruism*.

$$H_{020a}: a_1 = 0$$

$$H_{a20a}: a_1 > 0$$

$$H_{020b}: a_2 = 0$$

$$H_{a20b}: a_2 > 0$$

**Hypothesis 21:** In the proposed *Altruism Value Congruence Work Engagement* structural model it is hypothesised that a) *Work Engagement* changes negatively

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<sup>24</sup>  $\rho$  represents the population multiple correlation depicted with the capital Greek letter rho.

along the line of incongruence as incongruence moves from low *Employee Endorsement of Altruism* and high *Perceived Organisational Endorsement of Altruism* to high *Employee Endorsement of Altruism* and low *Perceived Organisational Endorsement of Altruism*, and b) *Work Engagement* changes concavely along the line of incongruence as incongruence moves from 00 outward to low *Employee Endorsement of Altruism* and high *Perceived Organisational Endorsement of Altruism* and from 00 outward to high *Employee Endorsement of Altruism* and low *Perceived Organisational Endorsement of Altruism*.

$$H_{021a}: a_3 = 0$$

$$H_{a21a}: a_3 < 0$$

$$H_{021b}: a_4 = 0$$

$$H_{a21b}: a_4 < 0$$

The third overarching substantive research hypothesis (**Hypothesis 22**) states that the *Relationships with others Value Congruence Work Engagement* structural model depicted in Figure 2.4 provides a valid account of the psychological process that determines the level of *Work Engagement*.

$$H_{022}: P = 0$$

$$H_{a22}: P > 0$$

In addition to the overall fit hypotheses the following specific response surface hypotheses were formulated and tested if the model fits the data statistically significantly ( $p < .05$ ):

**Hypothesis 23:** In the proposed *Relationships with others Value Congruence Work Engagement* structural model it is hypothesised that a) *Work Engagement* changes positively along the line of congruence as congruence moves from low *Employee Endorsement of Relationships with others* and low *Perceived Organisational Endorsement of Relationships with others* to high *Employee Endorsement of Relationships with others* and high *Perceived Organisational Endorsement of Relationships with others*, and b) *Work Engagement* changes convexly along the line of congruence as congruence moves from 00 outwards to low *Employee Endorsement of Relationships with others* and low *Perceived Organisational*

*Endorsement of Relationships with others* and from 00 outward to high *Employee Endorsement of Relationships with others* and high *Perceived Organisational Endorsement of Relationships with others*.

$$H_{023a}: a_1 = 0$$

$$H_{a23a}: a_1 > 0$$

$$H_{023b}: a_2 = 0$$

$$H_{a23b}: a_2 > 0$$

**Hypothesis 24:** In the proposed *Relationships with others Value Congruence Work Engagement* structural model it is hypothesised that a) *Work Engagement* changes negatively along the line of incongruence as incongruence moves from low *Employee Endorsement of Relationships with others* and high *Perceived Organisational Endorsement of Relationships with others* to high *Employee Endorsement of Relationships with others* and low *Perceived Organisational Endorsement of Relationships with others*, and b) *Work Engagement* changes concavely along the line of incongruence as incongruence moves from 00 outward to low *Employee Endorsement of Relationships with others* and high *Perceived Organisational Endorsement of Relationships with others* and from 00 outward to high *Employee Endorsement of Relationships with others* and low *Perceived Organisational Endorsement of Relationships with others*.

$$H_{024a}: a_3 = 0$$

$$H_{a24a}: a_3 < 0$$

$$H_{024b}: a_4 = 0$$

$$H_{a24b}: a_4 < 0$$

The specific response surface hypotheses formulated in section 3.4.3 ( $H_{019} - H_{024b}$ ) were tested via observed score polynomial regression with response surface analysis. The manner in which this is done is discussed in section 3.9.4.



### 3.5 SAMPLING

The current study attempts to gain a greater understanding of why variance in *Work Engagement* exists amongst different employees working in different organisational contexts. The term “different organisational contexts” is interpreted broadly to include NGO’s, non-profit organisations and profit organisations in the public and private sector. This study is furthermore particularly concerned with understanding *Work Engagement* in a South African context. It should also be noted that the *Work Engagement* structural model in this study proposes that leadership has a significant influence on *Work Engagement*. It is therefore assumed that the focus is on employees who report to a superior/leader/manager. This implies a target population consisting of all South African employees working in NGO’s, non-profit organisations or profit organisations in the public or private sector, who report to a leader/superior/manager.

The ideal in research would be to study the target population. In most cases researchers do, however, not have the required resources, such as time, money or access to the population, in order to achieve this ideal. Most researchers therefore use sampling as a solution to this unattainable ideal. The purpose of sampling is to select a portion of individuals from the population as representatives of that target population (Kerlinger & Lee, 2000). A sample is representative to the extent to which it adequately reflects those characteristics/properties in the target population being studied that are of interest to the research study (Salkind, 2010). To allow the selection of a representative sample, the target population needs to be operationalised in the form of a sampling population. The sampling population represents those final sampling units (FSU) in the target population that have a non-zero probability of being selected. The list of FSU in the sampling population constitutes the sampling frame. To ensure a representative sample firstly requires a sampling population or sampling frame that largely overlaps with the target population. The gap between the sampling population and the target population needs to be small to ensure a representative sample (Babbie & Mouton, 2001). A small sampling gap is a necessary requirement for a representative sample to be selected from the target population. In the current study it was not possible to define a sampling population that largely overlaps with the target population. This inevitably

meant that it would be practically impossible to draw a sample that is representative of the target population.

The sampling population for the purpose of this study was defined as teachers working in public sector schools falling under the jurisdiction of the Western Cape Education Department (WCED). The final sampling units and units of analysis in this study were therefore teachers in the Western Cape working in public sector schools falling under the jurisdiction of the WCED. The assumption underpinning the choice of the particular sampling population in the current study is that the psychological mechanism that operates to determine the level of *Work Engagement* experienced by individual employees is essentially the same across all organisational contexts. In other words, the psychological mechanism that operates to determine the level of *Work Engagement* experienced by teachers in the Western Cape is the same psychological mechanism that operates to determine the level of *Work Engagement* amongst all employees in South Africa, irrespective of their particular organisational context. It is thereby, however, not implied that the levels of the latent variables comprising the psychological mechanism are the same across organisational contexts. The possibility that specific contextual factors unique to teaching positions might also act as moderators can, however, not be ruled out.

The large sampling gap between the sampling population and the target population invariably means that the sample drawn from the sampling population will not be representative of the target population. This is acknowledged as a limitation in the research study.

### **3.5.1 SAMPLING PROCEDURE**

Sampling procedures can broadly be classified into probability and non-probability sampling procedures (Kerlinger & Lee, 2000). In probability sampling, each element in the sampling population has a known, but not necessarily equal probability of being selected into the sample. On the other hand, non-probability sampling refers to those sampling procedures in which the probability of selection is unknown for each element of the sampling population. Probability samples are considered preferable, but are not always practical or feasible (Salkind, 2010).

In the current study, non-probability sampling was used. More specifically a convenience sampling design was employed, which refers to a sampling procedure of using individuals who are readily available (Salkind, 2010). Kerlinger and Lee (2000) use the term “accidental sampling” as synonymous to convenience sampling, stating that during accidental sampling the researcher selects available FSU at hand into the samples. Kerlinger and Lee (2000) describe accidental sampling as the weakest form of sampling. They do, however note that when used with reasonable knowledge and care, it most probably does not deserve the bad reputation it has. They add that despite being the weakest form of sampling, it is the most frequently used and further mention that “if you do use accidental samples, use extreme circumspection in analysis and interpretation of data’ (p. 179). Due to the use of a convenience sampling procedure in the current study to select a sample from a sampling population that already shows a large sampling gap with the target population the problem created by the large sampling gap is further aggravated. It cannot be claimed that the sample is representative of the target population. The results of the current study will have to be generalised to both the sampling and target populations with great circumspection.

In the current study primary and high schools in the Western Cape were approached. The Western Cape Department of Education (DOE) granted permission to conduct the research (See *Appendix 1*). The principal of a particular school that was approached was asked to indicate the school’s willingness to participate in this research study. Those principals who were willing to participate signed a permission template (See *Appendix 2*). The principals of the participating schools received the electronic Work Engagement Survey (WES) link via e-mail (See *Appendix 3*). It was the principal’s responsibility to distribute the WES link to the teachers, which ensured that teachers’ email addresses remained confidential. Teachers were not obliged to fill in the survey and this was communicated to them via an informed consent form at the start of the survey (See *Appendix 4*).

### 3.5.2 SAMPLE SIZE

Sample size planning is defined as a “systematic approach to selecting an optimal number of participants to include in a research study so that some specified goal or set of goals can be satisfied” (Salkind, 2010, p. 1301). If the sample size is too small, the study runs various risks; the risk of not accurately reflecting the population the sample was drawn from, the risk of failing to find a real effect because of inadequate statistical power, and the risk of finding apparent effects that cannot be replicated in subsequent experiments. On the other hand, using a larger sample size than necessary is a costly drain on resources that is likely to slow the completion of studies (Salkind, 2010). It is therefore essential that the researcher should give careful attention to the process of determining the optimal sample size for the particular research study.

According to Kelloway (1998), a sample size of at least 200 observations appears to be satisfactory for most SEM applications. Various studies suggest that three issues are particularly relevant when choosing the appropriate sample size (Burger, 2012; Smuts, 2011). Firstly, the ratio of sample size to the number of parameters to be estimated needs to be considered. The bare minimum requirement for a situation to at least be regarded as acceptable is that the freed model parameters that have to be estimated do not exceed the number of observations in the sample. This implies that elaborate measurement and structural models which contain more variables and therefore have more freed parameters that have to be estimated, require larger sample sizes. Bentler and Chou (as cited in Kelloway, 1998) suggest that the ratio of sample size to number of parameters estimated should fall between 5:1 and 10:1. This guideline implies a sample size of 800-1600 teachers in the current study in order to provide a convincing test of the proposed *Work Engagement* structural model (160 freed parameters).

A second consideration is that of statistical power, which in the context of SEM refers to the probability of rejecting the null hypothesis of close fit ( $H_0$ : RMSEA  $\leq$  .05) when in fact it should be rejected (i.e. the model fit is actually mediocre;  $H_a$ : RMSEA = .08). Excessively high statistical power would mean that any attempt to obtain formal empirical proof of the validity of the model would be futile. Even a small deviation

from close fit would result in a rejection of the close fit null hypothesis. On the other hand, excessively low statistical power would mean that even if the model fails to fit closely (i.e. the model fits mediocre in the parameter), the close fit null hypothesis would still not be rejected. Not rejecting the close fit null hypothesis under conditions of low statistical power does not provide very convincing evidence on the validity of the model.

Preacher and Coffman (2006) compiled software that was used in the current study to derive sample size estimates for the test of close fit, given the effect sizes assumed above, a significance level ( $\alpha$ ) of .05, a power level of .80 and degrees of freedom ( $v$ ) of  $(\frac{1}{2}[(p+q)(p+q+1)]-t)^{25} = (\frac{1}{2}[(33+14)(33+14+1)]-160) = 968$ . The software indicates that a sample of at least 33.78906 observations is required to ensure statistical power of .80 in testing the null hypothesis of close fit for the *Work Engagement* structural model. This sample size requirement, however, clearly conflicts with the Bentler and Chou (as cited in Kelloway, 1998) guidelines on the ratio of sample size to number of parameters estimated referred to above.

Thirdly, practical and logistical considerations such as cost, availability of respondents and the willingness of the employer to commit employees to research needs to be taken into account when deciding on the appropriate sample size.

In the current study, taking all three the above considerations into account, it was decided that a sample of between 200 and 400 teachers should be selected. This represents an ambitious but still potentially feasible sample size target for a single researcher study with a small budget. It would ensure that the statistical power of the testing of the hypothesis of close fit would have sufficiently high power (.80) but it would still fall substantially short of the Bentler and Chou (as cited in Kelloway, 1998) guidelines on the ratio of sample size to number of parameters estimated.

After numerous primary and high schools in the Western Cape were approached, the final sample for this study consisted of 227 teachers from 21 schools.

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<sup>25</sup>  $p$  = the number of exogenous indicator variables,  $q$  = the number of endogenous indicator variables and  $t$  = the number of parameters in the comprehensive LISREL model that were freed to be estimated

## 3.6 MEASURING INSTRUMENTS/OPERATIONALISATION

In order to test the validity of the substantive hypotheses derived through the literature study in Chapter 2 captured in the comprehensive *Work Engagement* structural model and the two narrow-focus structural models, appropriate measuring instruments need to be selected or adapted with which to operationalise the latent variables via indicator variables. Evidence in existing literature on the reliability and validity of various measuring instruments was considered when choosing the appropriate measures. As a result of this literature review, seven instruments were selected or adapted. In the following section, these instruments will briefly be discussed and psychometric evidence from the literature will be presented in order to justify the choice of instrument.

### 3.6.1 WORK ENGAGEMENT

The following study views *Work Engagement* as an independent construct that is negatively related to *Burnout*, rather than the opposite pole of *Burnout* on a single continuum. *Work Engagement* is defined as a separate construct in its own right comprising three dimensions - *Vigour*, *Dedication* and *Absorption* (Schaufeli et al., 2002). The measure of *Work Engagement* chosen for the current study therefore needs to be able to appropriately measure all three these dimensions, thereby reflecting *Work Engagement* as a separate multi-dimensional construct.

The Utrecht Work Engagement Scale (UWES; Schaufeli et al., 2002) is the instrument that is most often used to measure *Work Engagement* (Bakker, Schaufeli, Leiter & Taris, 2008) in the sense that it is constitutively defined in the current study. The original UWES consists of 17-items (Schaufeli et al., 2002). The current study makes use of a 9-item shortened version, the UWES-9 (Schaufeli & Bakker, 2004b). The UWES-9 consists of three sub-scales, each measuring one of the three *Work Engagement* dimensions. Participants are required to respond to each of the nine items by making use of a 7-point Likert scale, ranging from never (0) to always (6). In an investigation of the psychometric qualities of the UWES using an international database of nine countries (including South Africa), Schaufeli and Bakker (2004b)

reported the following internal consistencies (Cronbach's alpha) for the three subscales of the UWES-9: *Dedication*  $\alpha = .87$ , *Absorption*  $\alpha = .79$ , and *Vigour*  $\alpha = .76$ . Furthermore, Schaufeli et al. (2006) constructed a database of twenty-seven studies that have been carried out between 1999 and 2003 in ten different countries (including South Africa). Results demonstrated the following internal consistencies for the three sub-scales; *Dedication*  $\alpha = .85$ , *Absorption*  $\alpha = .78$ , and *Vigour*  $\alpha = .70$ . In the current study, it was decided that existing measures would only be considered as appropriate measures if the internal consistencies of the scales/sub-scales is at least  $\alpha \geq .70$ . In the psychometric evidence lead above the internal consistencies of the UWES-9 exceed this minimum requirement.

### 3.6.2 JOB CHARACTERISTICS

The Job Diagnostic Survey (JDS; Hackman & Oldham, 1975, 1980) measures each major class of variables in the Job Characteristics Model (JCM), namely the five job characteristics, three critical psychological states and outcomes. Idaszak and Drasgow (1987) created a revised version (JDS-R) of the original JDS, which has proven to be more psychometrically sound with regards to the *Job Characteristics* items (Boonzaier, 2001). Boonzaier (2001) made further alterations to those items in the JDS-R which measure the three personal outcomes, but section one and two of the JDS-R which measures *Job Characteristics* (skill variety, task identity, task significance, autonomy and feedback) remained unaltered. Therefore in the current study section one and section two of the JDS-R (Boonzaier, 2001) will be utilised. Section one consists of five items and section two comprises ten items. Each of the five core job characteristics are measured by one item from section one and two items from section two. Responses are recorded on a 7-point Likert scale.

Boonzaier (2001) tabulated the reliability coefficients for each of the five core characteristics reported in a vast number of studies that either utilised the original JDS (Hackman & Oldham, 1980) or that utilised the JDS-R (Idaszak and Drasgow, 1987) to measure the five core characteristics. From these reliability coefficients, depicted in Table 3.1, it is evident that the JDS-R has much higher mean reliabilities

(alpha's) than the original JDS. The alpha coefficients for each of the five characteristics are satisfactory ( $\alpha > .70$ ).

**Table 3.1**

***Boonzaier's (2001) Tabulated Reliability Coefficients of the Job Characteristics***

Researchers	Skill Variety	Task Identity	Task Significance	Autonomy	Feedback
Bhagat & Chassie (1980)	.68	.78	.72	.66	.73
Birnbaum, Farh & Wong (1986)	.79	.72	.81	.84	.71
Brief & Aldag (1976)	.47	.47	.6	.55	.30
Champoux (1992)	.78	.67	.54	.70	.64
Cordery & Savastos (1993)	.72	.65	.69	.72	.73
Cordery & Savastos (1993)*	.80	.77	.75	.79	.78
Dunham (1976)	.76	.72	.72	.73	.75
Dunham, Aldag & Brief (1977)	.68	.70	.68	.69	.69
Evans, Kiggundu & House (1979)	.53	.52	.50	.53	.38
Forshaw (1985)	.64	.6	.58	.6	.48
Fried & Ferris (1987)	.69	.69	.67	.69	.70
Hackman & Oldham (1975)	.71	.59	.66	.66	.71
Hogan & Martell (1987)	.68	.66	.64	.61	.81
Johns, Xie & Fang (1992)	.64	.77	.61	.67	.74
Kiggundu (1980)	.78	.62	.59	.63	.70
Kim & Schuler (1979)	.8	.69	.73	.67	.73
Munz, Huelsman, Konold & McKinney (1996)	.77	.74	.72	.77	.81
Oldham, Hackman & Stepina (1979)	.68	.61	.58	.64	.68
Renn & Vandenberg (1995)*	.76	.76	.77	.79	.74
Spector & Jex (1991)*	.70	.81	.74	.87	.83
Xie & Johns (1995)	.76	.67	.64	.74	.73
Yeh (1996)	.68	.64	.63	.66	.74
<b>Mean JDS</b>	<b>.69</b>	<b>.65</b>	<b>.64</b>	<b>.67</b>	<b>.67</b>
<b>Mean JDS-R</b>	<b>.75</b>	<b>.78</b>	<b>.75</b>	<b>.81</b>	<b>.78</b>

\*Used JDS-R

(Boonzaier, 2001).

### 3.6.3 PSYCHOLOGICAL CAPITAL

*PsyCap* is a higher-order construct consisting of four constructs - *Hope*, *Optimism*, *Self-Efficacy* and *Resiliency*. In the current study *PsyCap* was measured using the Psychological Capital Questionnaire Self-Rater Version (PCQ; Luthans, Avolio, Avey



& Norman, 2007a). Luthans et al. (2007a) proposed that each of the four constructs would have equal weight. Therefore, the 24-item questionnaire consists of four sub-scales with 6-items each. The PCQ is based on past, established scales of *Optimism*, *Hope*, *Self-Efficacy* and *Resiliency* (Gooty, Gavin, Johnson, Frazier & Snow, 2009). Participants are asked to describe how they think about themselves at the present point in time when answering each item. Responses are recorded on a 6-point Likert scale, ranging from strongly disagree (1) to strongly agree (6). The PCQ is not available in the public domain. Permission to use the PCQ was requested and was granted for the current study (See Appendix 5).

Avey, Luthans, Smith and Palmer (2010) reported the following Cronbach's alpha for each of the four sub-scales; *Optimism*  $\alpha = .78$ , *Hope*  $\alpha = .87$ , *Self-Efficacy*  $\alpha = .87$  and *Resiliency*  $\alpha = .72$ . These reliability coefficients for the sub-scales are similar to those reported in the construct validation study of the PCQ-24 (Luthans et al., 2007a). Furthermore, Luthans et al. (2007a) reported the following Cronbach's alpha for the overall *PsyCap* measure for four samples;  $\alpha = .88$ ,  $\alpha = .89$ ,  $\alpha = .89$ ,  $\alpha = .89$ . In sum, the internal consistencies of the various sub-scales and the overall *PsyCap* measure are therefore satisfactory ( $\alpha \geq .70$ ).

### 3.6.4 TRANSFORMATIONAL LEADERSHIP

The Multi-Factor Leadership Questionnaire Rater Form 5X (MLQ, Bass & Avolio, 2004) was used to measure *Transformational Leadership*. Evidence exists that supports the notion of a multi-dimensional model of *Transformational Leadership* (Avolio, Bass & Jung, 1999). The MLQ measures the four dimensions of *Transformational Leadership* - *Idealised Influence*, *Individualised Consideration*, *Intellectual Stimulation* and *Inspirational Motivation*. *Idealised Influence* is subdivided into its two sub-categories, namely *Idealised Influence (attributed)* and *Idealised Influence (behaviour)*. The 20-item MLQ utilised in the following study therefore comprises five sub-scales, consisting of four items each. Responses are recorded on a 5-point Likert scale, ranging from not at all (0) to frequently, if not always (4). The MLQ is not available in the public domain. Permission to use the MLQ was requested and was granted for the current study (See Appendix 5).

According to Bass and Avolio (2004), the MLQ-5X has an overall reliability coefficient of  $\alpha = .93$ . The Cronbach's alpha for each of the five sub-scales is as follows: *Idealised Influence* (attributes)  $\alpha = .72$ , *Idealised Influence* (behaviour)  $\alpha = .73$ , *Individualised Consideration*  $\alpha = .83$ , *Intellectual Stimulation*  $\alpha = .80$  and *Inspirational Motivation*  $\alpha = .84$ . In sum, the internal consistencies of the various sub-scales and the overall MLQ meet the minimum requirement of  $\alpha \geq .70$ .

### 3.6.5 WORK VALUES

The Work Value Survey (WVS; Cable & Edwards, 2004) model is based on Schwartz (1992) value model. The WVS model identifies eight core work values that load on four higher-order value types. The survey consists of twenty-four items (three items per value) adapted from existing measures of work values. In the current study, the focus is only on the *Self-Transcendence* higher-order value type and the two lower-order values, *Altruism* and *Relationships with others*, which load on *Self-Transcendence*. More specifically, the current study is concerned with the congruence/fit between the organisation's endorsement of *Self-Transcendence*, *Altruism* and *Relationships with others*, and the employee's endorsement of these values. Congruence/fit was assessed subjectively (i.e. fit was assessed indirectly through the comparison of a person's endorsement of particular values and an organisation endorsement of particular values as reported by the same person). Respondents were therefore asked to rate each WVS item in terms of "How important is this to you?" and "How important is this to your organisation?" Responses are recorded on a 5-point Likert scale, ranging from not important at all (1) to extremely important (5). In sum, each respondent will therefore respond to six items (three items for *Altruism* and three items for *Relationships with others*) twice (a first time in order to measure the respondent's endorsement of the particular value and a second time to measure the respondent's perception of the organisation's endorsement of a particular value).

Edwards and Cable (as cited in Cable & Edwards, 2004) conducted a validation study and obtained reliabilities for the three-item scales that ranged from  $\alpha = .73$  to  $\alpha$

= .87 and averaged  $\alpha = .82$ . These reliability coefficients are therefore satisfactory ( $\alpha \geq .70$ ).

### 3.6.6 MEANINGFULNESS

Constructs gain their connotative meaning in the literature study. In the literature study in Chapter 2 it was noted that there is agreement between Hackman and Oldham (1975, 1980) and Kahn (1990) as to what *Meaningfulness* represents. This study endorses the Hackman-Oldham-Kahn definition of *Meaningfulness*. A suitable measure of *Meaningfulness* therefore needs to be selected that reflects this conceptual agreement (“common ground”) between Hackman and Oldham (1975, 1980) and Kahn (1990) on the manner in which *Meaningfulness* is defined.

Four items in the JDS (Hackman & Oldham, 1980) relates to *Meaningfulness*. Two items ask respondents to indicate their agreement/disagreement with a number of statements about their work experience. The other two items use a projective format in which respondents are asked to think of other people in their organisation who hold the same job as they do and to indicate how accurate each of the two statements are in describing the feelings of those other people about the job. Responses are recorded on a 7-point Likert scale ranging from “disagree strongly” through “neutral” to “agree strongly.” The reliability coefficient of the *Meaningfulness* items is  $\alpha = .74$  (Hackman & Oldham, 1975).

May, Gilson and Harter (2004) built on Kahn’s (1990) work and aimed to explore the determinants and mediating effects of the three psychological conditions - *Meaningfulness*, *Psychological Safety* and *Psychological Availability* - on employees’ engagement in their work. Six items ( $\alpha = .90$ ) drawn from Spreitzer (as cited in May et al., 2004) and May (as cited in May et al., 2004) measured *Meaningfulness* (i.e. measured the degree of meaning that employees discovered in their work-related activities). Responses are recorded on a 5-point Likert scale with strongly disagree (1) to strongly agree (5).

The current study adapted items from Hackman and Oldham (1980) and May et al. (2004) to develop a measure of *Meaningfulness* that appropriately reflects the

Hackman-Oldham-Kahn definition of *Meaningfulness* endorsed in this study. Consequently, six items were developed/ selected to measure the *Meaningfulness* construct. Responses are recorded on a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5). The reliability of the adapted scale will be empirically examined in the current study.

### 3.6.7 PSYCHOLOGICAL SAFETY

Kahn defines *Psychological Safety* as “feeling able to show and employ one’s self without fear of negative consequences to self-image, status, or career” (1990, p. 708). In other words, employees feel safe when they perceive that they will not suffer for expressing their true selves at work. Employees experience *Psychological Safety* as a result of a supportive and trusting relationship with co-workers and supervisors in the organisation (Kahn, 1990; May et al., 2004).

Based on an extensive literature review there does not appear to be a measure that fully captures the connotative meaning of the *Psychological Safety* construct as it is constitutively defined in the current study. Kahn (1990) did all his research in a qualitative manner and never developed and evaluated a measure that captures his conceptualisation of *Psychological Safety*. Existing research studies that measure the *Psychological Safety* construct either develop a measure based on Kahn’s qualitative work or adapt measures by combining items from previous studies that measure *Psychological Safety* (Brown & Leigh, 1996; Liang, Farth & Farth, 2012; May et al., 2004).

May et al. (2004) measure *Psychological Safety* with three items ( $\alpha = .71$ ) based on Kahn’s (1990) work. Brown and Leigh (1996) developed a measure of *Psychological Climate*, which consisted of six first-order dimensions that loaded onto two higher-order dimensions, namely *Psychological Safety* and *Psychological Meaningfulness*. More specifically, *Supportive Management*, *Role Clarity* and *Self-Expression* represent the three first-order dimensions that were hypothesised to load onto *Psychological Safety*. Confirmatory factor analysis was performed and adequate fit was obtained. Five items measure the *Supportive Management* dimension. An alpha of  $\alpha = .83$  and  $\alpha = .85$  was obtained for two samples. Three items measure the *Role*

*Clarity* dimension ( $\alpha = .78$  and  $.76$ ). Four items measure the *Self-Expression* dimension ( $\alpha = .83$  and  $.73$ ). Ling et al. (2012) measure *Psychological Safety* with five items adapted from Brown and Leigh (1996) and May et al. (2004) to match their research context.

The current study selected and adapted items from Brown and Leigh (1996), Liang et al. (2012) and May et al. (2004) to develop a measure of *Psychological Safety* that appropriate reflects the connotative meaning of *Psychological Safety* in this study. Consequently, nine items were selected/ adapted/ developed to measure the *Psychological Safety* construct. Responses are recorded on a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5). The reliability of the adapted scale will be empirically examined in the current study.

### **3.7 REPRESENTATION OF THE LATENT VARIABLES VIA INDICATOR VARIABLES**

Besides selecting appropriate measures with which to operationalise the latent variables via indicator variables, the question how the individual items of the multi-indicator measures should be used to represent the latent variables needs to be addressed. Essentially, four possibilities were considered in the current study: 1) using the individual items to represent the latent variables, 2) forming item parcels by calculating the mean of the even and uneven numbered items to form two composite indicator variables, 3) calculating total scores/ mean scores for the items of each sub-dimension comprising the latent variables (where applicable), and 4) combining all the items into a single score to represent the latent variable (Theron, 2012).

Earlier when considering the appropriate research design, it was decided that an *ex post facto* correlational design with two or more indicator variables per latent variable would be used with SEM as the analysis technique when fitting the proposed *Work Engagement* structural model. In terms of the two narrow-focus structural models, it was decided that an *ex post facto* correlational design with a single indicator per latent variable with polynomial regression analysis as analysis technique would be used.

### 3.7.1 REPRESENTATION OF THE LATENT VARIABLES VIA INDICATOR VARIABLES: THE *WORK ENGAGEMENT* STRUCTURAL MODEL

With regards to the *Work Engagement* latent variable, confirmatory factor analysis indicates that the three-factor structure of the UWES is superior to the one-factor model (Schaufeli et al., 2002). In a more recent study, the multi-dimensionality of the UWES-9 is indeed confirmed (De Bruin & Henn, 2013). Therefore, instead of assuming all items weigh on one underlying *Work Engagement* factor, the mean score for each of the three sub-scales represent three indicator variables for the *Work Engagement* latent variable. De Bruin and Henn agree, suggesting that in an SEM context it is considered appropriate to "...create three item parcels that correspond with the three subscales and use these as manifest indicators of the latent work engagement factor" (2013, p. 797).

Two item parcels were calculated for the *Job Characteristics* latent variable by taking the mean of the even and uneven numbered items of the *Job Characteristics* scale to form two indicator variables. Likewise, two item parcels were calculated for the *PsyCap* latent variable to form two indicator variables. In terms of the *Transformational Leadership* latent variable, the mean score (obtained from four items) for each of the five sub-scales (*Idealised Influence: attributed*, *Idealised Influence: behaviour*, *Individualised Consideration*, *Intellectual Stimulation and Inspirational Motivation*) of *Transformational Leadership* represent five indicator variables. Two item parcels were calculated for the *Meaningfulness* latent variable by taking the mean of the even and uneven numbered items of the *Meaningfulness* scale to form two indicator variables. Likewise, two item parcels were calculated for the *Psychological Safety* latent variable to form two indicator variables. For the two *Self-Transcendence* latent variables (i.e. the *Employee Endorsement of Self-Transcendence* latent variable and the *Perceived Organisational Endorsement of Self-Transcendence* latent variable) three indicator variables were calculated for each of the two latent variables by parcelling the six items of the *Self-Transcendence* value scale. Because of the rather small number of items in the first-order value sub-scales (three items for the *Altruism* sub-scale and three items for the *Relationships with others* sub-scale), instead of creating item parcels with even and uneven numbers, three item parcels were created by placing the three *Altruism* items each in

a parcel and the three *Relationships with others* items each in a parcel (e.g. the first item of each sub-scale in the first parcel, second item of each sub-scale in the second parcel, and third item of each sub-scale in the third parcel).

The *Work Engagement* structural model does not only hypothesise about main effects between the latent variables, but also hypothesises about two latent interaction effects and two latent squared effects. The inclusion of the first latent interaction effect was grounded in a substantive theoretical argument, namely that in the *Work Engagement* structural model it is proposed that the influence of *Job Characteristics* on *Work Engagement* is moderated by *PsyCap* (i.e. that the *PsyCap\*Job Characteristics* interaction latent variable influences *Work Engagement*). In contrast to this, the second latent interaction effect and the two latent squared effects were included because of the need to make provision for possible curvilinearity in the response surface describing the response of *Work Engagement* to congruence between *Employee Endorsement of Self-Transcendence* and *Perceived Organisational Endorsement of Self-Transcendence*.

Little, Bovaird and Widaman (2006) propose a technique known as orthogonalising (i.e. residual centring) to derive indicator variables for the latent interaction effects and latent squared effects when testing a model containing such effects. Orthogonalising involves calculating all possible product terms from the indicators of the latent variables involved in the latent interaction effect or latent squared effects, regressing each product term on all the individual indicators of the latent variables involved and then calculating the residuals for each regression model. The residuals are then used to represent the indicator variables for the latent interaction effect variables or latent squared effect variables. Since the residuals contain that part of the dependent variable that is unrelated to the predictors it was regressed on, the residuals in this case contain the pure interaction effect from which the main effects involved in the creation of the product term have been removed.

Therefore, in the case of the *PsyCap\*Job Characteristics* latent variable, a total of four product terms were calculated since the *PsyCap* latent variable is represented by two indicator variables and the *Job Characteristics* latent variable is represented by two indicator variables. These four product terms were then regressed on all four individual indicator variables involved (two indicator variables representing the

*PsyCap* latent variable and two indicator variables representing the *Job Characteristics* latent variable) and residuals were then calculated for each regression model. The four residuals represent four indicator variables for the *PsyCap\*Job Characteristics* latent variable.

In the case of the *Employee Endorsement of Self-Transcendence\*Perceived Organisational Endorsement of Self-Transcendence* latent variable, a total of nine product terms were calculated since the *Employee Endorsement of Self-Transcendence* latent variable is represented by three indicator variables and the *Perceived Organisational Endorsement of Self-Transcendence* latent variable is also represented by three indicator variables. These nine product terms were then regressed on all six individual indicator variables involved. The nine residuals calculated for each regression model represent nine indicator variables for the *Employee Endorsement of Self-Transcendence\*Perceived Organisational Endorsement of Self-Transcendence* latent variable.

In the case of the two latent squared effects (i.e. the *Squared Employee Endorsement of Self-Transcendence* latent variable and *Squared Perceived Organisational Endorsement of Self-Transcendence* latent variable), a total of six product terms were calculated for each latent squared effect since each latent squared effect is represented by three indicator variables. In each case, these six product terms were then regressed on all three individual indicator variables involved. The six residuals calculated for each regression model represent six indicator variables for the particular latent squared effect (i.e. for the *Squared Employee Endorsement of Self-Transcendence* latent variable and for the *Squared Perceived Organisational Endorsement of Self-Transcendence* latent variable).

The representation of the latent variables via indicator variables in the *Work Engagement* structural model is summarised in Table 3.2 below:



**Table 3.2*****Representation of the Latent Variables via Indicator Variables in the Work Engagement Structural Model***

<b>Latent variable</b>	<b>Number of indicators per latent variable</b>
<i>Work Engagement</i>	3
<i>Job Characteristics</i>	2
<i>PsyCap</i>	2
<i>Transformational Leadership</i>	5
<i>Meaningfulness</i>	2
<i>Psychological Safety</i>	2
<i>Employee Endorsement of Self-Transcendence</i>	3
<i>Perceived Organisational Endorsement of Self-Transcendence</i>	3
<i>PsyCap*Job Characteristics</i>	4
<i>Employee Endorsement of Self-Transcendence*Perceived Organisational Endorsement of Self-Transcendence</i>	9
<i>Squared Employee Endorsement of Self-Transcendence</i>	6
<i>Squared Perceived Organisational Endorsement of Self-Transcendence</i>	6

**3.7.2 REPRESENTATION OF THE LATENT VARIABLES VIA INDICATOR VARIABLES: THE TWO NARROW-FOCUS STRUCTURAL MODELS**

Earlier when considering the appropriate research design, it has been decided that a single indicator would represent the latent variables in the two narrow-focus structural models (i.e. the *Altruism Value Congruence Work Engagement* structural model and the *Relationships with others Value Congruence Work Engagement* structural model). Indicator variables were therefore calculated for the endogenous latent variable in the model as well as the two exogenous main effect latent variables by calculating the total score from the observed scores of the items measuring the particular latent variables. In other words, the indicator representing the *Employee Endorsement of Altruism* latent variable and the indicator representing the *Perceived Organisational Endorsement of Altruism* latent variable represent the total of the observed scores on the three *Altruism* items. *Work Engagement* was represented by the total score on the UWES-9. Likewise, the indicator representing the *Employee Endorsement of Relationships with others* latent variable and the indicator representing the *Perceived Organisational Endorsement of Relationships with others*

latent variable represent the total of the observed scores on the three *Relationships with others* items<sup>26</sup>.

Little et al. (2006) propose a technique known as mean-centering to derive indicator variables for the latent interaction effects (*Employee Endorsement of Altruism\*Perceived Organisational Endorsement of Altruism* and *Employee Endorsement of Relationships with others\*Perceived Organisational Endorsement of Relationships with others*) and the latent squared effects (*Squared Employee Endorsement of Altruism*, *Squared Perceived Organisational Endorsement of Altruism*, *Squared Employee Endorsement of Relationships with others* and *Squared Perceived Organisational Endorsement of Relationships with others*) when testing the two narrow-focus structural models containing such effects via observed score polynomial regression. Mean-centering involves subtracting the mean of each single indicator from the indicator score for each case as follows:

$$X_{1MC} = X_{i1} - \bar{X}_1$$

$$X_{2MC} = X_{i2} - \bar{X}_2$$

Once the single indicators ( $X_1$  and  $X_2$ ) representing the single latent variables in the two narrow-focus structural models have been mean-centred ( $X_{1MC}$  and  $X_{2MC}$ ), the indicator variables for the latent interaction effects ( $X_4$ ) and the latent squared effects ( $X_3$  and  $X_5$ ) can be calculated as follows:

$$X_3 = X_{1MC}^2$$

$$X_4 = X_{1MC} * X_{2MC}$$

$$X_5 = X_{2MC}^2$$

### 3.8 MISSING VALUES

The ideal would be to have complete sets of data. It is however often the case that data is missing. The presence of missing values presents a problem that needs to

<sup>26</sup> The employee responds to three items measuring *Altruism* and three items measuring *Relationships with others* twice – a first time in order to assess how important the value is to the employee and a second time in order to assess how important the employee perceives the value to be to the organisation.

be addressed before analysis can proceed. The method used to address missing values depends on the number of missing values as well as the nature of the data, especially whether the data follows a multivariate normal distribution. Various possible options to treat the problem of missing values have been investigated and are discussed in this section. The investigated options were as follows:

- List-wise deletion of cases
- Pair-wise deletion of cases
- Full information maximum likelihood (FIML) estimation
- Multiple imputations(MI)
- Imputation by matching

List-wise deletion of cases involves identifying and deleting complete cases where there is missing values for one or more items. Pair-wise deletion entails deleting cases only for analysis on variables where values are missing (Dunbar-Isaacson, 2006). The problem with these two options is that they result in a large loss of data. In list-wise deletion, the size of the sample could be dramatically reduced. Pair-wise deletion may result in a correlation matrix with extreme variation in N-values. Experience indicated that correlation matrices in which excessive variation in N-values occur may sometimes fail to be positive definite (Jöreskog & Sörbom, 1996). Based on the above information, neither of these two methods would be considered.

Full information maximum likelihood (FIML) estimation uses an iterative approach, the expectation-maximisation (EM) algorithm, in order to compute a case-wise likelihood function using only those variables that are observed for specific cases. This allows for estimates to be obtained of missing values based on incomplete observed data to maximise the observed data likelihood (Enders & Bandalos as cited in Dunbar-Isaacson, 2006). Further item analysis, dimensionality analysis and the calculation of item parcels is not possible, due to the fact that FIML directly returns a covariance matrix calculated from imputed data (Smuts, 2011). The FIML estimation method assumes that the observed data follows an underlying multivariate distribution, and can therefore only be applied if this assumption is met (Du Toit & Du Toit, 2001).

The multiple imputation method involves conducting several imputations for each missing value. Each imputation produces a complete data set, which is analysed separately in order to obtain multiple estimates of the parameters of the model (Davey, et al., Raghunatha & Schafer as cited in Dunbar-Isaacson, 2006). As is the case with FIML, multiple imputation assumes that data is missing at random and that the observed data follows a multivariate normal distribution (Du Toit & Du Toit, 2001).

Imputation by matching involves substituting real values for missing values. The substitute values replaced for a case are derived from one or more other cases that have a similar response pattern over a set of matching variables. The ideal is to use matching variables that will not be utilised in confirmatory factor analysis. This ideal is normally not possible. The items least plagued by missing values are consequently typically identified to serve as matching variables. Cases with missing values that could not be imputed are eliminated from the data set.

Given the above investigation of the various methods available for treating missing values, imputation by matching appears to be the most suitable method. This is particularly due to the fact that the assumption of multivariate normality is not met in most cases. Imputation by matching makes less stringent assumptions than the MI and FIML estimation procedures. According to Theron (2013), imputation by matching appears to be the most conservative and safe procedure to solve the missing values problem.

### **3.9 STATISTICAL ANALYSIS**

Item analysis, exploratory factor analysis, structural equation modelling and polynomial regression analysis with response surface analysis were used to analyse the data obtained from the various measuring instruments.

### 3.9.1 ITEM ANALYSIS

Measuring instruments are generally developed to measure a specific construct or a dimension of a construct to which constitutive meaning has been attached. The particular instruments used in this study to operationalise the latent variables comprising the three structural models depicted in Figure 2.3, Figure 2.4, and Figure 2.5 have been identified and discussed in section 3.6. The items of the various instruments have been developed to reflect the standing of the respondents on these specific latent variables. In other words, the items are intended to function as stimulus sets to which the participants respond with behaviour that is a relatively uncontaminated expression of a specific underlying latent variable or a latent dimension of a multi-dimensional latent variable. The question that needs to be raised is whether this intention succeeded? The items can only be fruitfully combined into composite indicators of specific latent variables as indicated in section 3.7.1 and section 3.7.2 if the design intention underlying the design and development of the various scales succeeded.

The degree to which the intention of having specific items reflecting the standing on specific latent variables (or latent dimensions of multi-dimensional latent variables) succeeded is reflected in a number of classical measurement theory item statistics. Item analysis is therefore conducted with the purpose of identifying those items that do not successfully reflect the intended latent variable<sup>27</sup>. In other words, item analysis allows the researcher to identify and eliminate those items not contributing to an internally consistent description of the various latent dimensions comprising the construct in question and those that are insensitive to differences on the latent variable they are meant to reflect. The identifying of poor items and the consequent decision of whether or not to eliminate those poor items was based on a basket of statistical evidence. The evidence includes, amongst others, the following classical measurement theory item statistics: the item-total correlations, the squared multiple correlation, the change in subscale reliability when the item is deleted, the change in

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<sup>27</sup> Neither the item analysis nor the EFA of the various scales provide sufficient evidence to permit a conclusive verdict on the success with which the specific latent variable, as constitutively defined, is measured. To obtain more conclusive evidence on the construct validity of the various scales the measurement models mapping the items on the latent variables will have to be elaborated into fully fledged structural models that also map the latent variables onto outcome latent variables in accordance with the directives of the constitutive definitions of the latent variables.

subscale variance when the item is deleted, the inter-item correlations and the item mean and standard deviation (Burger, 2012).

Item analysis was performed on the data after the treatment of missing values, using SPSS version 21 (<http://www.ibm.com/za/en/>).

### **3.9.2 DIMENSIONALITY ANALYSES VIA EXPLORATORY FACTOR ANALYSIS (EFA)**

The architecture of each of the scales and subscales used to operationalise the latent variables comprising the proposed *Work Engagement* structural model and the two narrow-focus structural models reflects the intention to construct essentially one-dimensional sets of items. These items are intended to act as stimulus sets to which the participants respond with behaviour that is primarily an expression of a specific uni-dimensional underlying latent variable or latent dimension of a multi-dimensional latent variable. The behavioural response to each item is however never only a reflection of the latent variable of interest, but is also influenced by a number of other latent variables and random error influences (Guion, 1998). An assumption is however made that only the relevant latent variable is a common source of variance across all the items comprising a subscale. This is because the non-relevant latent variables that influence a respondent's reaction to item  $i$ , do not operate to affect respondent's reaction to item  $j$  (Burger, 2012). The assumption can therefore be made that if the latent variable of interest would be statistically controlled, the partial correlation between items would approach zero (Hulin, Drasgow & Parson, 1983). In the case that this is indeed so, it would imply the existence of a single underlying common factor. In addition the assumption is that a substantial proportion of the variance in each item is explained by the latent variable or latent dimension of a multi-dimensional latent variable it was designed to reflect. In sum, the aim is to obtain a relatively uncontaminated measure of the specific underlying latent variable via the items comprising the scale.

In order to examine the uni-dimensionality assumption and the assumption that a particular latent variable explains a substantial proportion of the variance observed in each item, exploratory factor analysis (EFA) was performed on each of the scales

referred to in section 3.6. Du Toit and Du Toit (2001) agree on the usefulness of EFA, mentioning that the usefulness of EFA in the early stages of experimentation or test development is widely acknowledged in research. Furthermore, principal axis factor analysis was used as the extraction technique and the extracted solution was subjected to oblique rotation in the case of factor fission (Tabachnick & Fidell, 2001). Principal axis factoring (PAF) only analyses common variance shared between the items comprising a subscale, and is therefore preferred over principal component analysis (PCA) which analyses all the variance (Tabachnick & Fidell, 2001). Oblique rotation, although slightly more difficult to interpret than orthogonal rotation, is more realistic because it makes better provision for the possibility that, if factor fission would occur, that the extracted factors could be correlated. A factor loading of a single item on an extracted factor was considered acceptable if  $\lambda_{ij} > .50$ . It is however recommended that in the context of confirmatory factor analysis, factor loadings of composite indicator variables on the latent variable they were tasked to reflect should be considered satisfactory if  $\lambda_{ij} > .71$  (Hair, Anderson, Tatham & Black, 2006). This critical cut-off value suggested by Hair et al. (2006) was regarded as rather stringent in the case of individual items. It was, however, utilised when interpreting the factor loadings of the item parcels in the measurement model fitted prior to the evaluation of the fit of the proposed *Work Engagement* structural model.

Dimensionality analysis was performed using SPSS version 21 (<http://www.ibm.com/za/en/>).

### **3.9.3 STRUCTURAL EQUATION MODELLING**

Earlier when considering the appropriate research design, it was decided that an *ex post facto* correlational design should be used with two or more indicators per latent variable with structural equation modelling (SEM) as the statistical analysis technique to test the *Work Engagement* structural model. SEM involves various statistical procedures that are discussed in greater depth in this section.

### 3.9.3.1 VARIABLE TYPE

The appropriate moment matrix to analyse and appropriate technique to use to estimate the freed model parameters, depends on the measurement level on which the indicator variables are measured (Burger, 2012). According to Theron (2012), four possibilities exist when using measured operational definitions to test a structural model- the individual items could be used to represent the latent variable, item parcels could be formed, dimension scores could be calculated from the items or all the items can be combined in a single score. The option of combining all items to form a single score is however not applicable when using SEM to evaluate the proposed structural model, since the resultant comprehensive LISREL model would run the risk of not being identified (Diamantopoulos & Siguaaw, 2000). Using individual items as indicator variables can result in a very complex LISREL model, which would then require a very large sample to ensure credible parameter estimates. It was therefore instead decided that dimension scores could be calculated from the items where applicable and that item parcels would also be formed in some instances. Item responses on a Likert scale represent discrete variables. Variables analysed in SEM are however typically continuous, as continuous variables have certain desirable properties above and beyond discrete variables. Such desirable properties include a distribution that is approximately normal and a range of scores sufficiently broad to reasonably distinguish among individual cases (Kline, 1998). Estimation methods in LISREL used for continuous variables are also much more advanced than in the case of discrete variables. Likert responses may be assumed to be continuous if the Likert scale consists of 5 or more scale points (Muthén & Kaplan, 1985). Composite indicator variables can also be considered to be continuous variables. In the current study, it was therefore assumed that indicator variables are continuous variables, measured on an interval level. The maximum likelihood estimation technique assumes variables are continuous. Based on this assumption, the covariance matrix will be analysed using maximum likelihood estimation. A further assumption must, however, be taken into consideration. The maximum likelihood estimation technique further assumes multivariate normality of variables (Kline, 1998; Mels, 2003). The covariance matrix



would therefore be analysed using maximum likelihood provided that the multivariate normality assumption is met.

### **3.9.3.2 MULTIVARIATE NORMALITY**

The null hypothesis assumption that the indicator variables used to operationalise the latent variables in the structural model follow a multivariate normal distribution was formally tested in order to determine the appropriate estimation technique. Maximum likelihood estimation assumes multivariate normality. Therefore in the case that the null hypothesis of multivariate normality is not rejected, the maximum likelihood estimation technique can be used. If the null hypothesis of multivariate normality is however rejected, normalisation is attempted (Jöreskog & Sörbom, 1996). In the case that this attempt at normalisation is successful, the maximum likelihood estimation technique can be used. If however the attempt to normalise the data fails, robust maximum likelihood would be used (Mels, 2003).

### **3.9.3.3 CONFIRMATORY FACTOR ANALYSIS (CFA)**

The *Work Engagement* 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 successfully reflect the latent variables they were intended to represent (Diamantopoulos & Siguaw, 2000). The fit of the *Work Engagement* measurement model therefore needs to be evaluated prior to fitting the *Work Engagement* structural model. The measurement model describes the manner in which the latent variables express themselves in indicator variables and is therefore an additional model that is used to operationalise the *Work Engagement* structural model. Decisions were made in section 3.6 about the manner in which the latent variables in the *Work Engagement* structural model should be operationalised. Decisions were made in section 3.7 about the manner in which the latent variables should be represented via indicator variables. The comprehensive LISREL model comprises an exogenous and an endogenous measurement. However, a single exogenous measurement model was fitted to

examine the success of the operationalisation of the latent variables in which all twelve latent variables in Figure 2.5 are treated as if they are exogenous latent variables.

The covariance matrix was analysed when fitting the measurement model. In the case where the multivariate normality assumption is met (before or after attempting to normalise the data) the maximum likelihood estimation technique was used. If however the normalisation attempt failed to achieve multivariate normality, the robust maximum likelihood estimation technique was used to estimate the freed measurement model parameters. In the current study LISREL 8.8 (Du Toit & Du Toit, 2001) was used to perform the confirmatory factor analysis.

The substantive measurement hypothesis being evaluated is that the measurement model provides a valid account of the process that produced the observed covariance matrix. If the measurement hypothesis is interpreted to mean that the *Work Engagement* measurement model provides a perfect account of the manner in which the latent variables manifest themselves in the indicator variables, the measurement hypothesis can be translated into the following exact fit null hypothesis (hypothesis 26a):

$$\begin{aligned} H_{026a}: \text{RMSEA} &= 0 \\ H_{a26a}: \text{RMSEA} &> 0 \end{aligned}$$

Models are however only approximations of reality and therefore it is somewhat unrealistic to assume that the measurement model provides a perfect account of the manner in which the latent variables manifest themselves in indicator variables. Therefore it would be more appropriate if the measurement hypothesis is interpreted to mean that the *Work Engagement* measurement model provides an approximate account of the manner in which the latent variables manifest themselves in indicator variables. The measurement hypothesis of approximate fit translates into the following close fit null hypothesis (hypothesis 26b):

$$\begin{aligned} H_{026b}: \text{RMSEA} &\leq .05 \\ H_{a26b}: \text{RMSEA} &> .05 \end{aligned}$$

### 3.9.3.4 INTERPRETING THE WORK ENGAGEMENT MEASUREMENT MODEL FIT AND PARAMETER ESTIMATES

The aim of fitting the measurement model is to determine the validity and reliability of the measures used to represent the constructs of interest (Diamantopoulos & Siguaw, 2000). Measurement model fit describes the ability of the fitted model to reproduce the observed covariance matrix. In other words, the model fits well if the reproduced covariance matrix approximates the observed covariance matrix. Measurement model fit was interpreted by inspecting the full spectrum of goodness of fit indices provided by LISREL (Diamantopoulos & Siguaw, 2000). The exact fit null hypothesis ( $H_{026a}$ ) that the *Work Engagement* measurement model provides a perfect account of the manner in which the latent variables manifest themselves in the indicator variables was tested via the Satorra-Bentler chi square ( $\chi^2$ ) statistic (assuming that the multivariate assumption was not met). A statistically significant chi square results in the rejection of the null hypothesis ( $H_{026a}$ ), thereby implying imperfect measurement model fit. It is somewhat unrealistic to assume that the measurement model would provide a perfect account of the manner in which the latent variables manifest themselves, and it is therefore highly likely that  $H_{026a}$  would therefore be rejected. In this case, the close fit null hypothesis ( $H_{026b}$ ) was tested by inspecting the probability of obtaining the sample estimate of the root mean square error of approximation (RMSEA) under the close fit null hypothesis. Diamantopoulos and Siguaw (2000) suggest that a sample RMSEA value less than .05 is indicative of good model fit, a value greater than .05 and less than .08 is indicative of reasonable fit, a value greater than .08 and less than .10 is indicative of mediocre fit and a value greater than .10 indicates poor fit in the sample. The close fit null hypothesis was not rejected if the probability of observing the sample RMSEA estimate under the close fit null hypothesis was sufficiently large (i.e. > .05). Not rejecting the close fit null hypothesis implies that the position that the model fits closely in the parameter ( $H_{026b}$  RMSEA= .05) is a valid (i.e. permissible) position to hold.

In addition to the goodness of fit statistics, the magnitude and distribution of the standardised residuals and the magnitude of model modification indices calculated for  $\Lambda_x$  and  $\Theta_\delta$  were also examined to assess the quality of model fit. Residuals represent the difference between elements of the observed and reproduced

covariance matrices. Standardised residuals can be interpreted as z-scores (i.e. in terms of standard deviation units deviating from the mean; Diamantopoulos & Siguaw, 2000). Standardised residuals can be considered large if they exceed the absolute value of 2.58. In terms of distribution, residuals should be distributed approximately symmetrical around zero. Positive residuals indicate underestimation and thus imply the need for additional explanatory paths. Negative residuals indicate overestimation and thus suggest the need to prune paths away. Modification indices indicate the extent to which the  $\chi^2$  fit statistic will decrease if a currently fixed parameter in the models is freed. Large modification indices indicate measurement model parameters that, if set free, would improve the fit. Large numbers of large and significant modification indices comment negatively on the fit of the model, in that it suggests that numerous possibilities exist to improve the fit of the model.

If the *Work Engagement* measurement model shows at least reasonable fit the measurement model parameter estimates will be interpreted. Specifically, the statistical significance and magnitude of the freed factor loadings in  $\Lambda_x$ , the statistical significance and magnitude of the measurement error variances in the main diagonal in  $\Theta_\delta$ , the statistical significance and magnitude of the measurement error covariances in the off-diagonal of  $\Theta_\delta$  and the statistical significance and magnitude of the latent variable covariances in the off-diagonal of  $\Phi$  are considered.

If exact or close measurement model fit would be found (i.e.  $H_{026a}$  or  $H_{026b}$  would not be rejected) the following 47 null hypotheses on the slope of the regression of the  $j^{\text{th}}$  item parcel on the  $k^{\text{th}}$  latent variable will be tested:

$$H_{0i}: \lambda_{jk}=0; i=26, 27, \dots, 72; j=1, 2, \dots, 47; k=1, 2, \dots, 12$$

$$H_{ai}: \lambda_{jk}\neq 0; i=26, 27, \dots, 72; j=1, 2, \dots, 47; k=1, 2, \dots, 12$$

If exact or close measurement model fit would be found (i.e.  $H_{026a}$  or  $H_{026b}$  would not be rejected), the following 47 null hypotheses would be tested with regards to the freed variance elements in the variance-covariance matrix  $\Theta_\delta$ :

$$H_{0i}: \Theta_{\delta jj}=0; i=73, 74, \dots, 119; j=1, 2, \dots, 47$$

$$H_{ai}: \Theta_{\delta jj} > 0; i=88, 89, \dots, 119; j=1, 2, \dots, 47$$

Due to the orthogonalising procedure that was used to create the indicator variables for the latent product terms and latent squared terms in the model, specific measurement error terms were allowed to correlate. Consequently the following 39 null hypotheses would be tested with regards to the freed covariance elements in the variance-covariance matrix  $\Theta_{\delta}$  if exact or close measurement model fit would be found (i.e.  $H_{026a}$  or  $H_{026b}$  would not be rejected):

$$H_{0i}: \Theta_{\delta_{jk}} = 0; i = 120, 89, \dots, 159; j = 1, 2, \dots, 39; k = 1, 2, \dots, 39; j \neq k$$

$$H_{ai}: \Theta_{\delta_{jk}} > 0; i = 120, 89, \dots, 159; j = 1, 2, \dots, 39; k = 1, 2, \dots, 39; j \neq k$$

If exact or close measurement model fit would be found (i.e.  $H_{026a}$  or  $H_{026b}$  would not be rejected), the following 66 null hypotheses would be tested with regards to the freed covariance elements in the variance-covariance matrix  $\Phi$ :

$$H_{0i}: \phi_{jk} = 0; i = 160, 161, \dots, 225; j = 1, 2, \dots, 66; k = 1, 2, \dots, 66; j \neq k$$

$$H_{ai}: \phi_{jk} > 0; i = 160, 161, \dots, 225; j = 1, 2, \dots, 66$$

In addition, the squared multiple correlations ( $R^2$ ) for the indicators were interpreted. The  $R^2$  shows the proportion of the variance in an indicator that is explained by its underlying latent variable. High  $R^2$  values are preferred.

Successful operationalisation of the latent variables comprising the structural model is indicated if: a) the measurement model fits the data reasonably well, b) the completely standardised factor loadings  $\lambda_{ij}^x$  are large ( $\lambda_{ij} \geq .71$ ) and statistically significant ( $p < .05$ ), c) the variance terms ( $\theta_{\delta}$ ) in the completely standardised solution are small and statistically significant ( $p < .05$ ) for all items, and d) the  $R^2$  indices are large. If at least reasonable fit is obtained for the *Work Engagement* measurement model and if the parameter estimates satisfy the stipulated conditions discussed above, then the *Work Engagement* structural model will be tested by fitting the comprehensive LISREL model.

### 3.9.3.5 FITTING OF THE WORK ENGAGEMENT STRUCTURAL MODEL

The *Work Engagement* structural model was fitted by analysing the covariance matrix. The maximum likelihood estimation technique is used if the multivariate normality assumption was met (before or after normalising the data). If the attempt to normalise the data failed, the robust maximum likelihood estimation technique is used. LISREL 8.8 (Du Toit & Du Toit, 2001) was used to perform the structural equation analysis.

### 3.9.3.6 INTERPRETING THE WORK ENGAGEMENT STRUCTURAL MODEL FIT AND PARAMETER ESTIMATES

Structural model fit is interpreted by inspecting the full spectrum of goodness of fit indices provided by LISREL (Diamantopoulos & Siguaaw, 2000). The exact fit null hypothesis ( $H_{01a}$ ) that the *Work Engagement* structural model provides a perfect account of the psychological dynamics underlying *Work Engagement* is tested via the Satorra-Bentler chi square ( $\chi^2$ ) statistic (assuming that RML estimation was used). A statistically significant chi square results in the rejection of the null hypothesis ( $H_{01a}$ ), thereby implying imperfect model fit. It is somewhat unrealistic to assume that the *Work Engagement* structural model would provide a perfect account of the psychological dynamics underlying *Work Engagement*, and it is therefore highly likely that  $H_{01a}$  would be rejected. In the case that  $H_{01a}$  is indeed rejected, the close fit null hypothesis ( $H_{01b}$ ) is tested by inspecting the probability of observing the sample estimate of the root mean square error of approximation (RMSEA) under the close fit null hypothesis ( $H_{01b}$ ). In addition to the goodness of fit statistics, the magnitude and distribution of the standardised residuals and the magnitude of the modification indices calculates for  $\Gamma$ ,  $\mathbf{B}$  and  $\Psi$  were inspected. Standardised residuals can be considered large if they exceed +2.58 or - 2.58. In terms of distribution, residuals should be distributed approximately symmetrical around zero. Positive residuals indicate underestimation and thus imply the need for additional explanatory paths. Negative residuals indicate overestimation and thus suggest the need to prune paths away. Large modification index values indicate structural model

parameters that, if set free, would improve the model fit. In confirmatory factor analysis, inspection of the measurement model modification indices serves the sole purpose of commenting on the model fit. Inspection of the structural model modification indices also serves this primary purpose, however, in addition to this the modification indices (calculated for  $\Gamma$  and  $\mathbf{B}$ ) were also used to explore possible modifications to the current *Work Engagement* structural model (see section 3.9.3.7), if such modifications make substantive sense (Diamantopoulos & Siguaaw, 2000).

If  $H_{01b}$  is not rejected or at least reasonable *Work Engagement* structural model fit is obtained (i.e. a sample estimate for RMSEA greater than .05 and less than .08), the structural model parameter estimates will be interpreted. Specifically, the statistical hypotheses formulated in section 3.4.1 for the path-specific substantive hypotheses will be tested by investigating the statistical significance and magnitude of the path coefficients. Furthermore, the completely standardised solutions for  $\Gamma$  and  $\mathbf{B}$  will be inspected to evaluate the magnitude of the statistically significant ( $p < .05$ ) path coefficients.

If the exact or close structural model fit would be found (i.e.  $H_{01a}$  or  $H_{01b}$  would not be rejected) the following 6 null hypotheses would be tested with regards to the freed variance elements in the variance-covariance matrix  $\Psi$ :

$H_{0i}$ :  $\psi_j = 0$ ;  $i = 150, 151, \dots, 155$ ;  $j = 1, 2, \dots, 6$ ;

$H_{ai}$ :  $\psi_j > 0$ ;  $i = 150, 151, \dots, 155$ ;  $j = 1, 2, \dots, 6$ ;

The squared multiple correlations ( $R^2$ ) associated with each endogenous latent variable will also be inspected. The  $R^2$  values reflect the proportion of variance in each endogenous latent variable that can be explained by the weighted linear composite of effects linked to it in the model. Large  $R^2$  values are therefore preferred.

### 3.9.3.7 CONSIDERING POSSIBLE STRUCTURAL MODEL MODIFICATIONS

The modification indices calculated for the  $\Gamma$  and  $\mathbf{B}$  matrices were inspected. The aim of inspecting the modification indices is to estimate the decrease in  $\chi^2$  that may

occur if parameters that are currently fixed are set free and the model is re-estimated. A modification index value equal to or greater than 6.64 identifies those currently fixed parameters that would improve the model fit significantly ( $p < .01$ ) if set free. Modification of the model is however only considered if the proposed structural changes make substantive theoretical sense and if the sign of the expected parameter estimate agrees with the theoretical argument offered in support of the path.

### **3.9.3.8 STRUCTURAL EQUATION MODELING WITH RESPONSE SURFACE ANALYSIS**

Response surface analysis (Shanock, Baran, Gentry, Pattison and Heggestad, 2010) permits a more detailed examination of the manner *Work Engagement* responds non-linearly to congruence and incongruence in the levels of the organisation's perceived endorsement of the *Self-Transcendence* value and the employee's endorsement of the same value when the effect of the other latent variables in the structural model are controlled. Observed score polynomial regression with response surface analysis is described in section 3.9.4. Essentially the same procedure described in section 3.9.4 was used to calculate the four surface test values ( $a_1 - a_4$ ) and to map and interpret the *Work Engagement* response surface in the case of the SEM analysis. However, rather than using the partial regression coefficients and their standard errors obtained from the observed score polynomial regression analysis to calculate the four surface test values and test their statistical significance, the unstandardised estimates of  $\beta_{14}$ ,  $\gamma_{12}$ ,  $\gamma_{13}$ ,  $\gamma_{14}$  and  $\gamma_{15}$  along with their standard errors were used. The LISREL command *EC=<filename>.txt* on the LISREL Output line was used in the Simplis syntax file to calculate the estimated asymptotic covariance matrix of the path coefficient estimates. The Cunningham Excel macro (Shanock et al., 2010) was used to calculate the surface test values and test their statistical significance and to produce the three-dimensional response surface graph.



### 3.9.4 OBSERVED SCORE POLYNOMIAL REGRESSION ANALYSIS WITH RESPONSE SURFACE ANALYSIS

Earlier when considering the appropriate research design, it was decided that an *ex post facto* correlational design should be used with one indicator per latent variable with polynomial regression analysis as the statistical analysis technique to test the two narrow-focus structural models. In addition, it is more specifically the response surface analysis that permits the more detailed examination of the manner *Work Engagement* responds to combinations of levels of the organisation's perceived endorsement of the *Altruism* value and the employee's endorsement of the same value as well as combinations of levels of the organisation's perceived endorsement of the *Relationships with others* value and the employee's endorsement of the same value. The various statistical procedures involved in polynomial regression analysis with response surface analysis are discussed in greater depth in this section.

#### 3.9.4.1 INCIDENCE OF CONGRUENCE

Before performing the polynomial regression analysis, the incidence of congruence and incongruence needed to be described in order to evaluate whether there is sufficient incidences of congruence and both types of incongruence (+- and -+) to warrant the study. In other words, is the response surface space sufficiently covered to allow a credible estimate of the response surface? The incidence of congruence and incongruence was described by transforming the employee's endorsement of the value in question and the organisation's perceived endorsement of the same value to z-scores ( $Z_{EmpValue}$  and  $Z_{OrgValue}$ ), by calculating the difference between the two transformed scores for each observation ( $Z_{DiscrepValue}$ ) and transforming the standardised difference scores to a trichotomy ( $Z_{DiscrepValue} < -.50$ ;  $-.50 \leq Z_{DiscrepValue} \leq .50$ ;  $Z_{DiscrepValue} > .50$ ). The number of observations falling in each of these ranges was then depicted via a bar chart. In addition  $Z_{EmpValue}$  was plotted against  $Z_{OrgValue}$  in a scatterplot. Ideally, the bar chart should depict relatively equal representation in each of the three categories (i.e. relatively equal representation in the incidences of congruence and both types of incongruence Theron, 2013). Ideally, observations

should be randomly scattered across the whole of the scatterplot and not restricted to the lines of congruence and incongruence running diagonally across the scatterplot.

### 3.9.4.2 FITTING THE POLYNOMIAL REGRESSION MODEL

Once the incidence of congruence and incongruence have been described and assuming that it was interpreted that there exists sufficient incidence of congruence and both types of incongruence to warrant the study (i.e. to allow a credible estimate of the response surface), the polynomial regression model was fitted on the sample data via SPSS version 21 (<http://www.ibm.com/za/en/>).

The two polynomial regression models were earlier expressed as Equation 2 and Equation 3 in section 3.3.2:

$$E[Y|X_i] = \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 \quad (2)$$

where:

- $X_1$  represents the total score on *Employee Endorsement of Altruism*;
- $X_2$  represents the total score on *Perceived Organisational Endorsement of Altruism*;
- $X_3$  represents the total score on *Squared Employee Endorsement of Altruism*;
- $X_4$  represents the total score on *Employee Endorsement of Altruism\*Perceived Organisational Endorsement of Altruism*;
- $X_5$  represents the total score on *Squared Perceived Organisational Endorsement of Altruism*; and
- $Y_1$  represents the total score on *Work Engagement*

$$E[Y|X_i] = \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 \quad (3)$$

where:

- $X_1$  represents the total score on *Employee Endorsement of Relationships with others*;

- $X_2$  represents the total score on *Perceived Organisational Endorsement of Relationships with others*;
- $X_3$  represents the total score on *Squared Employee Endorsement of Relationships with others*;
- $X_4$  represents the total score on *Employee Endorsement of Relationships with others \*Perceived Organisational Endorsement of Relationships with others*;
- $X_5$  represents the total score on *Squared Perceived Organisational Endorsement of Relationships with others*; and
- $Y_1$  represents the total score on *Work Engagement*

#### **3.9.4.3 INTERPRETING THE FIT OF THE TWO NARROW-FOCUS STRUCTURAL MODELS**

The second over-arching substantive research hypothesis (Hypothesis 19) in the current study that the *Altruism Value Congruence Work Engagement* structural model depicted in Figure 2.3 provides a valid account of the psychological process that determines the levels of *Work Engagement* and the third overarching substantive research hypothesis (Hypothesis 22) that the *Relationships with others Value Congruence Work Engagement* structural model depicted in Figure 2.4 provides a valid account of the psychological process that determines the level of *Work Engagement* were tested by inspecting the multiple correlation (R) in the regression output.

A significant R ( $p < .05$ ) indicates that the particular narrow-focus structural model statistically significantly ( $p < .05$ ) explains variance in *Work Engagement*. Only if R is significant ( $p < .05$ ), will the specific response surface hypotheses be tested.

#### **3.9.4.4 CALCULATING THE RESPONSE SURFACE TEST VALUES AND DRAWING THE RESPONSE SURFACE GRAPH**

The core of the response surface analysis is to calculate four response surface test values ( $a_1 - a_4$ ) and to plot the response surface in three-dimensions (which

produces a response surface graph/pattern; Shanock et al., 2010). The Cunningham Excel Macro allows one to calculate the response surface test values by reading the following values from the regression output into the Excel Macro: a) the unstandardised partial regression coefficients ( $b_i$ ), b) the standard errors of unstandardised partial regression coefficients, c) the sample size, and d) the covariances between the partial regression coefficients. In addition to calculating the response surface test values, the Cunningham Excel Macro draws the response surface graph by plotting the  $E[Y_1|X_i]$  values in a three dimensional space defined by  $Y_1$ ,  $X_1$ , and  $X_2$  and interpolation.

#### **3.9.4.5 INTERPRETING THE RESPONSE SURFACE TEST VALUES AND GRAPH**

The four response surface test values ( $a_1 - a_4$ ) describe the response surface. Four characteristics of the response surface are of particular interest: 1) the slope of the line of congruence ( $a_1$ ), 2) the curvature along the line of congruence ( $a_2$ ), 3) the slope of the line of incongruence ( $a_3$ ), and 4) the curvature along the line of incongruence ( $a_4$ ; Shanock et al., 2010). The specific response surface hypotheses formulated in section 3.4.3 hypothesise about these four characteristics of the response surface. In other words, the influence of congruence and incongruence in the employee's perception of the degree to which the organisation endorses the *Altruism* value and the employee's own endorsement of the *Altruism* value on *Work Engagement* is investigated by testing hypotheses on the slope and curvature of the *Work Engagement* response surface along the lines of *Altruism* congruence and *Altruism* incongruence. Furthermore, the influence of congruence and incongruence in the employee's perception of the degree to which the organisation endorses the *Relationships with others* value and the employee's own endorsement of the *Relationships with others* value on *Work Engagement* is investigated by testing hypotheses on the slope and curvature of the *Work Engagement* response surface along the lines of *Relationships with others* congruence and *Relationships with others* incongruence. Therefore, in addition to the over-arching substantive research hypotheses (and assuming R is significant ( $p < .05$ )), the specific response surface hypotheses formulated in section 3.4.3 were tested.

The response surface hypotheses were tested by examining the sign and statistical significance ( $p < .05$ ) of the response surface test values ( $a_1$ - $a_4$ ) and interpreting the graph visually. A positive and statistically significant ( $p < .05$ )  $a_1$  indicates that *Work Engagement* increases as the  $X_1$  and  $X_2$  values change along the line of congruence from - - to ++ congruence. A negative and statistically significant ( $p < .05$ )  $a_1$  indicates that *Work Engagement* decreases as the  $X_1$  and  $X_2$  values change along the line of congruence from - - to ++ congruence. If  $a_2$  is statistically insignificant, *Work Engagement* increases/decreases (depending on the sign of  $a_1$ ) linearly as the  $X_1$  and  $X_2$  values change along the line of congruence from - - to ++ congruence. If  $a_2$  is positive and statistically significant ( $p < .05$ ), it means that as  $X_1$  and  $X_2$  values change along the line of congruence from 00 outward to - - congruence and from 00 outward to ++ congruence, *Work Engagement* responds in a nonlinear, convex, upward-curving manner. If  $a_2$  is negative and statistically significant ( $p < .05$ ), it means that as  $X_1$  and  $X_2$  values change along the line of congruence from 00 outward to - - congruence and from 00 outward to ++ congruence, *Work Engagement* responds in a nonlinear, concave, downward-curving manner.

A positive and statistically significant ( $p < .05$ )  $a_3$  indicates that *Work Engagement* increases as the  $X_1$  and  $X_2$  values change along the line of incongruence from - + to +- incongruence. A negative and statistically significant ( $p < .05$ )  $a_3$  indicates that *Work Engagement* decreases as the  $X_1$  and  $X_2$  values change along the line of incongruence from - + to +- incongruence. If  $a_4$  is statistically insignificant, *Work Engagement* increases/decreases (depending on the sign of  $a_3$ ) linearly as the  $X_1$  and  $X_2$  values change along the line of incongruence from - + to +-. If  $a_4$  is positive and statistically significant ( $p < .05$ ), it means that as  $X_1$  and  $X_2$  values change along the line of incongruence from 00 outward to - + incongruence and from 00 outward to +- incongruence, *Work Engagement* responds in a nonlinear, convex, upward-curving manner. If  $a_4$  is negative and statistically significant ( $p < .05$ ), it means that as  $X_1$  and  $X_2$  values change along the line of incongruence from 00 outward to - + incongruence and from 00 outward to +- incongruence, *Work Engagement* responds in a nonlinear, concave, downward-curving manner (Shanock et al., 2010; Theron, 2013). Visual interpretation of the response surface graph entailed examining the changes in the response surface along the lines of congruence and incongruence,

noting where the response surface reaches its highest and lowest points and visually corroborating that the interpretations of  $a_1$ - $a_4$  are visibly reflected in the graph.

## CHAPTER 4

### RESEARCH RESULTS

#### 4.1 INTRODUCTION

Chapter 3 attempted to comprehensively describe and motivate the research methodology used in the current study to test the three structural models: 1) the comprehensive *Work Engagement* structural model, 2) the narrow-focus *Altruism Value Congruence Work Engagement* structural model, and 3) the narrow-focus *Relationships with others Value Congruence Work Engagement* structural model. The aim of Chapter 4 is to report and discuss the results of the various statistical analyses performed.

This chapter starts off with a discussion on missing values, followed by a discussion on the item analyses executed to determine the psychometric integrity of the indicator variables meant to represent the various latent variables. Subsequently an evaluation of the extent to which the data satisfies the assumptions that need to be met before proceeding with the statistical analyses will be discussed. Once this has been established, the fit of the measurement model and the statistical significance and magnitude of the measurement model parameter estimates are evaluated. On condition that the operationalisation of the latent variables is successful, the structural model fit and the statistical significance and magnitude of the structural model parameter estimates can then be evaluated. Finally, this chapter reports on the response surface analyses performed.

#### 4.2 MISSING VALUES

The ideal in a research study would be to have complete sets of data. The electronic survey system used to compile the Work Engagement Survey offers the researcher the choice of selecting a “Required fields alert” option. Selecting this option ensures that the respondent completes all items. In the case that a respondent proceeds to a

following page of the survey before responding to all items on a current page, an alert appears on the screen drawing the respondent's attention to those items that require a response. The "Required fields alert" option was selected in the current study. The scales in the current study also did not make provision for an unable to respond option. As a result, no data was missing.

### 4.3 ITEM ANALYSIS

The purpose of conducting item analysis via the SPSS reliability procedure was to detect and remove poor items. Poor items were defined as those items that do not successfully reflect the latent dimension that the items have been tasked to reflect, that are not sensitive to relative small differences on the latent dimension and/or that do not respond in unison with other items assigned to a specific subscale. Item analysis informs the researcher when a scale is unreliable or fails to show expected levels of validity. In addition to identifying unreliability, item analysis suggests ways of improving reliability (i.e. identifying and removing bad items; Burger, 2012).

Item analysis was conducted on each of the latent variable scales included in the Work Engagement Survey (WES), as well as on each subscale of the latent variable multi-dimensional scales, used to measure the latent variables included in the *Work Engagement* structural model depicted in Figure 2.3 and the two narrow-focus structural models depicted in Figure 2.4, and Figure 2.5. The objective of the procedure was to investigate: 1) the reliability of indicators of each latent variable, 2) the homogeneity of each subscale, and 3) detect poor items prior to their inclusion in composite indicator variables (item parcels) representing the latent variable (Burger, 2012).

Item analysis was performed via the reliability procedure of SPSS version 21 (<http://www.ibm.com/za/en/>). A summary of the item analysis results for each of the latent variable scales and for the subscales of the latent variable multi-dimensional scales is depicted in Table 4.1 below. In addition, the results obtained from the various subscales of the latent variable multi-dimensional scales were used to calculate the reliability coefficient for the relevant latent variable multi-dimensional scale. Nunnally (1978) proposed a formula for calculating the reliability coefficient of



linear composites.<sup>28</sup> The calculated reliability for a particular latent variable multi-dimensional scale is therefore not the reliability coefficient that would have been obtained if item analysis would have been conducted on all the items of the particular latent variable multi-dimensional scale. The calculated reliability coefficients for those latent variables that have been conceptualised as multi-dimensional constructs are also depicted in the summarised results in Table 4.1. The results depicted in Table 4.1 will be discussed in greater detail in the subsequent sections.

**Table 4.1**

**Summary of reliability results of work engagement survey scales**

Scale	Sample size	Number of items	Mean	Variance	Standard deviation	Cronbach's alpha	Calculated reliability coefficient for linear composites
WE	227	9	42.44	70.079	8.371	.929	.941329
WE_V	227	3	13.36	10.904	3.302	.886	
WE_D	227	3	14.87	7.752	2.784	.857	
WE_A	227	3	14.21	9.778	3.127	.820	
JC	227	15	83.23	118.770	10.898	.870	.903555
JC_A	227	3	15.85	9.142	3.024	.760	
JC_TI	227	3	15.92	10.750	3.279	.705	
JC_SV	227	3	17.27	6.835	2.614	.650	
JC_TS	227	3	18.68	6.279	2.506	.762	
JC_F	227	3	15.51	10.959	3.310	.799	
PC	227	24	113.3921	182.434	13.50682	.903	.913839
PC_Eff	227	6	29.68	20.279	4.503	.863	
PC_H	227	6	28.41	15.536	3.942	.813	
PC_R	227	6	28.0485	15.303	3.91190	.702	
PC_O	227	6	27.2467	17.718	4.20923	.691	
TL	227	20	56.79	277.937	16.671	.963	.967962
TL_IS	227	4	10.36	15.550	3.943	.900	
TL_IM	227	4	12.54	11.267	3.357	.896	
TL_IC	227	4	9.93	15.114	3.888	.826	
TL_IIB	227	4	12.24	11.333	3.366	.846	
TL_IIA	227	4	11.73	14.306	3.782	.874	
WVE_ST	227	6	25.16	12.453	3.529	.830	.905873
WVE_A	227	3	13.40	2.958	1.720	.841	
WVE_RwO	227	3	11.76	6.211	2.492	.887	
WVO_ST	227	6	23.91	18.376	4.287	.900	.949051
WVO_A	227	3	13.02	3.933	1.983	.888	
WVO_RwO	227	3	10.89	7.996	2.828	.938	
M	227	6	26.39	11.877	3.446	.922	
PS	227	9	32.81	42.130	6.491	.899	

WE= Work Engagement, WE\_V= Vigour, WE\_D= Dedication, WE\_A= Absorption, JC= Job Characteristics, JC\_A= Autonomy, JC\_TI= Task Identity, JC\_SV= Skills Variety, JC\_TS= Task Significance, JC\_F= Feedback, PC= Psychological Capital, PC\_Eff= Self-Efficacy, PC\_H= Hope, PC\_R= Resiliency, PC\_O= Optimism, TL= Transformational Leadership, TL\_IS= Intellectual Stimulation, TL\_IM= Inspirational Motivation, TL\_IC= Individualised Consideration, TL\_IIB= Idealised Influence (Behaviour), TL\_IIA= Idealised Influence (Attributed), WVE\_ST= Employee Endorsement of Self-Transcendence, WVE\_A= Employee Endorsement of Altruism, WVE\_RwO= Employee Endorsement of Relationships with Others, WVO\_ST= Perceived Organisational

<sup>28</sup>  $r_{ttcomp} = 1 - \frac{\sum S^2 i - \sum r_{tti} S^2 i}{S^2 t}$

*Endorsement of Self-Transcendence*, *WVO\_A*= *Perceived Organisational Endorsement of Altruism*, *WVO\_RwO*= *Perceived Organisational Endorsement of Relationships with Others*, *M*= *Meaningfulness*, *PS*= *Psychological Safety*.

### 4.3.1 WORK ENGAGEMENT

The 9 item *Work Engagement* scale consists of 3 subscales. Each of the three subscales measures a dimension of *Work Engagement* (i.e. *Vigour*, *Absorption* or *Dedication*). Although these three subscales are expected to correlate to some degree they do measure distinct constructs. It is therefore possible that a respondent who scores high on one dimension does not necessarily score high on another dimension of *Work Engagement*. To conduct item analysis on all the items of the *Work Engagement* scale simultaneously would imply that the expectation is that there should be high consistency in item responses across all the items of the scale. Instead, a more theoretically justifiable expectation is that there should be high consistency in item responses across all the items of each of the three subscales. Item analysis was therefore conducted separately on the three subscales.

The reliability coefficient of .941329 calculated via the Nunnally (1978) formula for the *Work Engagement* scale reported in Table 4.1 was calculated using results obtained from the item analyses performed on the three subscales. This value falls well above the critical cut-off value of .80 set for this study. Approximately 94% of the variance in items is systematic/true variance, 6% is random error variance. The item analysis on the three subscales will be discussed in greater detail.

#### 4.3.1.1 VIGOUR

The *Vigour* subscale comprises 3 items. The results for the item analysis are depicted in Table 4.2 below.

**Table 4.2*****Item analysis results for the vigour subscale***

Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items			N of Items
.886	.889			3

	Mean	Std. Deviation	N
WE1_V	4.34	1.177	227
WE2_V	4.50	1.180	227
WE5_V	4.52	1.298	227

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
WE1_V	9.02	5.314	.775	.659	.842
WE2_V	8.86	5.030	.847	.729	.780
WE5_V	8.84	5.022	.722	.541	.894

Table 4.2 indicates a Cronbach's alpha of .886. The Cronbach alpha indicates the item homogeneity found for a scale/subscale. This value falls above the critical cut-off value of .80 set for this study, which entails the requirement that at least 80% or more of the variance in the items should be systematic/true score variance. When considering the item statistics, the means ranged from 4.32 to 4.52 (on a 7-point scale) and the standard deviations from 1.177 to 1.298. The absence of extreme means and small standard deviations indicate the absence of poor items.

Low inter-item correlations for an item might be an indication that the item does not reflect the same underlying factor as the remaining items. However, the items of the *Vigour* subscale obtained correlations of above .50 (see Appendix 6). The corrected item-total correlation represents the correlation between each item and the total score calculated from the remaining items. Poor items will not correlate with the remainder of the items because it is not reflecting the same underlying factor. The corrected item-total correlations for all the items were above .50. The squared multiple correlation represents the proportion of variance in each item explained by a weighted linear composite of all the remaining items. Good items share a reasonable proportion of variance with the other items. As can be observed in Table 4.2, the squared multiple correlations were well above .30, but not higher than .75. A final indication of a poor item would be a substantial increase in the alpha if the item would be deleted. The results showed that if WE5\_V would be deleted, this would result in a very slight increase in the Cronbach alpha of .886 to .894.

Given the length of the subscale and the already acceptably high alpha combined with the fact that the item statistics are not seriously problematic, all 3 items were retained in the subscale.

#### 4.3.1.2 DEDICATION

The *Dedication* subscale comprises 3 items. The results for the item analysis are depicted in Table 4.3 below.

**Table 4.3**

***Item analysis results for the dedication subscale***

Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items			N of Items
.857	.859			3

	Mean	Std. Deviation	N
WE3_D	4.90	1.066	227
WE4_D	4.68	1.185	227
WE7_D	5.29	.885	227

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
WE3_D	9.97	3.499	.782	.638	.750
WE4_D	10.19	3.048	.797	.656	.741
WE7_D	9.58	4.528	.649	.422	.878

Table 4.3 indicates a Cronbach's alpha of .857. This is a satisfactory coefficient of internal consistency (>.80). Approximately 85% of the variance in the items is systematic/true variance; 15% is random error variance. When considering the item statistics, the means ranged from 4.68 to 5.29 (on a 7-point scale) and the standard deviations from .885 to 1.185. The mean of WE\_D (5.29) and the standard deviation of WE7\_D (.885) is slightly different from the other two item means and standard deviations. The standard deviation is, however, not sufficiently small to raise serious concerns about the sensitivity of item WE7\_D.

The inter-item correlation matrix revealed that all the items correlated above .50 with the lowest correlation being .599 (see Appendix 6). The corrected item-total correlations for all the items were above .50. The corrected item-total correlation for WE7\_D was slightly lower than the other two items. The squared multiple

correlations were all larger than .30. Table 4.3 showed that if WE7\_D would be deleted, this would result in a marginal increase in the Cronbach alpha of .857 to .878.

Essentially the same argument in favour of retaining all the *Vigour* subscale items also applies here. Given the length of the *Dedication* subscale and the already acceptably high alpha combined with the fact that the item statistics are not seriously problematic, all 3 items were retained in the subscale.

#### 4.3.1.3 ABSORPTION

The *Absorption* subscale comprises 3 items. The results for the item analysis are depicted in Table 4.4 below.

**Table 4.4**

##### *Item analysis results for the absorption subscale*

	Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items			N of Items
	.820	.824			3
		Mean	Std. Deviation	N	
		WE6_A	4.89	1.083	227
		WE8_A	4.85	1.187	227
		WE9_A	4.47	1.361	227
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
WE6_A	9.33	5.398	.637	.411	.792
WE8_A	9.36	4.682	.718	.516	.708
WE9_A	9.74	4.131	.686	.480	.751

Table 4.4 indicates a Cronbach's alpha of .820. This falls above the critical cut-off value of .80 and is therefore satisfactory. Visual inspection of the item statistics revealed means that ranged from 4.47 to 4.89 (on a 7-point scale) and standard deviations from 1.083 to 1.361.

The inter-item correlation matrix for this scale showed that all the items correlated above .50. All the corrected item-total correlations were above .50. The squared

multiple correlations were all larger than .30. Table 4.4 revealed that none of the items, if deleted, would increase the current Cronbach alpha.

When considering the basket of results, none of the items were flagged as problematic items. All the items of the *Absorption* subscale were therefore retained.

### **4.3.2 JOB CHARACTERISTICS**

The 15 item *Job Characteristics* scale consists of 5 subscales. Each of the five subscales measures a particular characteristic of the job (i.e. *Autonomy*, *Task Identity*, *Skill Variety*, *Task Significance*, and *Feedback*). As already argued, although subscales measuring a multi-dimensional latent variable are expected to correlate to some degree they do measure distinct constructs. As a result, it is expected that there should be high consistency in item responses across all items of each of the five subscales. Item analysis was therefore conducted separately on the five subscales.

The reliability coefficient of .903555 calculated via the Nunnally (1978) formula for the *Job Characteristics* scale reported in Table 4.1 was calculated using results obtained from the item analyses performed on the five subscales. This value falls well above the critical cut-off value of .80 set for this study. Approximately 90% of the variance in items is systematic/true variance, 10% is random error variance. The item analysis on the five subscales will be discussed in greater detail in the subsequent sections.

#### **4.3.2.1 AUTONOMY**

The *Autonomy* subscale comprises 3 items. The results for the item analysis are depicted in Table 4.5 below.

**Table 4.5*****Item analysis results for the autonomy subscale***

	Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items			N of Items
	.760	.762			3
		Mean	Std. Deviation	N	
		JC1_A	4.76	1.264	227
		JC11_A	5.85	1.151	227
		JC14_A	5.25	1.259	227
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
JC1_A	11.09	4.660	.529	.282	.751
JC11_A	10.01	4.779	.604	.390	.668
JC14_A	10.61	4.213	.647	.432	.612

Table 4.5 indicates a Cronbach's alpha of .760. This falls just below the critical cut-off value of .80. When considering the item statistics, the means ranged from 4.76 to 5.85 (on a 7-point scale) and the standard deviations from 1.151 to 1.264. No extreme means or standard deviations were therefore evident.

The inter-item correlation matrix revealed that all the items correlated adequately with the other items in the subscale (see Appendix 6). The corrected item-total correlations for all the items were above .50. The squared multiple correlations were above .30 for all the items, except for JC1\_A. Table 4.5 showed that none of the items, if deleted, would increase the current Cronbach alpha. Consequently, none of the items were deleted.

#### **4.3.2.2 TASK IDENTITY**

The *Task Identity* subscale comprises 3 items. The results for the item analysis are depicted in Table 4.6 below.

**Table 4.6*****Item analysis results for the task identity subscale***

Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items			N of Items
.705	.709			3

	Mean	Std. Deviation	N
JC2_TI	5.18	1.419	227
JC7_TI	5.20	1.379	227
JC12_TI	5.54	1.334	227

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
JC2_TI	10.74	6.344	.335	.116	.839
JC7_TI	10.72	5.053	.612	.525	.499
JC12_TI	10.37	5.049	.654	.539	.449

Table 4.6 indicates a Cronbach's alpha of .705. This falls below the critical cut-off value of .80 and therefore raises concern. Visual inspection of the item statistics revealed means that ranged from 5.18 to 5.54 (on a 7-point scale) and standard deviations from 1.334 to 1.419.

The inter-item correlation matrix for this subscale showed that JC2\_TI correlated poorly with the other items (see Appendix 6). The lowest inter-item correlation was .290 between JC2\_TI and JC7\_TI. All the corrected item-total correlations were above .50, except for JC2\_TI. The squared multiple correlations were larger than .30, except for JC2\_TI. This item statistic evidence warrants flagging JC2\_TI as a potentially problematic item.

Table 4.6 revealed that if JC2\_TI was deleted, the Cronbach's alpha would increase from .705 to .839. Given the low current alpha and the dramatic increase in the Cronbach alpha if JC2\_TI were deleted, it was decided to strongly consider deleting the item. However, the final decision whether or not to delete item JC2\_TI was postponed until after the EFA.

#### **4.3.2.3 SKILLS VARIETY**

The *Skills Variety* subscale comprises 3 items. The results for the item analysis are depicted in Table 4.7 below.



**Table 4.7*****Item analysis results for the skills variety subscale***

Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items			N of Items
.650	.688			3

	Mean	Std. Deviation	N
JC3_SV	5.74	1.352	227
JC6_SV	5.80	.936	227
JC9_SV	5.72	1.080	227

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
JC3_SV	11.52	3.516	.294	.094	.838
JC6_SV	11.47	3.887	.561	.531	.459
JC9_SV	11.55	3.302	.603	.550	.362

Table 4.7 indicates a Cronbach's alpha of .650. This was the lowest of all the *Job Characteristics* subscales and raises concerns. Only 65% of the variance in the items is systematic/true variance; 35% is random error variance. When considering the item statistics, the means ranged from 5.72 to 5.80 (on a 7-point scale) and the standard deviations from .936 to 1.352. No extreme means and standard deviations were evident.

The inter-item correlation matrix for this subscale showed that JC3\_SV correlated poorly with the other items (see Appendix 6). The lowest inter-item correlation was .236 between JC3\_SV and JC6\_SV. All the corrected item-total correlations were above .50, except for JC3\_SV. The squared multiple correlations were larger than .30, except for JC3\_SV. Thus, based on the preceding correlation evidence, JC2\_TI was flagged as a poor item.

Table 4.7 further revealed that if JC3\_SV was deleted, the Cronbach's alpha would increase dramatically from .650 to .838. Given the low current alpha and the dramatic increase in the Cronbach alpha if JC3\_SV were deleted, it was decided to strongly consider deleting the item. However, as was the case with JC2\_TI in the *Task Identity* subscale, the final decision whether or not to delete item JC3\_SV was postponed until after the EFA.

#### 4.3.2.4 TASK SIGNIFICANCE

The *Task Significance* subscale comprises 3 items. The results for the item analysis are depicted in Table 4.8 below.

**Table 4.8**

***Item analysis results for the task significance subscale***

Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items			N of Items
.762	.763			3
	Mean	Std. Deviation	N	
JC4_TS	6.26	.968	227	
JC10_TS	6.16	1.107	227	
JC15_TS	6.26	.963	227	

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
JC4_TS	12.42	3.466	.521	.271	.758
JC10_TS	12.52	2.737	.632	.421	.638
JC15_TS	12.42	3.165	.638	.421	.634

Table 4.8 indicates a Cronbach's alpha of .760. This falls just below the critical cut-off value of .80. When considering the item statistics, the means ranged from 6.16 to 6.26 (on a 7-point scale) and the standard deviations from .963 to 1.107.

The inter-item correlation matrix revealed that all the items correlated adequately with the other items in the subscale (see Appendix 6). The corrected item-total correlations for all the items were above .50. The squared multiple correlations were above .30 for all the items, except for JC4\_TS. None of the items, if deleted, would increase the current Cronbach alpha. Consequently, all the items were retained.

#### 4.3.2.5 FEEDBACK

The *Feedback* subscale comprises 3 items. The results for the item analysis are depicted in Table 4.9 below.

**Table 4.9*****Item analysis results for the feedback subscale***

Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items			N of Items
.799	.799			3

	Mean	Std. Deviation	N
JC5_F	5.06	1.299	227
JC8_F	5.05	1.308	227
JC13_F	5.40	1.314	227

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
JC5_F	10.44	5.646	.588	.349	.783
JC8_F	10.46	5.320	.651	.445	.717
JC13_F	10.11	5.116	.692	.486	.672

Table 4.9 indicates a Cronbach's alpha of .799. This was satisfactory. Approximately 80% of the variance in the items is systematic/true variance; 20% is random error variance. When considering the item statistics, means ranged from 5.05 to 5.40 (on a 7-point scale) and standard deviations from 1.299 to 1.314. The absence of extreme means and small standard deviations showed the absence of insensitive or range restricted items.

The inter-item correlation matrix revealed that all the items correlated above .50 (see Appendix 6). The corrected item-total correlations for all the items were above .50. The squared multiple correlations were above .30 for all the items. None of the items, if deleted, would increase the current Cronbach alpha. No items were flagged as problematic. Consequently, none of the items were deleted.

### **4.3.3 PSYCHOLOGICAL CAPITAL**

*Psychological capital* is a higher-order latent variable comprising four different constructs (*Self-efficacy, Hope, Resiliency, and Optimism*). The *Psychological Capital* scale consists of four subscales, each measuring one of the four distinct lower-order constructs. The possibility exists that a respondent who scores high on one dimension of a multi-dimensional construct does not necessarily score high on another dimension of that multi-dimensional construct (Prinsloo, 2013). Item analysis

was therefore conducted separately on the four subscales instead of conducting item analysis on all the items of the *Psychological Capital* scale simultaneously.

The reliability coefficient of .913839 calculated via the Nunnally (1978) formula for the *Psychological Capital* scale, as reported in Table 4.1, demonstrates that approximately 91% of the variance in items is systematic/true variance, 9% is random error variance. This is a satisfactory reliability coefficient (>.80). The item analysis on the four subscales will be discussed in greater detail in the subsequent sections.

#### 4.3.3.1 SELF-EFFICACY

The *Self-efficacy* subscale comprises 6 items. The results for the item analysis are depicted in Table 4.10 below.

**Table 4.10**

##### *Item analysis results for the self-efficacy subscale*

	Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items			N of Items
	.863				6
		Mean	Std. Deviation	N	
		4.91	.898	227	
		4.99	1.026	227	
		4.79	1.029	227	
		5.06	.873	227	
		4.95	1.032	227	
		4.98	.975	227	
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
PC1_Eff	24.77	15.815	.512	.275	.864
PC2_Eff	24.69	13.559	.750	.601	.822
PC3_Eff	24.89	13.815	.707	.546	.830
PC4_Eff	24.63	14.669	.725	.532	.830
PC5_Eff	24.73	14.206	.644	.426	.843
PC6_Eff	24.70	14.749	.611	.385	.848

Table 4.10 indicates a Cronbach's alpha of .863. This value falls above the critical cut-off value of .80 set for this study. When considering the item statistics, the means ranged from 4.79 to 5.06 (on a 6-point scale) and the standard deviations from .873

to 1.032. When considering the range of means and the standard deviations, no extreme means or small standard deviations were evident.

Visual inspection of the inter-item correlation matrix (Appendix 6) revealed that all items correlated above .30. PC1\_Eff correlated the lowest with the other items. The corrected item-total correlations for all the items were above .50. PC1\_Eff returned the lowest corrected item-total correlation. The squared multiple correlations were all larger than .30, except for PC1\_Eff. This raises slight concerns that PC1\_Eff might be a problematic item. A final indication of a poor item would be a substantial increase in the alpha if the item would be deleted. The results showed that if PC1\_Eff would be deleted, this would result in a very slight increase in the Cronbach alpha of .863 to .864. None of the other items, if deleted, would result in an increase in the alpha. Given the acceptably high alpha combined with the fact that the item statistics are not seriously problematic, all 6 items were retained in the subscale.

#### 4.3.3.2 HOPE

The *Hope* subscale comprises 6 items. The results for the item analysis are depicted in Table 4.11 below.

**Table 4.11**

#### *Item analysis results for the hope subscale*

	Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items			N of Items	
	.813	.815			6	
		Mean	Std. Deviation	N		
		PC7_H	4.73	.943	227	
		PC8_H	4.60	1.090	227	
		PC9_H	4.95	.832	227	
		PC10_H	4.88	.858	227	
		PC11_H	4.68	.855	227	
		PC12_H	4.57	.881	227	
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted	
PC7_H	23.69	11.694	.458	.255	.809	
PC8_H	23.81	10.172	.601	.408	.780	
PC9_H	23.46	12.542	.391	.219	.819	
PC10_H	23.54	10.878	.692	.540	.759	
PC11_H	23.73	11.020	.667	.517	.764	
PC12_H	23.84	10.851	.673	.519	.762	

Table 4.11 indicates a Cronbach's alpha of .813. This is a satisfactory coefficient of internal consistency ( $>.80$ ). Approximately 81% of the variance in the items is systematic/true variance; 19% is random error variance. When considering the item statistics, the means ranged from 4.57 to 4.95 (on a 6-point scale) and the standard deviations from .832 to 1.090. When considering the range of means and the standard deviations, no extreme means or small standard deviations were evident.

Visual inspection of the inter-item correlation matrix revealed that almost all the items correlated above .30 (Appendix 6). PC7\_H correlated below .30 with PC11\_H. PC9\_H correlated below .30 with PC8\_H and PC12\_H. All the items correlated above .20. The corrected item-total correlations for the items were above .50, except for PC7\_H and PC9\_H. The squared multiple correlations were larger than .30, except for PC7\_H and PC9\_H. From the evidence discussed, PC7\_H and PC9\_H were flagged as potentially problematic items. A final indication of a poor item would be a substantial increase in the alpha if the item would be deleted. The results showed that if PC9\_H would be deleted, this would result in a very slight increase in the Cronbach alpha of .813 to .819. None of the other items, if deleted, would result in an increase in the alpha. Given the already acceptable alpha and the marginal improvement in the alpha if item PC9\_H were deleted, it was decided to retain all 6 the items in the *Hope* subscale.

#### **4.3.3.3 RESILIENCY**

The *Resiliency* subscale comprises 6 items. The results for the item analysis are depicted in Table 4.12 below.

**Table 4.12*****Item analysis results for the resiliency subscale***

Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items			N of Items
.702	.741			6

	Mean	Std. Deviation	N
PC13_RR	3.8370	1.36156	227
PC14_R	5.0000	.72258	227
PC15_R	4.9956	1.09098	227
PC16_R	4.4053	1.13807	227
PC17_R	4.9339	.88750	227
PC18_R	4.8767	.83758	227

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
PC13_RR	24.2115	11.486	.213	.051	.761
PC14_R	23.0485	12.259	.498	.284	.656
PC15_R	23.0529	11.289	.385	.195	.679
PC16_R	23.6432	10.000	.557	.350	.618
PC17_R	23.1145	11.208	.557	.407	.630
PC18_R	23.1718	11.320	.582	.408	.626

Table 4.12 indicates a Cronbach's alpha of .702. This falls below the critical cut-off value of .80 and therefore raises concern. Visual inspection of the item statistics revealed means that ranged from 3.837 to 5 (on a 6-point scale) and standard deviations from .72258 to 1.36156. The mean of item PC13\_RR (3.837) was much lower than any of the other means, but still could not be regarded as an extreme mean.

The inter-item correlation matrix for this subscale showed that PC13\_RR correlated extremely low with the other items (Appendix 6). The lowest inter-item correlation was .095. All the corrected item-total correlations were above .30, except for PC13\_RR. The squared multiple correlations were below .30 for PC13\_RR, PC14\_R and PC15\_R. Item PC13\_RR returned the lowest squared multiple correlation. Table 4.12 also showed that if item PC13\_RR were to be deleted, the Cronbach alpha would increase substantially from .702 to .761.

Given the basket of evidence, the low current alpha and the increase in the Cronbach alpha if PC13\_RR were deleted, this item was flagged as a poor item that should be deleted. The final decision whether or not to delete item PC13\_RR was postponed until after the EFA.

#### 4.3.3.4 OPTIMISM

The *Optimism* subscale comprises 6 items. The results for the item analysis are depicted in Table 4.13 below.

**Table 4.13**

***Item analysis results for the optimism subscale***

Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items		N of Items
.691	.703		6

Item Statistics				
	Mean	Std. Deviation	N	
PC19_O	4.1498	1.12672	227	
PC20_OR	4.4714	1.23833	227	
PC21_O	4.7885	.99078	227	
PC22_O	4.7621	1.02005	227	
PC23_OR	4.5991	1.19089	227	
PC24_O	4.4758	1.12615	227	

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
PC19_O	23.0969	14.044	.285	.149	.694
PC20_OR	22.7753	12.954	.362	.291	.673
PC21_O	22.4581	12.400	.621	.494	.592
PC22_O	22.4846	12.702	.547	.422	.613
PC23_OR	22.6476	13.212	.357	.287	.673
PC24_O	22.7709	13.071	.415	.265	.653

Table 4.13 indicates a Cronbach's alpha of .691. This was the lowest of all the *Psychological Capital* subscales and substantially falls below the critical cut-off value of .80 set for this study. Only 69% of the variance in the items is systematic/true variance; 31% is random error variance. When considering the item statistics, means ranged from 4.1498 to 4.7621 (on a 6-point scale) and standard deviations from 1.02005 to 1.19089. No extreme means and small standard deviations were evident.

The inter-item correlation matrix for this subscale revealed that PC19\_O and PC24\_O correlated poorly with the other items (see Appendix 6). All the corrected item-total correlations were above .30, except for item PC19\_O (.285). The squared multiple correlations were larger than .20, except for PC19\_O (.149). Based on the item statistic evidence presented thus far, item PC19\_O was flagged as a poor item.



Table 4.13 further revealed that if PC19\_O was deleted, the Cronbach's alpha would increase marginally from .691 to .694.

When considering the basket of results and the low current Cronbach alpha, it was decided that PC19\_O should be deleted. However, due to the fact that the deletion of PC19\_O would only marginally increase the Cronbach alpha, the final decision to delete item PC19\_O was postponed until after the EFA.

#### **4.3.4 TRANSFORMATIONAL LEADERSHIP**

The Multi-Factor Leadership Questionnaire (MLQ) Rater Form 5X (Bass & Avolio, 2004) was used in the current study to measure *Transformational Leadership*. The MLQ measures the four dimensions of *Transformational Leadership* - *Idealised Influence*, *Individualised Consideration*, *Intellectual Stimulation* and *Inspirational Motivation*. *Idealised Influence* is sub-divided into its two sub-categories, namely *Idealised Influence* (attributed) and *Idealised Influence* (behaviour). This 20-item *Transformational Leadership* scale therefore comprises five subscales. Item analysis was conducted on the five subscales.

The calculated reliability coefficient obtained via the Nunnally (1978) formula of .967962 for the *Transformational Leadership* scale, as reported in Table 4.1, demonstrates that approximately 97% of the variance in items is systematic/true variance, approximately 3% is random error variance. This is a highly satisfactory reliability coefficient (>.80). The item analysis on the five subscales will be discussed in greater detail in the subsequent sections.

##### **4.3.4.1 INTELLECTUAL STIMULATION**

The *Intellectual Stimulation* subscale comprises 4 items. The results for the item analysis are depicted in Table 4.14 below.

**Table 4.14*****Item analysis results for the intellectual stimulation subscale***

Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items			N of Items
.900	.899			4

	Mean	Std. Deviation	N
TL1_IS	2.67	1.035	227
TL3_IS	2.69	1.134	227
TL16_IS	2.54	1.149	227
TL18_IS	2.46	1.176	227

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
TL1_IS	7.69	9.897	.704	.515	.895
TL3_IS	7.67	8.831	.806	.658	.859
TL16_IS	7.82	8.759	.804	.680	.860
TL18_IS	7.90	8.672	.794	.649	.864

Table 4.14 indicates a Cronbach's alpha of .900. This is a highly satisfactory coefficient of internal consistency ( $>.80$ ). Approximately 90% of the variance in the items is systematic/true variance; 10% is random error variance. When considering the item statistics, the means ranged from 2.46 to 2.69 (on a 5-point scale) and the standard deviations from 1.035 to 1.176.

The inter-item correlation matrix revealed that all the items correlated above .50 (Appendix 6). The corrected item-total correlations for all the items were above .50. The squared multiple correlations were all larger than .50. None of the items, if deleted, would increase the current Cronbach alpha of .900. All the items were therefore retained.

#### **4.3.4.2 INSPIRATIONAL MOTIVATION**

The *Inspirational Motivation* subscale comprises 4 items. The results for the item analysis are depicted in Table 4.15 below.

**Table 4.15*****Item analysis results for the inspirational motivation subscale***

	Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items			N of Items
	.896	.898			4
		Mean	Std. Deviation	N	
		TL4_IM	3.19	.893	227
		TL6_IM	3.16	.919	227
		TL14_IM	3.04	1.053	227
		TL20_IM	3.15	.971	227
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
TL4_IM	9.35	6.990	.737	.574	.879
TL6_IM	9.37	6.536	.827	.687	.846
TL14_IM	9.50	6.304	.729	.549	.885
TL20_IM	9.39	6.398	.800	.643	.855

Table 4.15 indicates a Cronbach's alpha of .896. This falls well above the critical cut-off value of .80. When considering the item statistics, the means ranged from 3.04 to 3.19 (on a 5-point scale) and the standard deviations from .893 to 1.053. No extreme means or small standard deviations were evident.

The inter-item correlation matrix revealed that all the items correlated above .50 (Appendix 6). The corrected item-total correlations for all the items were above .50. The squared multiple correlations were all larger than .50. None of the items, if deleted, would increase the current Cronbach alpha of .896. All 4 the items were therefore retained.

#### **4.3.4.3 INDIVIDUALISED CONSIDERATION**

The *Individualised consideration* subscale comprises 4 items. The results for the item analysis are depicted in Table 4.16 below.

**Table 4.16*****Item analysis results for the individualised consideration subscale***

Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items			N of Items
.826	.836			4

	Mean	Std. Deviation	N
TL8_IC	1.88	1.367	227
TL10_IC	2.90	1.082	227
TL15_IC	2.61	1.144	227
TL17_IC	2.54	1.183	227

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
TL8_IC	8.05	9.268	.478	.252	.872
TL10_IC	7.03	9.495	.667	.559	.777
TL15_IC	7.31	8.605	.775	.661	.726
TL17_IC	7.39	8.610	.735	.570	.742

Table 4.16 indicates a Cronbach's alpha of .826. This is a satisfactory coefficient of internal consistency ( $>.80$ ). When considering the item statistics, the means ranged from 1.88 to 2.90 (on a 5-point scale) and the standard deviations from 1.082 to 1.367. Although the mean of TL8\_IC (1.88) is slightly lower than the other means, the mean is not low enough to curtail the distribution of responses.

The inter-item correlation matrix revealed that all the items correlated above .30 (Appendix 6). The corrected item-total correlations for the items were above .50, except for TL8\_IC (.478). The squared multiple correlations were larger than .30, except for TL8\_IC (.252). Table 4.3 showed that if TL8\_IC would be deleted, this would result in an increase in the Cronbach alpha of .826 to .872.

Given the length of the scale and the already acceptable high alpha, fact that the item statistics are not seriously problematic, and the moderate increase (.046) in the Cronbach alpha the decision whether or not to delete item TL8\_IC was postponed till after the EFA.

#### 4.3.4.4 IDEALISED INFLUENCE (BEHAVIOUR)

The *Idealised Influence (Behaviour)* subscale comprises 4 items. The results for the item analysis are depicted in Table 4.17 below.

**Table 4.17**

***Item analysis results for the idealised influence (behaviour) subscale***

Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items			N of Items	
.846	.845			4	
	Mean	Std. Deviation	N		
	TL2_IIB	3.03	.938	227	
	TL7_IIB	3.15	.963	227	
	TL12_IIB	3.08	1.098	227	
	TL19_IIB	2.97	1.064	227	
Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted	
TL2_IIB	9.21	7.554	.562	.328	.852
TL7_IIB	9.08	6.714	.740	.552	.781
TL12_IIB	9.16	6.143	.732	.565	.782
TL19_IIB	9.26	6.399	.706	.516	.794

Table 4.17 indicates a Cronbach's alpha of .846. This falls above the critical cut-off value of .80 set for this study. When considering the item statistics, the means ranged from 2.97 to 3.15 (on a 5-point scale) and the standard deviations from .938 to 1.098. No extreme means were evident. The standard deviation of item TL2\_IIB (.938) is slightly smaller than the other items' standard deviation. The standard deviation is, however, not small enough to suggest an insensitive item or a restriction of range.

The inter-item correlations were satisfactory (.474 to .679) (Appendix 6). The corrected item-total correlations for the items were all above .50. The squared multiple correlations were larger than .30. Item TL2\_IIB returned a slightly lower squared multiple correlation (.328) than the other items. Table 4.3 showed that if TL2\_IIB would be deleted, this would result in a slight increase in the Cronbach alpha of .846 to .852.

Given the length of the scale, the already acceptable high alpha, the fact that the item statistics are not seriously problematic, as well as the very small increase (.006) in the Cronbach alpha if item TL2\_IIB were deleted, it was decided to retain all 4 items.

#### 4.3.4.5 IDEALISED INFLUENCE (ATTRIBUTED)

The *Idealised Influence (Attributed)* subscale comprises 4 items. The results for the item analysis are depicted in Table 4.18 below.

**Table 4.18**

##### ***Item analysis results for the idealised influence (attributed) subscale***

Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items			N of Items
.874	.871			4

	Mean	Std. Deviation	N
TL5_IIA	2.85	1.173	227
TL9_IIA	2.79	1.139	227
TL11_IIA	2.85	1.164	227
TL13_IIA	3.23	.950	227

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
TL5_IIA	8.88	7.763	.790	.658	.813
TL9_IIA	8.93	8.097	.757	.601	.827
TL11_IIA	8.87	7.625	.828	.706	.796
TL13_IIA	8.50	10.056	.555	.312	.899

Table 4.18 indicates a Cronbach's alpha of .874. This is satisfactory and implies that approximately 87% of the variance in the items is systematic/true variance. When considering the item statistics, the means ranged from 2.85 to 3.23 (on a 5-point scale) and the standard deviations from .950 to 1.173. The mean of item TL13\_IIA (3.23) is slightly larger than the other item means. The standard deviation of item TL13\_IIA (.950) is slightly smaller than the other standard deviations. The standard deviation of item TL13\_IIA is, however, not small enough to suggest an insensitive item or a restriction of range.

The inter-item correlations were satisfactory (.477 to .788) (Appendix 6). The corrected item-total correlations for the items were all above .50. Item TL13\_IIA

returned the lowest corrected item-total correlation (.555). The squared multiple correlations were larger than .5, except for item TL13\_IIA (.312). Table 4.18 showed that if TL13\_IIA would be deleted, this would result in an increase in the Cronbach alpha of .874 to .899. None of the other items, if deleted, would result in an increase in the Cronbach alpha.

Given the length of the scale, the already acceptable high alpha, the fact that the item statistics are not seriously problematic, as well as the small increase (.025) in the Cronbach alpha if item TL13\_IIA were deleted, it was decided to retain all 4 items.

#### **4.3.5 EMPLOYEE ENDORSEMENT OF SELF-TRANSCENDENCE**

*Self-Transcendence* is a higher-order value type comprising two lower-order values, *Altruism* and *Relationships with others*. The 6 item *Employee Endorsement of Self-Transcendence* scale consists of 2 subscales (i.e. the *Altruism* subscale and the *Relationships with Others* subscale). The current study is not only concerned with *Employee Endorsement of Self-Transcendence*, but also with *Employee Endorsement of Altruism* and *Employee Endorsement of Relationships with Others*. The fact that the two first-order values load on a single second-order value necessarily means that the two values correlate to some degree. Nonetheless as two distinct first-order values the possibility remains that a respondent who scores high on one value does not necessarily have to score equally high on the other first-order value. Item analysis was therefore conducted on the two subscales instead of on all the items of the *Employee Endorsement of Self-Transcendence* scale simultaneously.

The reliability coefficient of .905873 calculated via the Nunnally (1978) formula for the *Employee Endorsement of Self-Transcendence* scale reported in Table 4.1 was calculated using results obtained from the item analyses performed on the two subscales. This value falls above the critical cut-off value of .80 set for this study. The item analysis on the two subscales will be discussed in greater detail in the subsequent two sections.

#### 4.3.5.1 EMPLOYEE ENDORSEMENT OF ALTRUISM

The *Employee Endorsement of Altruism* subscale comprises 3 items. The results for the item analysis are depicted in Table 4.19 below.

**Table 4.19**

***Item analysis results for the employee endorsement of altruism subscale***

Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items			N of Items
.841	.841			3

	Mean	Std. Deviation	N
WVE1_A	4.52	.640	227
WVE2_A	4.39	.698	227
WVE3_A	4.49	.634	227

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
WVE1_A	8.89	1.509	.660	.439	.822
WVE2_A	9.01	1.283	.751	.570	.735
WVE3_A	8.91	1.465	.712	.523	.775

Table 4.19 indicates a Cronbach's alpha of .841. This falls above the critical cut-off value of .80 and is therefore satisfactory. Visual inspection of the item statistics revealed means that ranged from 4.39 to 4.52 (on a 5-point scale) and standard deviations from .634 to .698.

The inter-item correlation matrix for this scale showed that all the items correlated above .50 (Appendix 6). All the corrected item-total correlations were above .50. The squared multiple correlations were all larger than .30. Table 4.21 revealed that none of the items, if deleted, would increase the current Cronbach alpha.

When considering the basket of results, none of the items were flagged as problematic items. All the items of the subscale were therefore retained.

#### 4.3.5.2 EMPLOYEE ENDORSEMENT OF RELATIONSHIPS WITH OTHERS

The *Employee Endorsement of Relationships with Others* subscale comprises 3 items. The results for the item analysis are depicted in Table 4.20 below.



**Table 4.20*****Item analysis results for the employee endorsement of relationships with others subscale***

Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items			N of Items
.887	.892			3

	Mean	Std. Deviation	N
WVE4_RwO	4.23	.787	227
WVE5_RwO	3.91	.903	227
WVE6_RwO	3.62	1.051	227

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
WVE4_RwO	7.53	3.445	.734	.554	.885
WVE5_RwO	7.85	2.830	.845	.714	.781
WVE6_RwO	8.14	2.476	.795	.659	.841

Table 4.20 indicates a Cronbach's alpha of .887. This is a satisfactory coefficient of internal consistency (>.80). Visual inspection of the item statistics revealed means that ranged from 3.62 to 4.23 (on a 5-point scale) and standard deviations from .787 to 1.051. The mean of item WVE6\_RwO was not considered to be an extreme mean since the item response distribution was not substantially curtailed relative to the other two distributions.

The inter-item correlation matrix for this scale showed that all the items correlated above .50 (Appendix 6). All the corrected item-total correlations were above .50. The squared multiple correlations were all larger than .50. Table 4.20 revealed that none of the items, if deleted, would increase the current Cronbach alpha.

When considering the basket of results, none of the items were flagged as problematic items. All the items of the subscale were therefore retained.

#### **4.3.6 PERCEIVED ORGANISATIONAL ENDORSEMENT OF SELF-TRANSCENDENCE**

The *Perceived Organisational Endorsement of Self-Transcendence* scale comprises the same six items as the *Employee Endorsement of Self-Transcendence* scale.

However, instead of rating each item in terms of “How important is this to you” respondents rate the items in terms of “How important is this to your organisation.” Item analysis was conducted on the two subscales instead of on all the items of the *Perceived Organisational Endorsement of Self-Transcendence* scale simultaneously.

The calculated reliability coefficient of .949051 obtained from the Nunnally (1978) formula for linear composites for the *Perceived Organisational Endorsement of Self-Transcendence* scale, as reported in Table 4.1, demonstrates that approximately 95% of the variance in items is systematic/true variance, approximately 5% is random error variance. This is a highly satisfactory reliability coefficient (>.80). The item analysis on the two subscales will be discussed in greater detail in the subsequent two sections.

#### 4.3.6.1 PERCEIVED ORGANISATIONAL ENDORSEMENT OF ALTRUISM

The *Perceived Organisational Endorsement of Altruism* subscale comprises 3 items. The results for the item analysis are depicted in Table 4.21 below.

**Table 4.21**

***Item analysis results for the perceived organisational endorsement of altruism subscale***

Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items			N of Items	
.888	.888			3	
	Mean	Std. Deviation	N		
	WVO1_A	4.33	.728	227	
	WVO2_A	4.36	.730	227	
	WVO3_A	4.33	.736	227	
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
WVO1_A	8.70	1.974	.698	.488	.911
WVO2_A	8.66	1.792	.824	.720	.802
WVO3_A	8.69	1.773	.825	.721	.801

Table 4.21 indicates a Cronbach's alpha of .888. This is a satisfactory coefficient of internal consistency (>.80). When considering the item statistics, the means ranged from 4.33 to 4.36 (on a 5-point scale) and the standard deviations from .728 to .736.

Despite the high item means the degree of dispersion in the item response distributions seemingly have not been negatively affected.

High inter-item correlations were obtained. The inter-item correlations ranged from .781 to .871. The corrected item-total correlations for all the items were larger than .60. The corrected item-total correlation for item WVO1\_A (.698) was slightly lower than the other item-total correlations (Appendix 6). The squared multiple correlations were all larger than .30. Item WVO1\_A returned the lowest squared multiple correlation (.488). Table 4.21 revealed that if item WVO1\_A were deleted, the Cronbach alpha would increase marginally from .888 to .911. However, given the already high alpha and the length of the subscale, it was decided to retain all 3 items.

#### 4.3.6.2 PERCEIVED ORGANISATIONAL ENDORSEMENT OF RELATIONSHIPS WITH OTHERS

The *Perceived Organisational Endorsement of Relationships with Others* subscale comprises 3 items. The results for the item analysis are depicted in Table 4.22 below.

**Table 4.22**

***Item analysis results for the perceived organisational endorsement of relationships with others subscale***

	Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items		N of Items
	.938	.939		3

	Mean	Std. Deviation	N
WVO4_RwO	3.81	.944	227
WVO5_RwO	3.60	1.006	227
WVO6_RwO	3.48	1.045	227

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
WVO4_RwO	7.08	3.932	.847	.743	.930
WVO5_RwO	7.29	3.524	.917	.840	.875
WVO6_RwO	7.41	3.534	.858	.762	.923

Table 4.22 indicates a Cronbach's alpha of .938. This is a highly satisfactory coefficient of internal consistency ( $>.80$ ). Approximately 94% of the variance in the items is systematic/true variance; only approximately 6% is random error variance. When considering the item statistics, the means ranged from 3.48 to 3.81 (on a 5-point scale) and the standard deviations from .944 to 1.045.

Visual inspection of the inter-item correlations revealed that all the items correlated above .50 (Appendix 6). The corrected item-total correlations for all the items were all above .80. The squared multiple correlations were all larger than .70. Good items share a reasonable proportion of variance with the other items since they are meant to measure the same underlying factor. None of the items, if deleted, would increase the current Cronbach alpha of .938. All three the items were therefore retained.

#### 4.3.7 MEANINGFULNESS

The *Meaningfulness* scale comprises 6 items. The item analysis was conducted on all 6 items simultaneously. The results are depicted in Table 4.23 below.

**Table 4.23**

##### *Item analysis results for the meaningfulness subscale*

	Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items			N of Items
	.922	.923			6
		Mean	Std. Deviation	N	
		M1	4.55	.611	227
		M2	4.35	.651	227
		M3	4.25	.766	227
		M4	4.37	.714	227
		M5	4.48	.626	227
		M6	4.39	.684	227

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
M1	21.85	8.812	.742	.593	.912
M2	22.04	8.498	.778	.658	.907
M3	22.14	7.918	.782	.666	.908
M4	22.02	8.070	.813	.702	.902
M5	21.91	8.479	.824	.715	.902
M6	22.00	8.482	.734	.635	.913

Table 4.23 indicates a Cronbach's alpha of .922. This is a highly satisfactory coefficient of internal consistency ( $>.80$ ). Approximately 92% of the variance in the items is systematic/true variance; only 8% is random error variance. When considering the item statistics, the means ranged from 4.25 to 4.55 (on a 5-point scale). The standard deviations ranged from .611 to .766. Despite the high item means the degree of dispersion in the item response distributions seemingly have not been seriously negatively affected. The item response distributions for the two items with the highest means (M1 and M5) were nonetheless slightly narrower.

The inter-item correlation matrix revealed that all the items correlated above .50 (Appendix 6). The corrected item-total correlations were all large, ranging from .734 to .824, and were therefore satisfactory. The squared multiple correlations were all larger than .50. None of the items, if deleted, would increase the current Cronbach alpha of .922. All the items were therefore retained.

#### 4.3.8 PSYCHOLOGICAL SAFETY

The *Psychological Safety* scale comprises 9 items that were selected and adapted from existing studies that measured *Psychological Safety*. The item analysis was conducted on all 9 items simultaneously. The results are depicted in Table 4.24 below.

**Table 4.24**

##### ***Item analysis results for the psychological safety subscale***

Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items			N of Items
.899	.899			9
	Mean	Std. Deviation	N	
PS1	3.75	.946	227	
PS2	3.38	1.051	227	
PS3	3.66	1.007	227	
PS4	3.27	1.023	227	
PS5	3.32	1.007	227	
PS6	3.83	.916	227	
PS7	3.74	.969	227	
PS8	3.83	.972	227	
PS9	4.03	.809	227	

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item- Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
PS1	29.05	34.218	.634	.516	.890
PS2	29.42	31.971	.762	.672	.880
PS3	29.15	34.508	.558	.393	.897
PS4	29.54	33.205	.668	.544	.888
PS5	29.49	32.286	.772	.685	.880
PS6	28.97	34.008	.682	.643	.887
PS7	29.07	33.411	.695	.622	.886
PS8	28.97	33.601	.673	.651	.888
PS9	28.78	36.155	.547	.331	.896

Table 4.24 indicates a Cronbach's alpha of .899. This is a satisfactory coefficient of internal consistency ( $>.80$ ). When considering the item statistics, the means ranged from 3.27 to 4.03 (on a 5-point scale) and standard deviations from .809 to 1.051. No extreme means and small standard deviations were evident.

The inter-item correlation matrix revealed that all the items correlated adequately. The corrected item-total correlations were all above .50 (Appendix 6). The squared multiple correlations were all larger than .30. None of the items, if deleted, would increase the current Cronbach alpha of .899. All 9 the items were therefore retained.

#### **4.4 DIMENSIONALITY ANALYSIS VIA EXPLORATORY FACTOR ANALYSIS (EFA)**

The architecture of each of the scales and subscales used to operationalise the latent variables comprising the proposed *Work Engagement* structural model and the two narrow-focus structural models reflects the intention to construct essentially one-dimensional sets of items. These items are intended to act as stimulus sets to which the participants respond with behaviour that is primarily an expression of a specific uni-dimensional underlying latent variable or latent dimension of a multi-dimensional latent variable. In other words, each item should reflect only its associated latent variable or latent dimension of a multi-dimensional latent variable, without significantly reflecting any other latent variables. In sum, the aim is to obtain a relatively uncontaminated measure of the specific underlying latent variable via the items comprising the scale/subscale.

Exploratory factor analysis (EFA) was performed on each of the scales and on the subscales of a scale that measures a multi-dimensional latent variable. Allen and

Yen (1979) refer to factor analysis as a family of multivariate statistical procedures that seeks to condense a large number of observed variables (i.e. items) into highly correlated groups that measure a single underlying construct. In the current research study, the observed variables (i.e. the items) measure the extent of agreement with specific behavioural statements. A factor analytical model represents a description of the mechanism through which values on the observed variables (i.e. items) are generated by underlying latent variables or factors (Byrne 2001). The factor loading pattern and the parameters characterising the regression paths from the factors to the observed variables (i.e. factor loadings) are therefore important. A factor loading represents the slope of the regression of an observed variable on the underlying factor that it represents (Allen and Yen, 1979). Byrne (2001) notes that although inter-factor relations are of interest, any regression structure amongst the factors is not considered in the factor-analytic model. Essentially, the factor analysis approach assumes that each observed variable is a linear combination of some number of common factors and a unique factor (Byrne, 2001).

Unrestricted principal axis factor analysis was used as the extraction technique and the extracted solution was subjected to oblique rotation in the case of factor fission. The correlation matrix was considered for each scale/subscale in order to establish whether the correlation matrix was factor analysable. The matrix should contain statistically significant ( $p < .05$ ) correlations larger than .30. In addition, the Kaiser-Meyer-Olkin (KMO) statistic for each scale/subscale should approach unity ( $> .60$ ) for the correlation matrix to be deemed factor analysable (Tabachnick & Fidell, 2007). The KMO represents a measure of the 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 decision on the null hypothesis tested via Bartlett's test of sphericity represented an additional criterion that was considered to determine the factor analysability of each scale/subscale. The Bartlett's test of sphericity tests the null hypothesis that the correlation matrix is an identity matrix in the parameter (Tabachnick & Fidell, 2007).

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 location of the elbow in the scree plot (Tabachnick & Fidell, 2007). A factor loading of a single item

on an extracted factor was considered acceptable if a value of  $>.50$  was obtained. The adequacy of the extracted solution was evaluated by calculating the percentage of large residual correlations. Residual correlations were considered large if they were greater than  $.05$ . A summary of the results of the factor analyses is depicted in Table 4.25. The results obtained for each scale/subscale will be discussed in greater detail in the subsequent sections. Detailed results of the separate factor analyses performed on each scale/subscale are shown in Appendix 7.

**Table 4.25**

***Factor analysis results for the Work Engagement Survey (WES) scales/subscales***

Scales/Subscales	KMO	Bartlett's Test	Maximum loading	Minimum loading	Number of factors extracted
WE_V	.709	412.138	.957	.762	1
WE_D	.702	338.997	.905	.691	1
WE_A	.712	247.975	.842	.716	1
JC_A	.675	175.810	.824	.607	1
JC_TI	.579	193.147	.904	.366	1
JC_SV	.555	191.912	.946	.317	1
JC_TS	.676	177.856	.784	.598	1
JC_F	.695	215.691	.841	.664	1
PC_Eff	.880	575.246	.826	.552	1
PC_H	.820	469.019	.833	.418	1
PC_R	.812	290.410	.732	.242	1
PC_O	.705	305.356	.842	.357	2
TL_IS	.818	568.621	.866	.744	1
TL_IM	.835	554.383	.897	.774	1
TL_IC	.774	413.454	.908	.510	1
TL_IIB	.802	384.509	.827	.611	1
TL_IIA	.812	504.227	.914	.585	1
WVE_A	.714	281.331	.874	.726	1
WVE_RwO	.725	413.438	.937	.780	1
WVO_A	.714	419.073	.915	.733	1
WVO_RwO	.738	622.372	.977	.878	1
M	.881	1000.715	.864	.772	1
PS	.887	1167.870	.803	.576	2

*WE\_V= Vigour, WE\_D= Dedication, WE\_A= Absorption, JC\_A= Autonomy, JC\_TI= Task Identity, JC\_SV= Skills Variety, JC\_TS= Task Significance, JC\_F= Feedback, PC\_Eff= Self-Efficacy, PC\_H= Hope, PC\_R= Resiliency, PC\_O= Optimism, TL\_IS= Intellectual Stimulation, TL\_IM= Inspirational Motivation, TL\_IC= Individualised Consideration, TL\_IIB= Idealised Influence (Behaviour), TL\_IIA= Idealised Influence (Attributed), WVE\_A= Employee Endorsement of Altruism, WVE\_RwO= Employee Endorsement of Relationships with Others, WVO\_A= Perceived Organisational Endorsement of Altruism, WVO\_RwO= Perceived Organisational Endorsement of Relationships with Others, M= Meaningfulness, PS= Psychological Safety.*



## 4.4.1 WORK ENGAGEMENT

### 4.4.1.1 VIGOUR

The dimensionality analysis was conducted on the 3-item *Vigour* subscale. All the item pairs in the correlation matrix obtained correlations that were larger than .30 and statistically significant ( $p < .05$ ). The subscale obtained a KMO-value of .709, which served as evidence that the subscale was factor analysable ( $> .60$ ). The final criterion to determine the factor analysability of the correlation matrix is the decision on the null hypothesis that the correlation matrix is an identity matrix in the parameter tested via the Bartlett's test of sphericity. This test indicated that  $H_0$  could be rejected ( $p < .05$ ), providing additional support that the correlation matrix was factor analysable.

The eigenvalue-greater-than-one rule and the scree plot suggested the extraction of one factor. The factor matrix, shown in Table 4.26, indicated that all the items loaded satisfactory on the single extracted factor ( $> .50$ ). Furthermore, none (0%) of non-redundant residuals had absolute values of greater than .05. This indicates that the 1-factor solution provides a highly credible explanation for the observed inter-item correlation matrix. The uni-dimensionality assumption was thus corroborated.

**Table 4.26**

***Factor structure for the vigour subscale***

	Factor
	1
WE1_V	.844
WE2_V	.957
WE5_V	.762

### 4.4.1.2 DEDICATION

The results for the *Dedication* subscale dimensionality analysis indicated that all the item pairs in the correlation matrix obtained correlations that were larger than .30

and statistically significant ( $p < .05$ ). The subscale obtained a KMO-value of .702, therefore indicating that the subscale was factor analysable ( $> .60$ ). The Bartlett's test of sphericity indicated that identity matrix null hypothesis could be rejected ( $p < .05$ ) providing additional support that the correlation matrix was factor analysable.

The eigenvalue-greater-than-one rule and the location of the elbow in the scree plot suggested the extraction of one factor. The factor matrix, shown in Table 4.27, indicated that all the items loaded satisfactory on the single factor ( $> .50$ ). Furthermore, no non-redundant residuals had absolute values of greater than .05. This indicates that the 1-factor solution provides a highly credible explanation for the observed inter-item correlation matrix. The uni-dimensionality assumption for this subscale was thus corroborated.

**Table 4.27**

***Factor structure for the dedication subscale***

	Factor
	1
WE3_D	.869
WE4_D	.905
WE7_D	.691

#### **4.4.1.3 ABSORPTION**

The dimensionality analysis was conducted on the 3-item *Absorption* subscale. All the item pairs in the correlation matrix obtained correlations that were larger than .30 and statistically significant ( $p < .05$ ). The subscale obtained a KMO-value of .712 and the Bartlett's test of sphericity indicated that identity matrix null hypothesis could be rejected ( $p < .05$ ). The correlation matrix was therefore factor analysable.

The eigenvalue-greater-than-one rule and the scree plot suggested the extraction of one factor. The factor matrix, shown in Table 4.28, indicated that all the items loaded satisfactory on factor the single extracted factor ( $> .50$ ). Furthermore, no non-redundant residuals had absolute values of greater than .05. The 1-factor solution

therefore provides a highly credible explanation for the observed inter-item correlation matrix. The uni-dimensionality assumption was thus corroborated.

**Table 4.28**

***Factor structure for the absorption subscale***

	<b>Factor</b>
	<b>1</b>
WE6_A	.716
WE8_A	.842
WE9_A	.786

#### **4.4.2 JOB CHARACTERISTICS**

##### **4.4.2.1 AUTONOMY**

The results for the *Autonomy* subscale dimensionality analysis indicated that all the item pairs in the correlation matrix obtained correlations that were larger than .30 and statistically significant ( $p < .05$ ). The subscale obtained a KMO-value of .675, therefore indicating that the subscale was factor analysable ( $> .60$ ). The Bartlett's test of sphericity indicated that identity matrix null hypothesis could be rejected ( $p < .05$ ) providing additional support that the correlation matrix was factor analysable.

The eigenvalue-greater-than-one rule and the position of the elbow in the scree plot suggested the extraction of one factor. The factor matrix, shown in Table 4.29, indicated that all the items loaded satisfactory on factor the single extracted factor ( $> .50$ ). Furthermore, no non-redundant residuals had absolute values of greater than .05. This indicates that the 1-factor solution provides a highly credible explanation for the observed inter-item correlation matrix. The uni-dimensionality assumption for this subscale was thus corroborated.

**Table 4.29*****Factor structure for the autonomy subscale***

	Factor 1
JC1_A	.607
JC11_A	.731
JC14_A	.824

**4.4.2.2 TASK IDENTITY**

The dimensionality analysis was conducted on the 3-item *Task Identity* subscale. All the item pairs in the correlation matrix obtained correlations that were larger than .30, except for the correlation between JC7\_TI and JC2\_TI. Despite this, all the correlations were statistically significant ( $p < .05$ ). The subscale obtained a KMO-value of .579, thus indicating that casting some doubt on the factor analysability of the subscale ( $< .60$ ). However, the Bartlett's test of sphericity indicated that the identity matrix null hypothesis could be rejected ( $p < .05$ ), which indicated that it was worth factor analysing the correlation matrix in search of one or more common factors.

The eigenvalue-greater-than-one rule and the scree plot suggested the extraction of one factor. The factor matrix, shown in Table 4.30, indicated that the items loaded satisfactory on factor the single factor ( $> .50$ ), except for JC2\_TI (.366). Furthermore, no non-redundant residuals had absolute values of greater than .05. As already discussed in section 4.3.2.2, the item analysis suggested that the deletion of JC2\_TI would result in an increase in the Cronbach alpha from .705 to .839. Based on the basket of evidence indicating that item JC2\_TI is a poor item, it was decided to delete the item from the *Task Identity* subscale.

**Table 4.30*****Rotated factor structure for the task identity subscale***

	Factor
	1
JC2_TI	.366
JC7_TI	.799
JC12_TI	.904

The item analysis was subsequently rerun without item JC2\_TI. As expected, the Cronbach alpha increased to .839, which falls above the critical cut-off value of .80. The inter-item correlation matrix showed that the remaining two items correlated .723. It was not meaningful to repeat the EFA with only two items. In conclusion, none of the other items appeared to be problematic.

**4.4.2.3 SKILL VARIETY**

All the item pairs in the correlation matrix obtained correlations that were larger than .30, except for the correlation between JC3\_SV and JC6\_SV. Despite this, all the correlations were statistically significant ( $p < .05$ ). The subscale obtained a KMO-value of .555, thus casting some doubt on the factor analysability of the subscale ( $< .60$ ). However, the Bartlett's test of sphericity indicated that identity matrix null hypothesis could be rejected ( $p < .05$ ), which indicated that it was worth factor analysing the correlation matrix.

In line with what was hypothesised, the results indicated that only one factor could be extracted. The factor matrix, shown in Table 4.31, indicated that the items loaded satisfactory on factor the single extracted factor ( $> .50$ ), except for JC3\_SV (.317). Furthermore, no non-redundant residuals had absolute values of greater than .05. The item analysis results presented earlier indicated that item JC3\_SV was a poor item. More specifically, the item analysis revealed that the deletion of JC3\_SV would result in a dramatic increase in the Cronbach's alpha from .650 to .838. Consequently, the decision was made to delete item JC3\_SV from the *Skills Variety*

**Table 4.31*****Factor structure for the skills variety subscale***

	Factor
	1
JC3_SV	.317
JC6_SV	.769
JC9_SV	.946

The item analysis was subsequently rerun without item JC3\_SV. As expected, the Cronbach alpha increased to .838. This is a satisfactory coefficient of internal consistency ( $>.80$ ). The inter-item correlation matrix showed that the remaining two items correlated .729. In conclusion, none of the other items appeared to be problematic.

**4.4.2.4 TASK SIGNIFICANCE**

The results for the *Task Significance* subscale dimensionality analysis indicated that all the item pairs in the correlation matrix obtained correlations that were larger than .30 and statistically significant ( $p<.05$ ). The subscale obtained a KMO-value of .676, therefore indicating that the subscale was factor analysable ( $>.60$ ). The Bartlett's test of sphericity indicated that the identity matrix null hypothesis could be rejected ( $p<.05$ ) providing additional support that the correlation matrix was factor analysable.

The eigenvalue-greater-than-one rule and the position of the elbow in the scree plot suggested the extraction of one factor. The factor matrix, shown in Table 4.32, indicated that all the items loaded satisfactory on factor the single factor ( $>.50$ ). Furthermore, no non-redundant residuals had absolute values of greater than .05. This indicates that the 1-factor solution provides a highly credible explanation for the observed inter-item correlation matrix. The uni-dimensionality assumption for this subscale was thus corroborated.

**Table 4.32*****Factor structure for the task significance subscale***

	Factor
	1
JC4_TS	.598
JC10_TS	.784
JC15_TS	.784

**4.4.2.5 FEEDBACK**

All the item combinations in the *Feedback* correlation matrix obtained correlations that were larger than .30 and statistically significant ( $p < .05$ ). The subscale obtained a KMO-value of .695, therefore indicating that the subscale was factor analysable ( $> .60$ ). The Bartlett's test of sphericity indicated that the identity matrix null hypothesis could be rejected ( $p < .05$ ) providing additional support that the correlation matrix was factor analysable.

The eigenvalue-greater-than-one rule and the scree plot suggested the extraction of one factor. The factor matrix, shown in Table 4.33, indicated that all the items loaded satisfactory on factor the single extracted factor ( $> .50$ ). Furthermore, no non-redundant residuals had absolute values of greater than .05. This indicates that the 1-factor solution provides a highly credible explanation for the observed inter-item correlation matrix. The uni-dimensionality assumption for this subscale was thus corroborated.

**Table 4.33*****Factor structure for the feedback subscale***

	Factor
	1
JC5_F	.664
JC8_F	.764
JC13_F	.841

### 4.4.3 PSYCHOLOGICAL CAPITAL

#### 4.4.3.1 SELF-EFFICACY

The results of the dimensionality analysis on the *Self-efficacy* subscale indicated that the correlation matrix was factor analysable as all the obtained correlations were larger than .30 and all were statistically significant ( $p < .05$ ). In addition, the KMO was .880 and the Bartlett's test of sphericity indicated that the identity matrix null hypothesis could be rejected ( $p < .05$ ).

The eigenvalue-greater-than-one rule and the position of the elbow in the scree plot suggested the extraction of one factor. The factor matrix, shown in Table 4.34, indicated that all the items loaded satisfactory on factor the single extracted factor ( $> .50$ ). Furthermore, only 1 (6%) of non-redundant residuals had an absolute value greater than .05. This indicates that the 1-factor solution provides a credible explanation for the observed inter-item correlation matrix. The uni-dimensionality assumption for this subscale was thus corroborated.

**Table 4.34**

***Factor structure for the self-efficacy subscale***

	Factor
	1
PC1_Eff	.552
PC2_Eff	.826
PC3_Eff	.776
PC4_Eff	.790
PC5_Eff	.698
PC6_Eff	.660



#### 4.4.3.2 HOPE

The dimensionality analysis was conducted on the 6-item *Hope* subscale. The results indicated that the correlation matrix was factor analysable. All but one of the obtained correlations were larger than .30. Despite this, all the correlations were statistically significant ( $p < .05$ ). In addition, the KMO was .820 and the Bartlett's test of sphericity indicated that the identity matrix null hypothesis could be rejected ( $p < .05$ ).

One factor was extracted in terms of the observed correlation matrix, since only one factor obtained an eigenvalue greater than one. The factor matrix, shown in Table 4.35, indicated that four of the six items loaded satisfactory on the extracted factor ( $> .50$ ). The loading of item PC7\_H (.477) and item PC9\_H (.418) raised concerns that these two items were potentially problematic. Furthermore, 6 (40%) of non-redundant residuals had an absolute value greater than .05. This indicates that the 1-factor solution provides a rather tenuous explanation for the observed inter-item correlation matrix. The moderately high percentage of large residual correlations suggests the presence of a second factor. To examine this possibility a two factor solution was forced and rotated to simple structure. The rotated pattern matrix is shown in Figure 4.36.

**Table 4.35**

***Factor structure for the hope subscale***

	Factor 1
PC7_H	.477
PC8_H	.678
PC9_H	.418
PC10_H	.803
PC11_H	.765
PC12_H	.779

**Table 4.36*****Rotated two-factor factor structure for the hope subscale***

	Factor 1	Factor 2
PC7_H	-.042	.813
PC8_H	.582	.134
PC9_H	.208	.302
PC10_H	.820	-.012
PC11_H	.833	-.075
PC12_H	.779	.009

The rotated pattern matrix indicates that item PC7\_H (.813) and item PC9\_H (.302) load on factor 2. Inspection of the item wording of the items suggests that factor 1 could be interpreted as a will power factor whereas factor 2 could be interpreted as a way power factor. The loading of item PC11\_H does however seem to suggest that factor 2 is not an unqualified way power factor since one would have expected this item to load on factor 2 if it was. The two items that load on factor 2 seem to both refer to the ability to find alternative ways of achieving a goal when the currently used way/path is blocked. Item PC11\_H seems to refer to perceiving multiple ways to achieve a goal when the current path is not blocked.

Both factors represent meaningful facets of the *Hope* dimension. The item analysis for the *Hope* subscale returned a satisfactory Cronbach's alpha of .813. Furthermore, the item analysis indicated that if item PC9\_H were deleted, the Cronbach alpha would increase marginally to .819. This can be explained by the somewhat modest factor loading of this item on the minor second *Hope* factor. None of the other items, if deleted, would result in an increase in the Cronbach alpha. Given the already acceptable alpha for this subscale combined with the fact that the factor fission made conceptual sense, it was decided to retain all six of the items comprising the *Hope* subscale.

#### 4.4.3.3 RESILIENCY

For this subscale, item PC13\_RR correlated poorly ( $<.30$ ) with all of the other items. All the other items, excluding item PC13\_RR, obtained correlations that were larger than  $.30$ . Fourteen out of the fifteen correlations were statistically significant ( $p < .05$ ). Despite this, the subscale obtained a KMO-value of  $.812$  and the Bartlett's test of sphericity indicated that the identity matrix null hypothesis could be rejected ( $p < .05$ ). This served as evidence that it was worth factor analysing the correlation matrix.

The eigenvalue-greater-than-one rule and the scree plot suggested the extraction of one factor. The factor matrix, shown in Table 4.37, indicated that four of the six items loaded satisfactory on factor 1 ( $>.50$ ). The loading of item PC13\_RR ( $.242$ ) and item PC15\_R ( $.418$ ) raised concerns that these two items were potentially problematic. Only 2 (13%) of non-redundant residuals had an absolute value greater than  $.05$ . This indicates that the 1-factor solution provides a credible explanation for the observed inter-item correlation matrix. The uni-dimensionality assumption for this subscale was thus corroborated.

**Table 4.37**

***Factor structure for the resiliency subscale***

	Factor 1
PC13_RR	.242
PC14_R	.604
PC15_R	.474
PC16_R	.678
PC17_R	.712
PC18_R	.732

The earlier discussion of the item analysis results for this subscale in section 4.3.3 indicated that if item PC13\_RR were to be deleted, the Cronbach alpha would increase from  $.702$  to  $.761$ . None of the other items, if deleted at that stage, would result in an increase in the current Cronbach's alpha. It was therefore decided to only delete item PC13\_RR. The item analysis was subsequently rerun without item

PC13\_RR. As expected, the Cronbach alpha increased to .761, which is only slightly below the critical cut-off value of .80.

The EFA was repeated for the remaining five items. The results indicated that all the item pairs in the correlation matrix obtained correlations that were larger than .30 and statistically significant ( $p < .05$ ). The subscale obtained a KMO-value of .804 and the Bartlett's test of sphericity indicated that the identity matrix null hypothesis could be rejected ( $p < .05$ ). In sum, the subscale was factor analysable. The results again revealed that only one factor had to be extracted. The resultant factor matrix (Table 4.38) indicated that all the items, except for item PC15\_R, loaded satisfactory on the extracted factor ( $> .50$ ). The factor loading for item PC15\_R, however, approached the critical cut-off value of .50 and was consequently retained. Furthermore, 2 (20%) of non-redundant residuals had absolute values of greater than .05. This indicates that the 1-factor solution provides a credible explanation for the observed inter-item correlation matrix. The uni-dimensionality assumption for this subscale was thus corroborated.

**Table 4.38**

***Factor structure for the revised 5-item resiliency subscale***

	Factor
	1
PC14_R	.607
PC15_R	.477
PC16_R	.669
PC17_R	.713
PC18_R	.735

**4.4.3.4 OPTIMISM**

The dimensionality analysis was conducted on the 6-item *Optimism* subscale. The results indicated that the correlation matrix was factor analysable. Despite the fact that a number of the obtained correlations were smaller than .30 and the fact that three correlations were not statistically significant ( $> .05$ ), the KMO was .705 and the

Bartlett's test of sphericity indicated that the identity matrix null hypothesis could be rejected ( $p < .05$ ).

The eigenvalue-greater-than-one rule and the location of the elbow in the scree plot suggested the extraction of two factors. The pattern matrix is depicted in Table 4.39.

**Table 4.39**

***Rotated factor structure for the optimism subscale***

	Factor	
	1	2
PC19_O	.455	-.079
PC20_OR	.018	.700
PC21_O	.813	.113
PC22_O	.668	.129
PC23_OR	-.002	.729
PC24_O	.590	-.020

Table 4.39 indicated that the second factor is a method factor that reflects the manner in which the question/statement was phrased. Thus, it was decided to force the extraction of one factor and instead base decisions on the results obtained from the one factor solution. The results are displayed in Table 4.40.

**Table 4.40**

***Factor matrix when forcing the extraction of a single factor (optimism)***

	Factor
	1
PC19_O	.381
PC20_OR	.364
PC21_O	.842
PC22_O	.724
PC23_OR	.357
PC24_O	.542

The results indicated that three items (PC19\_O, PC20\_OR and PC23\_OR) did not load satisfactorily on factor 1 ( $< .50$ ). In addition, 7 (46%) of non-redundant residuals

had absolute values of greater than .05. This indicates that the 1-factor solution provides a somewhat tenuous, but still plausible explanation for the observed inter-item correlation matrix. The item analysis for the *Optimism* subscale revealed that PC\_19O should be flagged as a poor item. The item analysis further revealed that if PC19\_O was deleted, the Cronbach's alpha would increase marginally from .691 to .694. Given the low Cronbach's alpha and the fact that items PC19\_O, PC20\_OR and PC23\_OR obtained low loadings in both the 1-factor and 2-factor solutions, it was decided to delete all three these items and subsequently rerun the item analysis and EFA.

The item analysis revealed that the deletion of items PC19\_O, PC20\_OR and PC23\_OR resulted in an increase in the Cronbach's alpha from .694 to .746. No extreme means and small standard deviations were observed. Item PC24\_O returned a corrected item-total correlation of .483. The other two corrected item-total correlations were larger than .50. The squared multiple correlation for item PC24\_O (.244) fell below the critical value of .30. Item PC24\_O was flagged as a potentially poor item. In addition, the item analysis revealed item PC24\_O, if deleted, would result in an increase in the Cronbach alpha from .746 to .775.

The EFA on the remaining three items indicated that the correlation matrix was factor analysable as all the obtained correlations were larger than .30 and all were statistically significant ( $p < .05$ ). In addition, the KMO was .649 and the Bartlett's test of sphericity indicated that identity matrix null hypothesis could be rejected ( $p < .05$ ). The eigenvalue-greater-than-one rule and the scree plot suggested the extraction of one factor. The factor matrix, shown in Table 4.41, indicated that all the items loaded satisfactory on the extracted factor ( $> .50$ ). Furthermore, none (0%) of non-redundant residuals had an absolute value greater than .05. This indicates that the 1-factor solution for the remaining three items provides a highly credible explanation for the observed inter-item correlation matrix. Consequently, it was decided that all the remaining items should be retained.

**Table 4.41*****Factor structure for the revised 3-item optimism subscale***

	Factor 1
PC21_O	.873
PC22_O	.725
PC24_O	.548

**4.4.4 TRANSFORMATIONAL LEADERSHIP****4.4.4.1 INTELLECTUAL STIMULATION**

The results for this dimensionality analysis indicated that the correlation matrix was factor analysable as all the obtained correlations were larger than .30 and all were statistically significant ( $p < .05$ ). In addition, the KMO was .818 and the Bartlett's test of sphericity indicated that the identity matrix null hypothesis could be rejected ( $p < .05$ ).

The eigenvalue-greater-than-one rule and the scree plot suggested the extraction of one factor. The factor matrix, shown in Table 4.42, indicated that all the items loaded satisfactory on the single extracted factor ( $> .50$ ). Furthermore, none (0%) of non-redundant residuals had an absolute value greater than .05. This indicates that the 1-factor solution provides a highly credible explanation for the observed inter-item correlation matrix. The uni-dimensionality assumption for this subscale was thus corroborated.

**Table 4.42*****Factor structure for the intellectual stimulation subscale***

	Factor
	1
TL1_IS	.744
TL3_IS	.866
TL16_IS	.865
TL18_IS	.851

**4.4.4.2 INSPIRATIONAL MOTIVATION**

For this subscale, the EFA results indicated that the correlation matrix was factor analysable as all the obtained correlations were larger than .30 and all were statistically significant ( $p < .05$ ). In addition, the KMO was .835 and the Bartlett's test of sphericity indicated that the identity matrix null hypothesis could be rejected ( $p < .05$ ).

The eigenvalue-greater-than-one rule and the position of the elbow in the scree plot suggested the extraction of one factor. The factor matrix, shown in Table 4.43, indicated that all the items loaded satisfactory on the single extracted factor ( $> .50$ ). Furthermore, none (0%) of non-redundant residuals had an absolute value greater than .05. This indicates that the 1-factor solution provides a highly credible explanation for the observed inter-item correlation matrix. The uni-dimensionality assumption for this subscale was thus corroborated.

**Table 4.43*****Factor structure for the inspirational motivation subscale***

	Factor
	1
TL4_IM	.790
TL6_IM	.897
TL14_IM	.774
TL20_IM	.860



#### 4.4.4.3 INDIVIDUALISED CONSIDERATION

The dimensionality analysis was conducted on the 4-item *Individualised Consideration subscale*. All the item pairs in the correlation matrix obtained correlations that were larger than .30 and statistically significant ( $p < .05$ ). The subscale obtained a KMO-value of .774, which served as evidence that the subscale was factor analysable ( $> .60$ ). The Bartlett's test of sphericity indicated that the identity matrix null hypothesis could be rejected ( $p < .05$ ), providing additional support that the correlation matrix was factor analysable.

The eigenvalue-greater-than-one rule and the scree plot suggested the extraction of one factor. The factor matrix, shown in Table 4.44, indicated that all the items loaded satisfactory on the extracted factor ( $> .50$ ). Furthermore, only 1 (16%) of non-redundant residuals had absolute values of greater than .05. This indicates that the 1-factor solution provides a credible explanation for the observed inter-item correlation matrix. The uni-dimensionality assumption was thus corroborated.

**Table 4.44**

***Factor structure for the individualised consideration subscale***

	Factor
	1
TL8_IC	.510
TL10_IC	.772
TL15_IC	.908
TL17_IC	.824

#### 4.4.4.4 IDEALISED INFLUENCE (BEHAVIOUR)

The results for the *Idealised Influence (Behaviour)* subscale dimensionality analysis indicated that all the item pairs in the correlation matrix obtained correlations that were larger than .30 and statistically significant ( $p < .05$ ). The subscale obtained a KMO-value of .802, therefore indicating that the subscale was factor analysable ( $> .60$ ). The Bartlett's test of sphericity indicated that the identity matrix null

hypothesis could be rejected ( $p < .05$ ) providing additional support that the correlation matrix was factor analysable.

The eigenvalue-greater-than-one rule and the scree plot suggested the extraction of one factor. The factor matrix, shown in Table 4.45, indicated that all the items loaded satisfactory on the extracted factor ( $> .50$ ). Furthermore, no non-redundant residuals had absolute values of greater than  $.05$ . This indicates that the 1-factor solution provides a highly credible explanation for the observed inter-item correlation matrix. The uni-dimensionality assumption for this subscale was thus corroborated.

**Table 4.45**

***Factor structure for the idealised influence (behaviour) subscale***

	Factor 1
TL2_IIB	.611
TL7_IIB	.827
TL12_IIB	.824
TL19_IIB	.784

**4.4.4.5 IDEALISED INFLUENCE (ATTRIBUTED)**

All the item pairs in the correlation matrix obtained correlations that were larger than  $.30$  and statistically significant ( $p < .05$ ). The subscale obtained a KMO-value of  $.812$  and the Bartlett's test of sphericity indicated that the identity matrix null hypothesis could be rejected ( $p < .05$ ). The correlation matrix was therefore factor analysable.

The eigenvalue-greater-than-one rule and the location of the elbow in the scree plot suggested the extraction of one factor. The factor matrix, shown in Table 4.46, indicated that all the items loaded satisfactory on the single extracted factor ( $> .50$ ). Furthermore, no non-redundant residuals had absolute values of greater than  $.05$ . The 1-factor solution therefore provides a highly credible explanation for the observed inter-item correlation matrix. The uni-dimensionality assumption was thus corroborated.

**Table 4.46*****Factor structure for the idealised influence (attributed) subscale***

	Factor 1
TL5_IIA	.863
TL9_IIA	.819
TL11_IIA	.914
TL13_IIA	.585

**4.4.5 EMPLOYEE ENDORSEMENT OF SELF-TRANSCENDENCE****4.4.5.1 EMPLOYEE ENDORSEMENT OF ALTRUISM**

For this subscale, the correlation matrix was factor analysable as all the obtained correlations were larger than .30 and all were statistically significant ( $p < .05$ ). In addition, the KMO was .714 and the Bartlett's test of sphericity indicated that the identity matrix null hypothesis could be rejected ( $p < .05$ ).

The eigenvalue-greater-than-one rule and the scree plot suggested the extraction of one factor. The factor matrix, shown in Table 4.47, indicated that all the items loaded satisfactory on the extracted factor ( $> .50$ ). Furthermore, none (0%) of non-redundant residuals had an absolute value greater than .05. This indicates that the 1-factor solution provides a credible explanation for the observed inter-item correlation matrix. The uni-dimensionality assumption for this subscale was thus corroborated.

**Table 4.47*****Factor structure for the employee endorsement of altruism subscale***

	Factor 1
WVE1_A	.726
WVE2_A	.874
WVE3_A	.802

#### 4.4.5.2 EMPLOYEE ENDORSEMENT OF RELATIONSHIPS WITH OTHERS

The dimensionality analysis was conducted on the 3-item *Employee Endorsement of Relationships with others* subscale. All the item pairs in the correlation matrix obtained correlations that were larger than .30 and statistically significant ( $p < .05$ ). The subscale obtained a KMO-value of .725, which served as evidence that the subscale was factor analysable ( $> .60$ ). Bartlett's test of sphericity indicated that the identity matrix null hypothesis could be rejected ( $p < .05$ ), providing additional support that the correlation matrix was factor analysable.

In line with what was hypothesised, the results revealed that one factor should be extracted. The factor matrix, shown in Table 4.48, indicated that all the items loaded satisfactory on the single extracted factor ( $> .50$ ). Furthermore, none (0%) of the non-redundant residuals had absolute values of greater than .05. This indicates that the 1-factor solution provides a highly credible explanation for the observed inter-item correlation matrix. The uni-dimensionality assumption was thus corroborated.

**Table 4.48**

***Factor structure for the employee endorsement of relationships with others subscale***

	Factor 1
WVE4_RwO	.780
WVE5_RwO	.937
WVE6_RwO	.857

#### 4.4.6 PERCEIVED ORGANISATIONAL ENDORSEMENT OF SELF-TRANSCENDENCE

##### 4.4.6.1 PERCEIVED ORGANISATIONAL ENDORSEMENT OF ALTRUISM

All the item pairs in the correlation matrix obtained correlations that were larger than .30 and statistically significant ( $p < .05$ ). The subscale obtained a KMO-value of .714.

The Bartlett's test of sphericity indicated that the identity matrix null hypothesis could be rejected ( $p < .05$ ). Based on the basket of evidence, the subscale was factor analysable.

The eigenvalue-greater-than-one rule and the location of the elbow in the scree plot suggested the extraction of one factor. The factor matrix, shown in Table 4.49, indicated that all the items loaded satisfactory on the extracted factor ( $> .50$ ). Furthermore, no non-redundant residuals had absolute values of greater than .05. This indicates that the 1-factor solution provides a highly credible explanation for the observed inter-item correlation matrix. The uni-dimensionality assumption for this subscale was thus corroborated.

**Table 4.49**

***Factor structure for the perceived organisational endorsement of altruism subscale***

	Factor 1
WVO1_A	.733
WVO2_A	.913
WVO3_A	.915

**4.4.6.2 PERCEIVED ORGANISATIONAL ENDORSEMENT OF RELATIONSHIPS WITH OTHERS**

For this subscale, all the item pairs in the correlation matrix obtained correlations that were larger than .30 and statistically significant ( $p < .05$ ). The subscale obtained a KMO-value of .738 and the Bartlett's test of sphericity indicated that the identity matrix null hypothesis could be rejected ( $p < .05$ ). The correlation matrix was therefore factor analysable.

In line with what was hypothesised, the eigenvalue-greater-than-one rule and the scree plot suggested the extraction of one factor. The factor matrix, shown in Table 4.50, indicated that all the items loaded satisfactory on factor 1 ( $> .50$ ). Furthermore, no non-redundant residuals had absolute values of greater than .05. The 1-factor

solution therefore provides a highly credible explanation for the observed inter-item correlation matrix. The uni-dimensionality assumption was thus corroborated.

**Table 4.50**

***Factor structure for the perceived organisational endorsement of relationships with others subscale***

	Factor 1
WVO4_RwO	.878
WVO5_RwO	.977
WVO6_RwO	.890

#### 4.4.7 MEANINGFULNESS

The inter-item correlation matrix was factor analysable as all the obtained correlations were larger than .30 and all were statistically significant ( $p < .05$ ). In addition, the KMO was .881 and the Bartlett's test of sphericity indicated that the identity matrix null hypothesis could be rejected ( $p < .05$ ).

The eigenvalue-greater-than-one rule and the scree plot suggested the extraction of one factor. The factor matrix, shown in Table 4.51, indicated that all the items loaded satisfactory on the extracted factor ( $> .50$ ). Furthermore, 9 (60%) of non-redundant residuals had an absolute value greater than .05. Although uni-dimensionality is shown, the large percentage of large residual correlations demonstrates that this is not really a valid verdict. The single-factor solution does not provide a credible explanation of the observed correlation matrix if such a large percentage of the correlation estimates deviate markedly from the observed inter-item correlations. The large percentage of large residuals strongly suggests the presence of a second factor. The decision was made to force the extraction of two factors. The pattern matrix is shown in Table 4.52.

**Table 4.51*****Factor structure for the meaningfulness subscale***

	Factor 1
M1	.776
M2	.812
M3	.822
M4	.855
M5	.864
M6	.772

**Table 4.52*****Rotated factor matrix when forcing the extraction of two factors (Meaningfulness)***

	Factor	
	1	2
M1	<b>.803</b>	-.012
M2	<b>.865</b>	.009
M3	<b>.843</b>	-.022
M4	.095	<b>-.801</b>
M5	.105	<b>-.801</b>
M6	-.089	<b>-.910</b>

As can be seen in Table 4.52, the loadings are all satisfactory (>.50). Item M1, M2, and M3 load on factor 1, whereas item M4, M5, and M6 load on factor 2. After considering the nature of the items, it was established that factor 1 seems to represent a “personal meaningfulness” factor (i.e. the extent to which the work is experienced as of importance and of value to the person). The second factor seems to represent a “societal meaningfulness” factor (i.e. the extent to which the work is perceived to be of value/benefit to others). Both factors can be seen as facets of the *Meaningfulness* construct as defined in the current study, because it can be argued that employees also derives personal meaning from the fact that they perceive that which they do as valuable/beneficial to others (“societal meaningfulness”).

For the 2-factor structure none (0%) of non-redundant residuals had absolute values greater than .05, which indicated that the 2-factor solution clearly provided a more valid explanation of the observed correlation matrix. Despite the fact that the proposed structural model conceptualised *Meaningfulness* as uni-dimensional latent variable, the 2-factor finding was not really disconcerting because the factor fission was found to present a meaningful division of the factor that was originally conceptualised as indivisible. In addition all the items had high loadings when a single *Meaningfulness* factor is extracted.

#### 4.4.8 PSYCHOLOGICAL SAFETY

The dimensionality analysis was conducted on the 9-item *Psychological Safety* subscale. All the item pairs in the correlation matrix obtained correlations that were larger than .30 and statistically significant ( $p < .05$ ). The subscale obtained a KMO-value of .887 and the Bartlett's test of sphericity indicated that the identity matrix null hypothesis could be rejected ( $p < .05$ ). The correlation matrix was therefore factor analysable.

*Psychological Safety* was conceptualised as be a one-dimensional construct, however, the eigenvalue-greater-than-one rule and the scree plot suggested the extraction of two factors. The pattern matrix is shown in Table 4.53. Six items load on factor 1 and three items load on factor 2. All six the items that load on factor 1 display loadings that exceed the stated cut-off value of .50. This was also the case for the three items that load on factor 2. After considering the nature of the items, it was established that factor 1 seems to represent a "free to be authentic" factor, whereas factor 2 seems to represent a "supervisory support" factor. Both these represent meaningful facets of *Psychological Safety*. The proposed structural model conceptualised *Psychological Safety* as a single, undifferentiated latent variable. The extraction of one factor was forced, in order to establish how well the items of this scale reflected a single factor. The results of the one factor solution are depicted in Table 4.54.



**Table 4.53*****Rotated factor structure for the Psychological Safety subscale***

	Factor	
	1	2
PS1	<b>.743</b>	.027
PS2	<b>.892</b>	.021
PS3	<b>.699</b>	.071
PS4	<b>.528</b>	-.234
PS5	<b>.830</b>	-.048
PS6	.008	<b>-.847</b>
PS7	.085	<b>-.773</b>
PS8	-.050	<b>-.914</b>
PS9	<b>.364</b>	-.259

**Table 4.54*****Factor matrix when forcing the extraction of a single factor (Psychological Safety)***

	Factor
	1
PS1	.668
PS2	.803
PS3	.588
PS4	.709
PS5	.815
PS6	.726
PS7	.742
PS8	.721
PS9	.576

As can be seen in Table 4.54, the loadings are all satisfactory ( $>.50$ ). For the 2-factor structure only 3 (8%) of non-redundant residuals had absolute values of greater than .05, which indicated that the 2-factor solution provided a credible explanation for the observed correlation matrix. For the 1-factor structure, 25 (69%) of non-redundant residuals had absolute values greater than .05, demonstrating that the position of a single first-order *Psychological Safety* factor completely failed to provide a plausible

explanation for the observed covariance matrix. In sum, this scale failed to pass the uni-dimensionality assumption, but all the items successfully load on a single factor that is interpreted as a second-order factor<sup>29</sup>.

#### 4.5 CONCLUSIONS DERIVED FROM THE ITEM AND DIMENSIONALITY ANALYSIS

Item analysis and dimensionality analysis were performed to provide insight into the functioning of the scales of the latent variables included in the *Work Engagement* structural model and two narrow-focus structural models. Additionally, the analyses contributed to an understanding of the psychometric integrity of the indicator variables that were intended to represent each of the latent variables. (Burger, 2012)

Table 4.55 shows a summary of the findings of the item analysis and dimensionality analysis. From Table 4.55 it is evident that seven out of twenty-three uni-dimensional scales or subscales returned Cronbach's alpha reliability coefficients below the critical cut-off value set for the current study of .80.

All five subscales of the *Job Characteristics* scale returned reliability coefficients below .80. It, however, needs to be taken into account that *Job Characteristics* was included in the *Work Engagement* structural model as a composite latent variable comprising the five dimensions of *Autonomy*, *Task Identity*, *Skill Variety*, *Task Significance*, and *Feedback*. The five subscale scores were used as indicator variables to represent the multi-dimensional *Job Characteristics* latent variable. Although the unweighted total score will not be used as an indicator variable it is nonetheless argued that the reliability coefficient obtained for the unweighted linear composite of five subscale scores (.903555) to some degree mitigates the less favourable picture that emerged from the item analysis performed on the five *Job Characteristics* subscales.

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<sup>29</sup> The claim that the items of the *Psychological Safety* scale all provide valid measures of a single higher-order psychological Safety latent variable via two first-order factors can best be examined by fitting a second-order measurement model with the individual items as indicators of the first-order factors.

Two of the subscales of the *Psychological Capital* scale (PC\_R and PC\_O) returned reliability coefficients below .80. It again needs to be taken into account that *Psychological Capital* was included in the *Work Engagement* structural model as a composite latent variable. It can therefore also be argued that the reliability coefficient obtained for the unweighted linear composite of the four subscale scores (.913839) to some degree mitigates the less favourable picture that emerged from the item analysis performed on two of the subscales.

The subscales of the *Transformational Leadership* scale, the subscales of the *Work Engagement* scale, the subscales of the *Perceived Organisational Endorsement of Self-Transcendence* scale, the subscales of the *Employee Endorsement of Self-Transcendence* scale, the *Meaningfulness* scale and the *Psychological safety* scale all returned reliability coefficients above .80. It is also worthy of note that the reliability of the subscales of the *Perceived Organisational Endorsement of Self-Transcendence* scale were consistently all be it only marginally higher than that of the subscales of the *Employee Endorsement of Self-Transcendence* scale.

As earlier mentioned, the primary purpose of conducting item analysis is to detect and remove poor items. However, it was decided that the final decision whether or not to delete a poor item would be postponed until after the dimensionality analysis. The dimensionality analysis findings suggested that 6 items should be deleted. Consequently, the following items were deleted from the Work Engagement Survey (WES): JC2\_TI, JC3\_SV, PC13\_RR, PC19\_O, PC20\_OR and PC23\_OR. The *Job Characteristics* scale was therefore reduced to 13 items and the *PsyCap* scale was reduced to 20 items. As expected, the re-calculated coefficient of reliability for these two modified scales increased. The reliability coefficient for the *Task Identity* and *Skill Variety* subscales increased from below .80 to above the critical cut-off value of .80. In sum, after item deletion, five out of twenty-three uni-dimensional scales or subscales returned Cronbach alpha reliability coefficients below the critical cut-off value set for the current study of .80.

Furthermore, the dimensionality analysis results demonstrated that the *Optimism* subscale, *Psychological Safety* subscale, and *Meaningfulness* scale failed to pass the uni-dimensionality assumption as was originally hypothesised. After the deletion of 3 items from the *Optimism* scale, the uni-dimensionality assumption was met. The

items of the *Psychological Safety* subscale were successfully forced onto a single factor solution. As earlier mentioned, the 2-factor finding of the *Meaningfulness* scale was not really alarming because the factor fission was found to present a meaningful division of the factor that was originally conceptualised as indivisible.

In sum, the findings provided sufficient justification to combine the remaining items into item parcels as indicated in section 3.7.

**Table 4.55**

***Summary of findings: Item and dimensionality analyses***

Scale	Sample size	Initial number of item	Cronbach's alpha	Calculated reliability coefficient for linear composites	Number of items deleted	Cronbach's alpha (after item deletion)	Re-calculated reliability coefficient for linear composites (after item deletion)
WE	227	9	.929	.941329	0		
WE_V	227	3	.886		0		
WE_D	227	3	.857		0		
WE_A	227	3	.820		0		
JC	227	15	.870	.903555	2	.868	.919263
JC_A	227	3	.760		0		
JC_TI	227	3	.705		1	.839	
JC_SV	227	3	.650		1	.838	
JC_TS	227	3	.762		0		
JC_F	227	3	.799		0		
PC	227	24	.903	.913839	4	.911	.92675
PC_Eff	227	6	.863		0		
PC_H	227	6	.813		0		
PC_R	227	6	.702		1	.761	
PC_O	227	6	.691		3	.746	
TL	227	20	.963	.967962	0		
TL_IS	227	4	.900		0		
TL_IM	227	4	.896		0		
TL_IC	227	4	.826		0		
TL_IIB	227	4	.846		0		
TL_IIA	227	4	.874		0		
WVE_ST	227	6	.830	.905873	0		
WVE_A	227	3	.841		0		
WVE_RwO	227	3	.887		0		

WVO_ST	227	6	.900	.949051	0
WVO_A	227	3	.888		0
WVO_RwO	227	3	.938		0
M	227	6	.922		0
PS	227	9	.899		0

*WE= Work Engagement, WE\_V= Vigour, WE\_D= Dedication, WE\_A= Absorption, JC= Job Characteristics, JC\_A= Autonomy, JC\_TI= Task Identity, JC\_SV= Skills Variety, JC\_TS= Task Significance, JC\_F= Feedback, PC= Psychological Capital, PC\_Eff= Self-Efficacy, PC\_H= Hope, PC\_R= Resiliency, PC\_O= Optimism, TL= Transformational Leadership, TL\_IS= Intellectual Stimulation, TL\_IM= Inspirational Motivation, TL\_IC= Individualised Consideration, TL\_IIB= Idealised Influence (Behaviour), TL\_IIA= Idealised Influence (Attributed), WVE\_ST= Employee Endorsement of Self-Transcendence, WVE\_A= Employee Endorsement of Altruism, WVE\_RwO= Employee Endorsement of Relationships with Others, WVO\_ST= Perceived Organisational Endorsement of Self-Transcendence, WVO\_A= Perceived Organisational Endorsement of Altruism, WVO\_RwO= Perceived Organisational Endorsement of Relationships with Others, M= Meaningfulness, PS= Psychological Safety.*

#### 4.6 DATA SCREENING PRIOR TO FITTING THE MEASUREMENT MODEL AND STRUCTURAL MODEL

Maximum likelihood, the default method of estimation when fitting measurement and structural models to continuous data, assumes that the distribution of the indicator variables follow a multivariate normal distribution (Mels, 2003). Prior to fitting the measurement model and the structural model, it is therefore necessary to test the null hypothesis that the item parcels used to operationalise the latent variables in the structure model follow a multivariate normal distribution, in order to determine the appropriate estimation technique. The multivariate normality assumption of the composite indicator variables or item parcels used in this study to operationalise the latent variables comprising the *Work Engagement* structural and the two narrow-focus structural models<sup>30</sup> was tested via PRELIS. The results of the test of univariate and multivariate normality for the univariate *indicator variable distributions and the multivariate indicator variable distribution* are depicted in Table 4.56 and Table 4.57.

<sup>30</sup> Section 3.7 describes the composite indicator variables or item parcels used in this study to operationalise the latent variables comprising the *Work Engagement* structural and the two narrow-focus structural models

**Table 4.56****Test of univariate normality for the measurement model before normalisation**

Variable	Skewness		Kurtosis		Skewness and Kurtosis	
	Z-Score	P-Value	Z-Score	P-Value	Chi-Square	P-Value
WE1v	-5.363	.000	2.865	.004	36.970	.000
WE2d	-5.721	.000	2.682	.007	39.919	.000
WE3a	-5.250	.000	2.210	.027	32.450	.000
JCe	-5.523	.000	3.221	.001	40.879	.000
JCu	-4.289	.000	2.256	.024	23.480	.000
PCe	-5.511	.000	4.502	.000	50.639	.000
PCu	-3.172	.002	1.723	.085	13.031	.001
TL1is	-4.428	.000	.489	.625	19.842	.000
TL2im	-6.529	.000	3.333	.001	53.735	.000
TL3ic	-3.323	.001	-1.530	.126	13.380	.001
TL4iib	-6.367	.000	3.072	.002	49.971	.000
TL5iia	-5.564	.000	1.697	.090	33.842	.000
M1u	-6.691	.000	4.595	.000	65.876	.000
M2e	-5.373	.000	3.389	.001	40.353	.000
PS1u	-2.464	.014	.167	.867	6.101	.047
PS1e	-3.675	.000	1.517	.129	5.804	.000
STE1	-3.444	.001	-1.394	.163	13.805	.001
STE2	-2.957	.003	-1.102	.271	9.960	.007
STE3	-3.057	.002	.452	.652	9.551	.008
STO1	-4.621	.000	1.796	.072	24.579	.000
STO2	-4.800	.000	2.422	.015	28.910	.000
STO3	-3.944	.000	1.375	.169	17.442	.000
RES_1	8.408	.000	6.139	.000	108.385	.000
RES_2	6.857	.000	6.494	.000	89.189	.000
RES_3	7.470	.000	5.035	.000	81.154	.000
RES_4	6.668	.000	4.974	.000	69.203	.000
RES_5	11.239	.000	9.114	.000	209.373	.000
RES_6	11.285	.000	9.052	.000	209.280	.000
RES_7	11.517	.000	9.248	.000	218.173	.000
RES_8	11.769	.000	9.407	.000	226.996	.000
RES_9	11.948	.000	9.308	.000	229.390	.000
RES_10	11.920	.000	9.334	.000	229.198	.000
RES_11	12.829	.000	9.814	.000	26.896	.000
RES_12	12.728	.000	9.697	.000	256.015	.000
RES_13	12.527	.000	9.623	.000	249.524	.000
RES_14ES	8.852	.000	7.135	.000	129.274	.000
RES_15ES	9.588	.000	7.864	.000	153.781	.000
RES_16ES	11.160	.000	8.796	.000	201.912	.000
RES_17ES	8.757	.000	6.794	.000	122.843	.000
RES_18ES	1.699	.000	8.387	.000	184.816	.000
RES_19ES	11.300	.000	8.794	.000	205.010	.000
RES_20OS	9.620	.000	7.259	.000	145.244	.000
RES_21OS	9.514	.000	6.982	.000	139.257	.000
RES_22OS	9.275	.000	6.842	.000	132.830	.000
RES_23OS	9.345	.000	6.552	.000	130.271	.000
RES_24OS	8.965	.000	6.226	.000	119.131	.000
RES_25OS	8.351	.000	5.616	.000	101.277	.000

*WE1v, WE2d and WE3a = Work Engagement; JCe and Jcu= Job Characteristics; PCe and PCu= Psychological Capital; TL1is, TL2im, TL3ic, TL4iib and TL5iia = Transformational Leadership; M1u and M2e= Meaningfulness; PS1u and PS1e= Psychological Safety; STE1-STE3= Employee Endorsement of Self-Transcendence; STO1-STO3= Perceived Organisational Endorsement of Self-Transcendence; RES\_1-RES\_4= PsyCap\*Job Characteristics; RES\_5-RES\_13= Employee Endorsement of Self-Transcendence\* Perceived Organisational Endorsement of Self-Transcendence; RES\_14ES-RES\_19ES= Squared Employee Endorsement of Self-*

*Transcendence; RES\_200S-RES250S= Squared Perceived Organisational Endorsement of Self-Transcendence.*

**Table 4.57**

***Test of multivariate normality for the measurement model before normalisation***

Skewness			Kurtosis			Skewness and Kurtosis	
Value	Z-Score	P-Value	Value	Z-Score	P-Value	Chi-Square	P-Value
1374.564	118.993	.000	3157.419	25.583	.000	<b>14813.921</b>	<b>.000</b>

The exceedance probability associated with the Chi-square for skewness and kurtosis showed that all forty-seven item parcels failed the test for univariate normality ( $p < .05$ ). The null hypothesis that the item parcels follow a multivariate normal distribution also had to be rejected ( $X^2 = 14813.921$ ;  $p < .05$ ). The multivariate normality assumption made by the maximum likelihood estimation technique was therefore not satisfied. Consequently, it was decided to normalise the indicator variable distributions via PRELIS. The results of the test of univariate and multivariate normality after attempts at normalisation are depicted in Table 4.58 and Table 4.59.

**Table 4.58**

***Test of univariate normality for the measurement model after normalisation***

Variable	Skewness		Kurtosis		Skewness and Kurtosis	
	Z-Score	P-Value	Z-Score	P-Value	Chi-Square	P-Value
WE1v	-.505	.613	-.701	.483	.747	.688
WE2d	-1.398	.162	-1.844	.065	5.355	.069
WE3a	-.923	.356	-1.447	.148	2.945	.229
JCe	-.194	.846	-.153	.878	.061	.970
JCu	-.082	.935	-.040	.968	.008	.996
PCe	-.054	.957	-.010	.992	.003	.998
PCu	-.083	.934	-.065	.948	.011	.994
TL1is	-.295	.768	-1.057	.290	1.205	.547
TL2im	-1.461	.144	-1.993	.046	<b>6.106</b>	<b>.047</b>
TL3ic	-.209	.834	-.472	.637	.266	.875
TL4iib	-1.003	.316	-1.755	.079	4.086	.130
TL5iia	-1.015	.310	-1.573	.116	3.505	.173
M1u	-2.457	.014	-2.555	.011	<b>12.563</b>	<b>.002</b>
M2e	-2.341	.019	-2.793	.005	<b>13.281</b>	<b>.001</b>
PS1u	-.279	.780	-.497	.619	.325	.850
PS1e	-.186	.853	-.303	.762	.126	.939
STE1	-2.340	.019	-2.705	.007	<b>12.791</b>	<b>.002</b>
STE2	-1.442	.149	-1.964	.049	5.939	.051
STE3	-1.012	.311	-1.421	.155	3.044	.218
STO1	-1.237	.216	-1.518	.129	3.836	.147
STO2	-.935	.350	-1.295	.195	2.553	.279
STO3	-.905	.366	-1.204	.229	2.267	.322
RES_1	.000	1.000	.094	.925	.009	.996

RES_2	.000	1.000	.094	.925	.009	.996
RES_3	.000	1.000	.094	.925	.009	.996
RES_4	.000	1.000	.094	.925	.009	.996
RES_5	.034	.973	.084	.933	.008	.996
RES_6	-.054	.957	.064	.949	.007	.996
RES_7	-.089	.929	.022	.983	.008	.996
RES_8	-.054	.957	.064	.949	.007	.996
RES_9	-.054	.957	.063	.950	.007	.997
RES_10	-.102	.919	.006	.995	.010	.995
RES_11	-.196	.845	-.134	.893	.056	.972
RES_12	-.117	.907	-.014	.989	.014	.993
RES_13	-.161	.872	-.079	.937	.032	.984
RES_14ES	.086	.932	-.082	.934	.014	.993
RES_15ES	-.067	.947	.083	.934	.011	.994
RES_16ES	-.128	.898	.013	.990	.017	.992
RES_17ES	-.221	.825	-.196	.844	.087	.957
RES_18ES	-.231	.817	-.085	.933	.061	.970
RES_19ES	-.163	.870	-.115	.909	.040	.980
RES_20OS	-.020	.984	-.053	.957	.003	.998
RES_21OS	-.109	.913	-.026	.979	.013	.994
RES_22OS	-.143	.886	-.077	.939	.026	.987
RES_23OS	-.026	.979	-.055	.956	.004	.998
RES_24OS	-.083	.934	-.062	.951	.011	.995
RES_25OS	-.099	.921	-.009	.993	.010	.995

*WE1v, WE2d and WE3a = Work Engagement; JCe and JCu= Job Characteristics; PCe and PCu= Psychological Capital; TL1is, TL2im, TL3ic, TL4iib and TL5iia = Transformational Leadership; M1u and M2e= Meaningfulness; PS1u and PS1e= Psychological Safety; STE1-STE3= Employee Endorsement of Self-Transcendence; STO1-STO3= Perceived Organisational Endorsement of Self-Transcendence; RES\_1-RES\_4= PsyCap\*Job Characteristics; RES\_5-RES\_13= Employee Endorsement of Self-Transcendence\* Perceived Organisational Endorsement of Self-Transcendence; RES\_14ES-RES\_19ES= Squared Employee Endorsement of Self-Transcendence; RES\_20OS-RES25OS= Squared Perceived Organisational Endorsement of Self-Transcendence.*

**Table 4.59**

***Test of multivariate normality for the measurement model after normalisation***

Skewness			Kurtosis			Skewness and Kurtosis	
Value	Z-Score	P-Value	Value	Z-Score	P-Value	Chi-Square	P-Value
1082.276	87.824	.000	2882.252	22.304	.000	<b>8210.463</b>	<b>.000</b>

The results depicted in Table 4.58 indicate that after normalisation only four of the forty-seven item parcels failed the test for univariate normality ( $p < .05$ ). Table 4.59 indicates that the null hypothesis that the item parcels follow a multivariate normal distribution still had to be rejected ( $\chi^2=8210.463$ ;  $p < .05$ ) even after normalisation. The multivariate normality assumption was therefore still not satisfied. The problem is that the normalisation procedure used by PRELIS directly transforms the univariate indicator variables rather than the multivariate indicator variable distribution (Jöreskog & Sörbom, 1996). The normalisation did however succeed in reducing the deviation of the observed item parcel indicator distribution from the



theoretical multivariate normal distribution. This was evident by the decrease in the chi-square statistic from 14813.921 to 8210.463.

From the above procedure, it is evident that attempts to normalise the data failed. In section 3.9.3.2, the decision was made to use Robust Maximum Likelihood (RML) as the alternative method of estimation in a situation where the data failed to meet the multivariate normality assumption. RML necessitates the computation of an asymptotic covariance matrix via PRELIS to enable the calculation of more appropriate fit indices in LISREL (Mels, 2003). Since the normalisation had the effect of reducing the deviation of the observed indicator distribution from the theoretical multivariate normal distribution, the decision was made to use the normalised data to fit the *Work Engagement* measurement- and structural models.

#### **4.7 EVALUATING THE FIT OF THE WORK ENGAGEMENT MEASUREMENT MODEL VIA CONFIRMATORY FACTOR ANALYSIS**

The measurement model describes the manner in which the latent variables express themselves in indicator variables. The comprehensive LISREL 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 successfully reflect the latent variables they were intended to represent. The fit of the *Work Engagement* measurement model therefore needs to be evaluated prior to fitting the *Work Engagement* structural model. In sum, the purpose of confirmatory factor analysis is to determine whether the operationalisation of the latent variables comprising the structural model was successful (Burger, 2012). In the current study LISREL 8.8 (Du Toit & Du Toit, 2001) was used to perform the confirmatory factor analysis.

The operationalisation can be regarded as successful if the measurement model fits the data reasonably well, if the unstandardised factor loadings are statistically significant ( $p < .05$ ), if the completely standardised factor loadings are sufficiently large ( $\lambda_{ij} \geq .71$ ), if the unstandardised measurement error variances are statistically significant ( $p < .05$ ), and if the completely standardised measurement error variances

are sufficiently small ( $\Theta_{\delta ij} < .50$ )<sup>31</sup>. Measurement model fit describes the ability of the fitted model to reproduce the observed covariance matrix. In other words, the model fits well if the reproduced covariance matrix approximates the observed covariance matrix. Measurement model fit was interpreted by examining the full spectrum of goodness of fit indices provided by LISREL (Diamantopoulos & Siguaaw, 2000). In addition to the goodness of fit statistics, the magnitude and distribution of the standardised residuals and the magnitude of model modification indices calculated for  $\Lambda_x$  and  $\Theta_\delta$  were also examined to assess the quality of model fit. If the model shows at least reasonable fit, the measurement model parameter estimates and squared multiple correlations ( $R^2$ ) for the indicators will be interpreted.

The parameterisation of the fitted measurement model differed from the parameterisation in the normal single-group CFA model. Specific measurement error terms of the indicator variables calculated for the indicator variables of the latent interaction effects and latent squared terms were allowed to covary (Little et al., 2006). The orthogonalising procedure (Little et al., 2006) used to calculate the indicators for the latent product terms and the latent squared terms was described in paragraph 3.7.1. The product terms calculated from the original indicators of the latent variable or latent variables involved in the latent squared effect and the latent product term share specific indicator variables. The residuals obtained when regressing these product terms on the array of original indicators involved in the calculation of all the product terms should be allowed to correlate if the product terms they were derived from shared an original indicator.

The syntax used to calculate the indicator variables for the latent product terms and the latent squared terms in the structural model is shown in Appendix 8.

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<sup>31</sup> The latter condition implies that the latent variables are required to explain at least 50% of the variance in the indicators that were tasked to reflect them.

A visual representation of the fitted *Work Engagement* measurement model is provided in Figure 4.1.

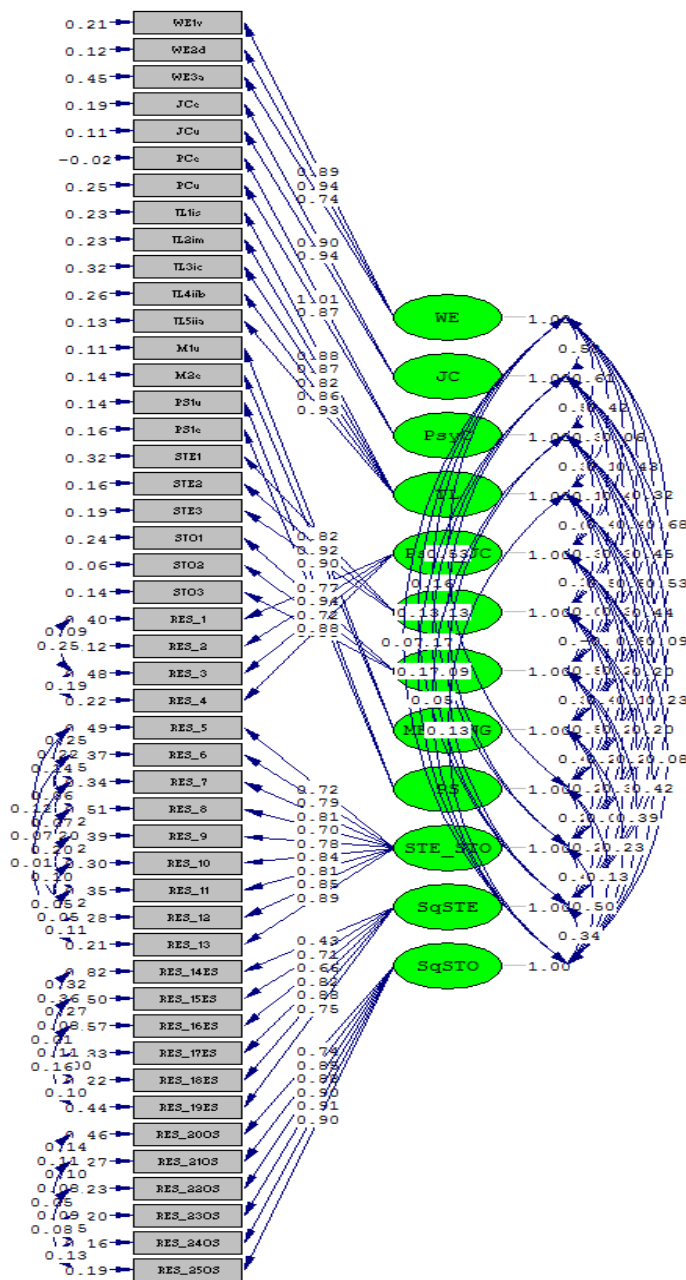


Figure 4.1. Representation of the fitted work engagement measurement model

#### 4.7.1 MEASUREMENT MODEL FIT INDICES

The purpose of assessing the overall fit of a model is to determine the degree to which the model as a whole is consistent with the empirical data at hand. A wide

range of goodness-of-fit indices have been developed over the years. The array of indices can be used as summary measures of a model's overall fit (Diamantopoulos & Sigauw, 2000). It is important to take note that none of these indices are unmistakably superior to the rest in all circumstances. As a result, a variety of indices are reported and discussed in greater detail in this section. The full spectrum of goodness of fit indices provided by LISREL 8.8 (Du Toit & Du Toit, 2001) is presented in Table 4.60.

**Table 4.60**

***Goodness of fit statistics for the work engagement measurement model***

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Degrees of Freedom = 929
Minimum Fit Function Chi-Square = 2126.361 (P = 0.0)
Normal Theory Weighted Least Squares Chi-Square = 1891.024 (P = 0.0)
<b>Satorra-Bentler Scaled Chi-Square = 1347.405 (P = 0.0)</b>
Estimated Non-centrality Parameter (NCP) = 418.405
90 Percent Confidence Interval for NCP = (324.624 ; 520.177)
Minimum Fit Function Value = 9.409
Population Discrepancy Function Value (F0) = 1.851
90 Percent Confidence Interval for F0 = (1.436 ; 2.302)
<b>Root Mean Square Error of Approximation (RMSEA) = 0.0446</b>
90 Percent Confidence Interval for RMSEA = (0.0393 ; 0.0498)
<b>P-Value for Test of Close Fit (RMSEA &lt; 0.05) = 0.957</b>
<b>Expected Cross-Validation Index (ECVI) = 7.723</b>
90 Percent Confidence Interval for ECVI = (7.308 ; 8.173)
<b>ECVI for Saturated Model = 9.982</b>
<b>ECVI for Independence Model = 110.604</b>
Chi-Square for Independence Model with 1081 Degrees of Freedom = 24902.437
<b>Independence AIC = 24996.437</b>
<b>Model AIC = 1745.405</b>
<b>Saturated AIC = 2256.000</b>
<b>Independence CAIC = 25204.409</b>
<b>Model CAIC = 2625.970</b>
<b>Saturated CAIC = 7247.344</b>
<b>Normed Fit Index (NFI) = 0.946</b>
<b>Non-Normed Fit Index (NNFI) = 0.980</b>
<b>Parsimony Normed Fit Index (PNFI) = 0.813</b>
<b>Comparative Fit Index (CFI) = 0.982</b>
<b>Incremental Fit Index (IFI) = 0.983</b>
<b>Relative Fit Index (RFI) = 0.937</b>
<b>Critical N (CN) = 174.135</b>
Root Mean Square Residual (RMR) = 0.0202
<b>Standardised RMR = 0.0432</b>
<b>Goodness of Fit Index (GFI) = 0.737</b>
<b>Adjusted Goodness of Fit Index (AGFI) = 0.681</b>
Parsimony Goodness of Fit Index (PGFI) = 0.607

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The following exact fit null hypothesis was tested:

$$H_{026a}: \text{RMSEA}=0$$

$$H_{a26a}: \text{RMSEA}>0$$

The exact fit null hypothesis that the *Work Engagement* measurement model provides a perfect account of the manner in which the latent variables manifest themselves in the indicator variables was tested via the Satorra-Bentler scaled chi-square ( $\chi^2$ ) statistic, which returned a value of 1347.405 ( $p=.00$ ). As a consequence, the exact fit null hypothesis ( $H_{026a}$ : RMSEA=0) was rejected ( $p<.05$ ), thereby implying imperfect model fit. As earlier mentioned, it is however somewhat unrealistic to assume that the measurement model would provide a perfect account of the manner in which the latent variables manifest themselves in indicator variables. It would be more appropriate to hypothesise that the measurement model provides an approximate account of the manner in which the latent variables manifest themselves in indicator variables. Consequently, the following close fit null hypothesis was tested:

$$H_{026b}: \text{RMSEA} \leq .05$$
$$H_{a26b}: \text{RMSEA} > .05$$

The close fit null hypothesis ( $H_{026b}$ ) was tested by inspecting the probability of obtaining the sample estimate of the root mean square error of approximation (RMSEA) under the close fit null hypothesis. The RMSEA expresses the difference between the observed and estimated sample covariance matrices with values below .05 indicating good fit and RMSEA smaller than .08 indicating reasonable fit. Table 4.60 shows that the close fit null hypothesis ( $\text{RMSEA} \leq .05$ ) should not be rejected ( $p > .05$ ; .957). This implies that the claim that the model fits closely in the parameter is a valid (i.e. permissible) claim to hold. The RMSEA value of .0446 indicated that the *Work Engagement* measurement model achieved good fit in the sample.

As opposed to the RMSEA that focuses on error due to approximation, the expected cross-validation index (ECVI) focuses on overall error. The ECVI, which assesses whether a model is likely to cross-validate across samples of the same size from the same population, serves as a useful indicator of a model's overall fit. In order to meaningfully interpret the ECVI, the value obtained (7.723) must be compared to the independence model and the saturated model. In this case, the ECVI (7.723) was smaller than the values obtained for the independence model (110.604) and the saturated model (9.982), which served as evidence that a model more closely resembling the fitted model seemed to have a better chance of being replicated in a

cross-validation sample than the saturated or independence models (Prinsloo, 2014).

Kelloway (1998) states that the assessment of a parsimonious fit acknowledges that model fit can always be improved by adding more paths to the model, and estimating more parameters until perfect fit is achieved in the form of a saturated or just-identified model with no degrees of freedom. Akaike's information criterion (AIC) and the consistent version of AIC (CAIC) represent two criteria that attempt to incorporate the issue of model parsimony in the assessment of model fit by taking the number of estimated parameters into account (Diamantopoulos & Sigauw, 2000). As is the case with the ECVI, the AIC and CAIC must be compared to the independence model and saturated model. From the results in Table 4.60, it is evident that the model AIC (1745.405) was smaller than the values obtained for the independence model (24996.437) and the saturated model (2256.000). The CAIC (2625.970) also achieved a smaller value than the independence model (25204.409) and the saturated model (7247.344). In sum, these two criteria provide further support for the fitted model.

The normed fit index (NFI=.946), the non-normed fit index (NNFI=.980), the comparative fit index (CFI=.982), the incremental fit index (IFI=.983) and the relative fit index (RFI=.937) are known as relative/incremental fit indices (Diamantopoulos & Sigauw, 2000). Relative/incremental indices demonstrate how much better the given model fits in comparison to a baseline model (usually the independence model). Values that approach unity are indicative of good fit. As can be observed in Table 4.60, all the values fall above .90, which strongly suggests a well-fitting model.

The critical N value (CN=174.135) indicates the size that a sample must achieve in order to accept the data fit of a given model on a statistical basis. The generally accepted rule-of-thumb indicating that a model is an adequate representation of the data is  $CN > 200$ . However, Diamantopoulos and Sigauw (2000) note that the value of the CN statistic itself and the suggested rule-of-thumb have been challenged in the literature and should therefore be used with caution.

Residuals represent the difference between elements of the observed and reproduced covariance matrices. Standardised residuals can be interpreted in terms of standard deviation units deviating from the mean (i.e. in terms of z-scores). The

standardised root mean residual (SRMR) serves as a summary measure of standardised residuals. According to Kelloway (1998), a SRMR-value smaller than .05 is indicative of acceptable fit. The SRMR value (.0432) depicted in Table 4.60 falls below this cut-off value and therefore serves as additional evidence of acceptable model fit.

The goodness-of-fit index (GFI) and the adjusted goodness-of-fit index (AGFI) are absolute fit indices. Unlike relative fit indices, the computation of absolute fit indices does not depend on a relative comparison with a baseline model. The GFI indicates how closely the model comes to perfectly reproducing the observed covariance matrix. The AGFI is the GFI adjusted for the degrees of freedom in the model. Both these indices should range between 0 and 1, with values exceeding .90 indicating acceptable model fit (Diamantopoulos & Sigauw, 2000). The GFI (.737) and AGFI (.681) fall below the benchmark value of acceptable fit and thus paint a slightly less positive picture of the fit of the model in comparison to the other indices discussed in this section. However, in sum, the array of fit indices seemed to indicate that good close fit was achieved. An interpretation of the standardised residuals and modification indices, discussed in the sections to follow, shed additional light on the quality of model fit.

#### **4.7.2 MEASUREMENT MODEL STANDARDISED RESIDUALS**

Residuals represent the difference between elements of the observed and fitted covariance matrices (Diamantopoulos & Sigauw, 2000). Standardised residuals refer to residuals divided by their estimated standard errors (Diamantopoulos & Sigauw, 2000). Residuals, and more specifically standardised residuals, provide diagnostic information on possible sources of lack of model fit (Kelloway, 1998). Standardised residuals can be interpreted as z-scores (i.e. in terms of standard deviation units deviating from the mean) and can be considered large if they exceed +2.58 or -2.58. Positive residuals indicate underestimation, thus implying the need for modification through additional explanatory paths (through the freeing of parameters). Negative residuals indicate overestimation, thus suggesting the need for modification through

the deletion of explanatory paths (through the fixing of parameters; Diamantopoulos & Siguaw, 2000). A summary of the standardised residuals is provided in Table 4.61.

**Table 4.61**

***Summary statistics for the work engagement measurement model standardised residuals***

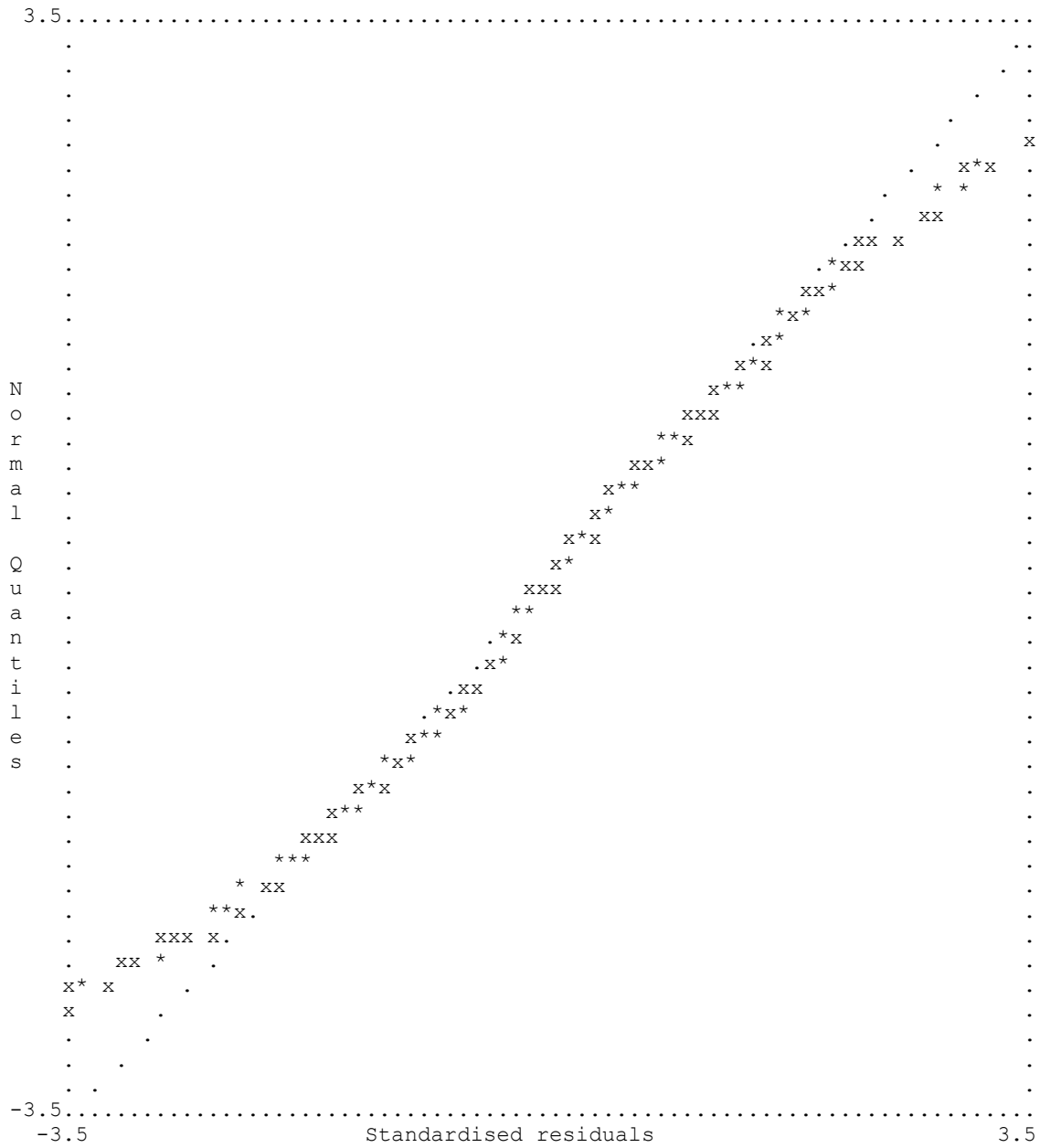
<b>Description</b>	<b>Values</b>
Smallest Standardised Residual	-6.404
Median Standardised Residual	.000
Largest Standardised Residual	4.892
<b>Largest Negative Standardised Residuals</b>	
Residual for JCu and WE1v	-2.727
Residual for PCe and WE2d	-2.834
Residual for TL4iib and WE1v	-2.819
Residual for TL5iia and JCu	-3.363
Residual for PS1e and WE1v	-3.402
Residual for PS1e and M1u	-3.883
Residual for STE2 and WE1v	-2.644
Residual for STO3 and WE1v	-3.023
Residual for RES_18ES and TL2im	-2.794
Residual for RES_23OS and STE3	-3.071
Residual for RES_23OS and RES_13	-3.186
Residual for RES_24OS and JCe	-6.404
<b>Largest Positive Standardised Residuals</b>	
Residual for JCe and WE3a	3.033
Residual for JCu and WE3a	2.993
Residual for PCu and JCu	2.860
Residual for STE1 and PS1u	2.820
Residual for STO1 and STE1	2.789
Residual for STO2 and WE2d	3.033
Residual for RES_11 and RES_7	4.892
Residual for RES_14ES and STE1	3.164
Residual for RES_16ES and RES_7	2.788
Residual for RES_17ES and STO3	2.793
Residual for RES_19ES and RES_13	2.722
Residual for RES_20OS and RES_5	3.220
Residual for RES_22OS and RES_11	3.077

Table 4.61 shows that twenty-five large residuals can be observed (residuals greater than  $|2.58|$ ). The number of large residuals (25) needs to be interpreted in comparison to the total number of unique observed variance-covariance terms (1128). Only 2.22% unique observed variance-covariance terms were poorly estimated by the fitted measurement model. This very small percentage of large residuals is indicative of good model fit.

A stem-and-leaf plot and a Q-plot allow for the collective examination of all standardised residuals (Diamantopoulos & Siguaw, 2000). A stem-and-leaf plot in







**Figure 4.3. Q-plot plot of the work engagement measurement model standardised residuals**

The findings in the Q-plot in Figure 4.3 support the findings inferred from Table 4.59 (the summary statistics of standardised residuals) and Figure 4.2 (the stem-and-leaf plot of standardised residuals). Almost all of the unique observed variance-covariance terms are in line with the 45-degree reference line, indicating good model fit.

### 4.7.3 MEASUREMENT MODEL MODIFICATION INDICES

Modification indices indicate the extent to which the (normal theory)  $\chi^2$  fit statistic will decrease if a currently fixed parameter in the model is freed (Diamantopoulos & Siguaaw, 2000). A value that exceeds the critical chi-square value of 6.64 indicates parameters that, if set free, would improve the fit of the model significantly ( $p < .01$ ). Large numbers of large and significant modification indices comment negatively on the fit of the model, in that it suggests that numerous possibilities exist to improve the fit of the model. In the evaluation of the modification indices calculated for the lambda-X and theta-delta matrices, the focus is not so much on possible ways of actually modifying the measurement model. Instead, the focus still falls on evaluating the overall fit of the model. If only a limited number of ways exist to improve the model, this comments favourably on the overall fit of the *Work Engagement* measurement model. The modification indices calculated for the lambda-X matrix are presented in Table 4.62.

**Table 4.62**

***Modification indices calculated for the lambda-X matrix***

	WE	JC	PsyC	TL	PsyC_JC	STE
WE1v	--	3.398	4.916	<b>7.797</b>	.111	4.136
WE2d	--	.016	6.588	3.826	.310	.767
WE3a	--	<b>6.837</b>	1.574	1.226	2.048	2.826
JCe	.859	--	.223	.143	.183	.546
JCu	.941	--	.234	.153	.205	.550
PCe	.101	3.049	--	.009	.198	1.211
PCu	.147	3.240	--	.008	.146	1.251
TL1is	.601	.452	5.876	--	.271	.063
TL2im	.046	.782	.124	--	.068	.026
TL3ic	2.012	4.153	1.565	--	1.636	.530
TL4iib	2.796	1.371	6.111	--	3.187	2.113
TL5iia	.209	2.861	.359	--	.014	.087
M1u	1.547	1.067	.434	.215	.056	.228
M2e	.371	.975	.259	.215	.056	.184
PS1u	4.723	6.553	4.382	<b>12.401</b>	.029	<b>8.993</b>
PS1e	4.495	6.229	4.233	<b>11.177</b>	.028	<b>9.277</b>
STE1	.185	.051	.129	3.902	3.831	--
STE2	.475	.313	.738	.900	.888	--
STE3	1.161	.157	1.418	.385	.391	--
STO1	.453	.275	.401	3.577	.015	.686
STO2	2.245	.907	.890	1.810	1.372	.185
STO3	1.265	.418	.297	.001	1.881	1.304
RES_1	2.939	1.402	.437	1.319	--	.406
RES_2	2.158	.922	.515	.726	--	1.223
RES_3	.657	.169	2.100	.060	--	.446
RES_4	.514	.094	1.779	.014	--	1.234
RES_5	.202	.099	.031	.690	.054	.423
RES_6	.811	.170	.802	.081	2.263	.065

RES_7	.126	.103	.059	.003	2.297	.520
RES_8	.278	1.356	.149	.010	.482	1.205
RES_9	.062	1.165	.136	.039	.454	3.264
RES_10	.713	6.348	.084	3.459	.029	.983
RES_11	.443	.783	.159	.191	.402	3.580
RES_12	.034	1.008	.316	.003	.141	3.261
RES_13	2.185	<b>8.626</b>	4.167	1.366	2.656	.339
RES_14ES	.434	.817	1.765	.017	.239	2.771
RES_15ES	.658	.003	.300	.000	.108	8.405
RES_16ES	.130	2.914	1.953	.003	.017	2.120
RES_17ES	2.207	.713	.380	1.697	.695	<b>12.837</b>
RES_18ES	1.670	1.389	.324	.934	.725	2.270
RES_19ES	.049	3.779	.070	.020	2.982	1.744
RES_20OS	1.399	.296	.196	3.123	.168	.006
RES_21OS	.520	.020	.000	.039	.714	2.532
RES_22OS	<b>7.698</b>	3.408	3.664	.002	3.088	.823
RES_23OS	.452	.624	.439	.908	.735	2.609
RES_24OS	.374	.590	.528	1.071	.020	.113
RES_25OS	.582	2.552	.541	1.914	.955	1.323

WE= Work Engagement (WE1v, WE2d and WE3a); JC= Job Characteristics (JCe and JCu); PsyC= Psychological Capital (PCe and PCu); TL= Transformational Leadership (TL1is, TL2im, TL3ic, TL4iib and TL5iia); PsyC\_JC= PsyCap\*Job Characteristics (RES\_1-RES\_4); STE= Employee Endorsement of Self-Transcendence (STE1-STE3); STO= Organisational Endorsement of Self-Transcendence (STO1-STO3); M= Meaningfulness (M1u and M2e); PS= Psychological Safety (PS1u and PS1e); STE\_STO= Employee Endorsement of Self-Transcendence\*Perceived Organisational Endorsement of Self-Transcendence(RES\_5-RES\_13); SqSTE= Squared Employee Endorsement of Self-Transcendence (RES\_14ES-RES\_19ES); SqSTO= Squared Perceived Organisational Endorsement of Self-Transcendence (RES\_20OS-RES25OS).

**Table 4.62 (continued)**

**Modification indices calculated for the lambda-X matrix**

	STO	MEANING	PS	STE_STO	SqSTE	SqSTO
WE1v	<b>7.659</b>	.080	4.089	4.318	3.899	1.102
WE2d	4.240	.331	1.712	.392	3.684	.030
WE3a	.852	2.312	.983	4.701	.019	3.603
JCe	1.050	.076	.040	.070	.138	.900
JCu	1.099	.094	.036	.069	.134	.908
PCe	.189	.658	.760	.059	.688	1.352
PCu	.170	.666	.773	.059	.643	1.331
TL1is	1.214	.226	.023	.106	1.569	.149
TL2im	.049	.337	.325	.060	.107	.303
TL3ic	2.400	3.158	1.536	1.064	.334	1.463
TL4iib	.316	4.429	2.148	.833	.759	.064
TL5iia	1.720	.167	.085	.006	1.054	.549
M1u	.001	--	.518	.411	.441	.084
M2e	.001	--	.501	.409	.443	.080
PS1u	.003	6.603	--	5.231	3.782	.090
PS1e	.003	6.350	--	5.424	3.714	.092
STE1	.504	1.730	1.618	.008	3.025	.002
STE2	.763	.212	1.578	1.877	.152	.559
STE3	.104	2.592	.066	2.185	1.110	.679
STO1	--	.299	1.115	.994	.434	1.445
STO2	--	2.511	.014	.297	2.775	4.733
STO3	--	1.707	.511	1.824	5.453	<b>9.948</b>
RES_1	.652	.025	.951	1.767	.273	2.838
RES_2	.286	.308	1.423	.820	.691	.574
RES_3	.065	.071	.000	3.015	1.277	1.358
RES_4	.007	.217	.131	1.461	1.789	.101
RES_5	.050	.621	.441	--	.466	.185
RES_6	.436	.855	.155	--	.005	.164

RES_7	.083	.430	.779	--	.034	.242
RES_8	.878	.000	.795	--	.623	.601
RES_9	.291	.077	1.259	--	1.676	.033
RES_10	.001	.020	2.335	--	.789	.321
RES_11	2.463	.129	.940	--	.789	3.332
RES_12	2.040	.493	1.509	--	.652	.002
RES_13	.039	1.597	4.253	--	.862	3.917
RES_14ES	1.348	1.697	1.056	.034	--	2.932
RES_15ES	1.206	2.128	2.190	1.845	--	4.809
RES_16ES	.204	.195	.019	4.249	--	.693
RES_17ES	2.354	3.861	2.194	.078	--	.054
RES_18ES	.230	1.925	.578	2.137	--	.488
RES_19ES	1.116	.012	.054	.478	--	.551
RES_20OS	.044	1.191	.646	.292	.122	--
RES_21OS	.353	.006	3.557	.077	.474	--
RES_22OS	.448	6.309	4.945	1.291	.409	--
RES_23OS	1.922	.460	.033	.005	1.125	--
RES_24OS	1.107	.348	.076	.108	.031	--
RES_25OS	.630	1.206	1.538	.006	.116	--

From Table 4.62, it is evident that eleven parameters, if set free, would improve the fit of the model significantly ( $p > .01$ ). It is possible to derive an indirect evaluation of the fit of the model by calculating the percentage of the currently fixed parameters in the lambda-X matrix that have significant modification indices. Only 11 out of the 517 possible ways of modifying the model (2.13%) would result in a significant improvement in model fit. This small percentage comments favourably on the fit of the *Work Engagement* measurement model.

Table 4.63 shows the modification indices calculated for the theta-delta matrix. Only 77 covariance terms out of 1081 covariance terms in the theta-delta matrix currently fixed to zero, if set free, would significantly improve the fit of the model. This implies that 7.12% of the parameters, if set free, would result in a significant ( $p < .01$ ) improvement in the model fit. This small percentage of large significant modification indices once again comments favourably on the fit of the measurement model.

**Table 4.63**

***Modification indices calculated for the theta-delta matrix***

	WE1v	WE2d	WE3a	JCe	JCu	PCe
WE1v	--					
WE2d	2.116	--				
WE3a	.705	<b>10.568</b>	--			
JCe	.718	1.573	3.956	--		
JCu	.041	1.644	.219	--	--	
PCe	6.271	1.872	1.375	.398	1.887	--
PCu	1.019	.134	3.018	.287	2.049	--
TL1is	.155	.031	.182	.183	.038	.666
TL2im	.501	.729	.512	.103	.988	.385
TL3ic	2.770	.515	1.038	.061	1.017	.077
TL4iib	3.508	1.017	2.335	.010	.001	.948

TL5iia	.095	.111	.827	.087	1.507	.317
M1u	.030	.139	.177	1.404	.327	.004
M2e	.121	.156	.023	2.298	.742	.659
PS1u	2.132	3.093	2.278	2.325	.393	1.819
PS1e	2.118	4.005	3.853	2.384	.402	.846
STE1	.007	1.491	2.273	.264	.018	.269
STE2	.008	.905	.272	.034	.293	.144
STE3	.708	.241	.000	1.227	.886	.074
STO1	.719	.423	.149	.973	.842	.408
STO2	.458	.286	3.094	.219	.070	.011
STO3	3.710	3.073	4.493	.862	1.143	.017
RES_1	.294	4.040	.240	.770	.022	.077
RES_2	.120	1.029	.958	.053	.165	.048
RES_3	.000	1.766	.417	.087	1.002	6.515
RES_4	.492	.073	.436	.674	1.424	1.885
RES_5	.076	.006	.046	.964	.408	.091
RES_6	.281	3.357	.257	<b>8.147</b>	4.402	.624
RES_7	.103	.000	.082	<b>8.405</b>	4.206	.004
RES_8	.367	.815	.001	.076	.921	.717
RES_9	.155	.229	2.151	.277	.038	1.844
RES_10	.910	1.770	1.993	1.402	.454	3.307
RES_11	.045	1.591	.361	.964	.028	.402
RES_12	.010	.018	1.675	.010	.147	.204
RES_13	1.005	.703	.951	1.545	.141	.103
RES_14ES	.128	1.120	.579	.802	.608	.043
RES_15ES	.283	.001	1.252	.942	1.902	1.158
RES_16ES	.592	2.712	.080	.378	3.759	.562
RES_17ES	1.196	2.482	1.660	.098	.188	.735
RES_18ES	.463	2.374	2.516	.877	.146	.648
RES_19ES	.000	.136	1.467	1.518	.369	.110
RES_20OS	.056	1.200	.152	4.994	3.181	.092
RES_21OS	1.122	2.712	.206	1.073	.186	2.401
RES_22OS	.405	.167	.081	.247	.189	.869
RES_23OS	1.583	.429	1.800	.735	2.729	.828
RES_24OS	.459	.329	.918	.019	.443	.070
RES_25OS	.000	.270	.032	.054	.272	.017

*WE1v, WE2d and WE3a = Work Engagement; JCe and JCu= Job Characteristics; PCe and PCu= Psychological Capital; TL1is, TL2im, TL3ic, TL4iib and TL5iia = Transformational Leadership; M1u and M2e= Meaningfulness; PS1u and PS1e= Psychological Safety; STE1-STE3= Employee Endorsement of Self-Transcendence; STO1-STO3= Perceived Organisational Endorsement of Self-Transcendence; RES\_1-RES\_4= PsyCap\*Job Characteristics; RES\_5-RES\_13= Employee Endorsement of Self-Transcendence\* Perceived Organisational Endorsement of Self-Transcendence; RES\_14ES-RES\_19ES= Squared Employee Endorsement of Self-Transcendence; RES\_20OS-RES25OS= Squared Perceived Organisational Endorsement of Self-Transcendence.*

**Table 4.63**

**Modification indices calculated for the theta-delta matrix (continued)**

	PCu	TL1is	TL2im	TL3ic	TL4iib	TL5iia
PCu	--					
TL1is	.998	--				
TL2im	2.282	3.137	--			
TL3ic	.010	<b>29.140</b>	<b>23.608</b>	--		
TL4iib	.015	2.452	<b>26.738</b>	<b>13.332</b>	--	
TL5iia	.262	4.359	1.008	2.205	.150	--
M1u	.006	.256	1.024	.258	.027	1.578
M2e	.730	1.019	.339	.646	.088	1.521
PS1u	2.768	.393	2.297	.041	.014	5.301
PS1e	1.305	.048	1.269	.248	.512	<b>6.764</b>
STE1	.713	.376	1.265	1.001	.337	.046

STE2	.782	1.619	1.449	.703	.537	3.142
STE3	.815	.062	.169	.772	2.776	.141
STO1	.514	.204	3.865	1.423	3.227	.684
STO2	.198	.614	3.537	.927	.518	.883
STO3	.075	1.579	.058	.280	.142	1.572
RES_1	1.561	<b>7.326</b>	.838	1.201	.500	3.616
RES_2	3.725	3.367	1.419	.010	.360	1.609
RES_3	1.822	3.867	.244	3.342	.802	.614
RES_4	.031	2.668	.601	.019	.005	.243
RES_5	.018	.551	.889	.180	.000	2.639
RES_6	.362	.042	1.289	.118	.687	.404
RES_7	.056	.080	.083	.217	.944	.233
RES_8	1.138	.702	2.020	.175	.176	.005
RES_9	3.707	.004	1.139	.184	.006	.367
RES_10	2.938	.119	.338	.081	.391	.061
RES_11	.450	1.312	2.049	2.836	1.093	.029
RES_12	.526	.064	.327	.942	.146	.529
RES_13	.004	.057	.275	.016	.044	.284
RES_14ES	.192	1.088	.171	.642	1.392	1.847
RES_15ES	.001	5.427	.938	2.090	3.009	1.539
RES_16ES	.254	5.167	1.661	3.366	.759	2.094
RES_17ES	.131	4.194	.015	2.476	1.726	2.001
RES_18ES	.155	.600	1.952	2.448	.525	.419
RES_19ES	.601	1.672	2.462	.473	1.243	.489
RES_20OS	.574	.020	.568	1.701	.000	.004
RES_21OS	2.017	2.687	.487	.261	.592	1.464
RES_22OS	1.009	4.137	.636	4.183	.250	2.755
RES_23OS	.993	1.147	.299	.226	.507	3.098
RES_24OS	.057	.060	1.156	.044	.013	.446
RES_25OS	.204	.991	2.806	.202	.014	.177

**Table 4.63****Modification indices calculated for the theta-delta matrix (continued)**

	M1u	M2e	PS1u	PS1e	STE1	STE2
M1u	--					
M2e	--	--				
PS1u	.661	2.307	--			
PS1e	.269	1.499	--	--		
STE1	.000	.210	1.340	3.640	--	
STE2	1.247	1.753	4.082	<b>9.013</b>	--	--
STE3	.575	1.770	.043	.044	.789	--
STO1	.203	.015	5.335	1.128	21.874	.035
STO2	.937	.615	.050	.353	1.841	1.946
STO3	.226	.253	3.291	1.680	3.578	4.705
RES_1	.874	.051	2.582	2.330	1.258	.010
RES_2	1.567	1.875	.486	1.060	4.530	.209
RES_3	.077	.012	1.090	.198	.038	.000
RES_4	.600	1.767	.008	.000	.200	.001
RES_5	1.919	.502	.685	2.382	.024	.121
RES_6	4.031	.924	1.400	1.862	.055	1.385
RES_7	1.217	.108	.746	2.729	.285	.305
RES_8	.376	.426	.057	1.131	.291	.344
RES_9	.288	.000	.242	.071	.289	2.299
RES_10	.186	.024	.006	.010	.021	.001
RES_11	.001	.064	.337	2.698	.001	.000
RES_12	2.139	1.528	.015	.539	.219	.064
RES_13	2.401	1.971	.004	.080	.989	1.979
RES_14ES	.407	.683	.226	.032	<b>17.192</b>	5.640
RES_15ES	.000	.400	1.393	.003	.350	1.138
RES_16ES	.589	.248	.161	.054	4.444	<b>2.125</b>
RES_17ES	.045	.115	1.476	2.019	3.133	4.280
RES_18ES	.532	.035	.030	.111	.344	<b>11.341</b>
RES_19ES	.575	.115	.717	1.133	<b>16.832</b>	.908

RES_20OS	.228	.027	.026	.240	.195	1.559
RES_21OS	1.941	3.952	.466	.875	2.429	1.406
RES_22OS	6.023	2.725	1.719	.025	.015	1.631
RES_23OS	3.712	3.728	.150	.013	<b>8.199</b>	5.615
RES_24OS	2.424	1.755	2.351	1.618	<b>6.849</b>	4.722
RES_25OS	.000	.187	.926	1.002	<b>7.811</b>	1.067

**Table 4.63****Modification indices calculated for the theta-delta matrix (continued)**

	STE3	STO1	STO2	STO3	RES_1	RES_2
STE3	--					
STO1	<b>18.121</b>	--				
STO2	3.511	--	--			
STO3	<b>33.538</b>	--	--	--		
RES_1	.683	.009	1.609	.044	--	
RES_2	.096	.192	.475	.562	--	--
RES_3	2.617	.559	.331	.269	--	--
RES_4	1.125	.023	.183	.980	--	--
RES_5	.814	.179	.163	1.308	.169	.617
RES_6	.042	.023	3.183	.838	.117	.323
RES_7	.051	.144	5.021	2.849	1.694	3.500
RES_8	.203	2.878	5.164	1.258	.937	.360
RES_9	.393	2.015	.382	.126	.005	.009
RES_10	1.342	.075	2.755	1.010	1.000	.220
RES_11	1.086	.110	1.197	.655	.087	.670
RES_12	1.146	.544	.082	.346	.279	.000
RES_13	6.133	.584	1.502	2.689	.000	.913
RES_14ES	<b>29.207</b>	<b>9.476</b>	.775	<b>10.701</b>	.286	.080
RES_15ES	5.597	.398	.167	.230	.019	.131
RES_16ES	<b>19.278</b>	<b>6.772</b>	1.299	<b>11.569</b>	2.492	1.788
RES_17ES	<b>35.270</b>	4.568	2.217	<b>8.343</b>	.657	.660
RES_18ES	<b>24.671</b>	.426	1.333	2.531	.119	.135
RES_19ES	1.554	.420	1.586	.229	2.209	2.668
RES_20OS	2.097	<b>6.982</b>	<b>21.196</b>	<b>8.044</b>	1.574	.972
RES_21OS	1.022	.502	.795	.159	.478	.605
RES_22OS	4.146	.413	<b>7.689</b>	6.453	.063	1.710
RES_23OS	1.905	<b>9.208</b>	.660	.111	1.417	.002
RES_24OS	.321	5.316	<b>8.803</b>	4.086	1.157	2.608
RES_25OS	.421	2.360	2.630	.217	1.142	2.116

**Table 4.63****Modification indices calculated for the theta-delta matrix (continued)**

	RES_3	RES_4	RES_5	RES_6	RES_7	RES_8
RES_3	--					
RES_4	--	--				
RES_5	.785	3.959	--			
RES_6	.003	.004	--	--		
RES_7	3.291	2.671	--	--	--	
RES_8	.547	.601	--	--	--	--
RES_9	.340	.018	--	--	--	--
RES_10	.850	.113	--	--	--	--
RES_11	.001	.058	--	--	--	--
RES_12	.004	.129	--	--	--	--
RES_13	.000	.218	.111	--	--	--
RES_14ES	3.196	2.417	<b>31.023</b>	2.966	3.041	<b>6.737</b>
RES_15ES	.078	.006	<b>7.386</b>	<b>10.349</b>	.569	<b>13.995</b>
RES_16ES	1.420	1.502	<b>30.150</b>	1.132	<b>15.058</b>	2.261



RES_17ES	1.808	.811	.015	1.577	2.132	.034
RES_18ES	.119	.003	2.637	<b>9.329</b>	.247	<b>15.302</b>
RES_19ES	1.231	.512	<b>6.671</b>	1.253	2.015	.711
RES_20OS	3.413	1.247	<b>14.460</b>	.040	.254	<b>8.659</b>
RES_21OS	.041	.862	.016	<b>9.951</b>	6.003	.096
RES_22OS	.265	.706	2.292	3.453	<b>12.022</b>	1.275
RES_23OS	1.429	.067	.551	.061	.235	1.325
RES_24OS	.519	1.625	.071	1.513	5.900	1.591
RES_25OS	.778	2.731	.072	<b>7.047</b>	4.943	.056

**Table 4.63*****Modification indices calculated for the theta-delta matrix (continued)***

	RES_9	RES_10	RES_11	RES_12	RES_13	RES_14ES
RES_9	--					
RES_10	--	--				
RES_11	--	--	--			
RES_12	--	--	--	--		
RES_13	--	--	--	--	--	
RES_14ES	.362	3.431	1.001	2.185	4.710	--
RES_15ES	1.340	5.116	.410	<b>10.379</b>	6.036	--
RES_16ES	<b>10.989</b>	.346	<b>9.235</b>	1.086	2.699	--
RES_17ES	.110	.180	.827	.025	.156	2.225
RES_18ES	1.326	<b>19.757</b>	1.508	2.570	<b>33.023</b>	--
RES_19ES	1.139	<b>6.667</b>	<b>17.434</b>	.668	<b>56.308</b>	--
RES_20OS	3.938	.025	<b>39.344</b>	<b>12.697</b>	.786	2.033
RES_21OS	5.075	4.945	<b>7.086</b>	<b>25.119</b>	<b>9.061</b>	.411
RES_22OS	.029	.219	<b>22.355</b>	.221	<b>10.309</b>	3.315
RES_23OS	<b>8.145</b>	<b>8.713</b>	.862	.042	.164	.278
RES_24OS	<b>20.882</b>	<b>29.696</b>	2.601	<b>27.114</b>	<b>22.476</b>	.051
RES_25OS	<b>10.461</b>	<b>15.627</b>	.131	<b>17.496</b>	<b>36.556</b>	.746

**Table 4.63*****Modification indices calculated for the theta-delta matrix (continued)***

	RES_15ES	RES_16ES	RES_17ES	RES_18ES	RES_19ES	RES_20OS
RES_15ES	--					
RES_16ES	--	--				
RES_17ES	--	--	--			
RES_18ES	--	--	--	--		
RES_19ES	--	--	--	--	--	
RES_20OS	.113	2.676	.118	.473	3.735	--
RES_21OS	4.833	2.182	.173	6.269	3.068	--
RES_22OS	<b>7.036</b>	<b>16.318</b>	4.862	2.910	<b>22.256</b>	--
RES_23OS	.001	.935	2.448	.289	.821	--
RES_24OS	.636	.861	2.012	2.264	.051	--
RES_25OS	1.390	4.888	.536	1.128	5.082	--

**Table 4.63*****Modification indices calculated for the theta-delta matrix (continued)***

	RES_21OS	RES_22OS	RES_23OS	RES_24OS	RES_25OS
RES_21OS	--				
RES_22OS	--	--			
RES_23OS	--	--	--		
RES_24OS	--	--	--	--	
RES_25OS	--	--	--	--	--

**4.7.4 DECISION ON THE FIT OF THE MEASUREMENT MODEL**

The goodness-of-fit statistics presented in Table 4.60 indicated that the close fit null hypothesis should not be rejected. The *Work Engagement* measurement model achieved good close fit. The small percentage of large residuals as well as the small percentage of parameters in the lambda-X and theta-delta matrices that, if set free, would improve the fit of the model significantly, served as additional evidence indicating good model fit. An interpretation of the measurement model parameter estimates and squared multiple correlations ( $R^2$ ) for the indicators is thus warranted.

**4.7.5 MEASUREMENT MODEL PARAMETER ESTIMATES AND SQUARED MULTIPLE CORRELATIONS**

The magnitude and significance of the paths between each latent variable and its indicator variables need to be considered in an attempt to determine whether an indicator variable provides a valid reflection of a specific latent variable it was intended to measure (Diamantopoulos & Siguaw, 2000). The unstandardised  $\Lambda^X$  matrix provides important information in this regard. The unstandardised matrices produced by LISREL (including the unstandardised  $\Lambda^X$ ) consist of three values of importance. The top value represents the unstandardised parameter estimate. The second value, below each parameter estimate, represents the standard error term. The standard error term is an indication of how precisely the parameter value has been estimated (Diamantopoulos and Siguaw, 2000). A smaller value is an indication of a good estimation. Finally, the bottom value represents the t-value, which is the value of the parameter divided by its standard error. T-values are of

particular importance, providing information on the significance of the hypothesised relationship (Diamantopoulos and Siguaw, 2000). Parameters should at least be significant, as indicated by t-values/z-scores in excess of  $|1.6449|$ .<sup>32</sup> The lambda-X matrix depicted in Table 4.64 shows the estimates of the loadings of the indicator variables on their various latent variables, the standard errors and the z-scores for the significance of the various relationships hypothesised between indicator variables and latent variables.

**Table 4.64*****Work engagement measurement model unstandardised lambda-X matrix***

	WE	JC	PsyC	TL	PsyC_JC	STE
WE1v	.979 (.056) 17.537	--	--	--	--	--
WE2d	.872 (.042) 20.540	--	--	--	--	--
WE3a	.776 (.062) 12.493	--	--	--	--	--
JCe	--	.686 (.041) 16.742	--	--	--	--
JCu	--	.729 (.041) 17.968	--	--	--	--
PCe	--	--	.630 (.031) 20.432	--	--	--
PCu	--	--	.507 (.033) 15.364	--	--	--
TL1is	--	--	--	.866 (.047) 18.386	--	--
TL2im	--	--	--	.734 (.040) 18.262	--	--
TL3ic	--	--	--	.800 (.051) 15.652	--	--
TL4iib	--	--	--	.726 (.041) 17.552	--	--
TL5iia	--	--	--	.880 (.041) 21.223	--	--

<sup>32</sup> The test-statistics calculated by LISREL to determine the statistical significance of unstandardised measurement and structural model parameter estimates are typically interpreted as Student t-values. Strictly speaking, however, given the sample sizes typically involved, when performing SEM, the values that are calculated should be interpreted as z-scores (Guilford & Fruchter, 1978). Moreover, since the alternative hypotheses are typically formulated as directional alternative hypotheses the test of the significance of the unstandardised parameter estimates should be treated as a directional test. Assuming a 5% significance level the critical z-score should therefore be  $|1.6449|$  rather than  $|1.96|$ . A critical z-value of 1.96 would have been appropriate if the alternative hypothesis would be formulated as a non-directional hypothesis.

M1u	--	--	--	--	--	--
M2e	--	--	--	--	--	--
PS1u	--	--	--	--	--	--
PS1e	--	--	--	--	--	--
STE1	--	--	--	--	--	.475 (.028) 17.066
STE2	--	--	--	--	--	.609 (.031) 19.725
STE3	--	--	--	--	--	.605 (.033) 18.327
STO1	--	--	--	--	--	--
STO2	--	--	--	--	--	--
STO3	--	--	--	--	--	--
RES_1	--	--	--	--	.359 (.036) 9.846	--
RES_2	--	--	--	--	.414 (.033) 12.576	--
RES_3	--	--	--	--	.346 (.038) 9.092	--
RES_4	--	--	--	--	.391 (.035) 11.140	--
RES_5	--	--	--	--	--	--
RES_6	--	--	--	--	--	--
RES_7	--	--	--	--	--	--
RES_8	--	--	--	--	--	--
RES_9	--	--	--	--	--	--
RES_10	--	--	--	--	--	--
RES_11	--	--	--	--	--	--
RES_12	--	--	--	--	--	--
RES_13	--	--	--	--	--	--
RES_14ES	--	--	--	--	--	--
RES_15ES	--	--	--	--	--	--
RES_16ES	--	--	--	--	--	--
RES_17ES	--	--	--	--	--	--
RES_18ES	--	--	--	--	--	--
RES_19ES	--	--	--	--	--	--
RES_20OS	--	--	--	--	--	--
RES_21OS	--	--	--	--	--	--
RES_22OS	--	--	--	--	--	--
RES_23OS	--	--	--	--	--	--
RES_24OS	--	--	--	--	--	--
RES_25OS	--	--	--	--	--	--

*WE= Work Engagement (WE1v, WE2d and WE3a); JC= Job Characteristics (JCe and JCu); PsyC= Psychological Capital (PCe and PCu); TL= Transformational Leadership (TL1is, TL2im, TL3ic, TL4iib and TL5iia); PsyC\_JC= PsyCap\*Job Characteristics (RES\_1-RES\_4); STE= Employee Endorsement of Self-Transcendence (STE1-STE3); STO= Organisational Endorsement of Self-Transcendence (STO1-STO3); M= Meaningfulness (M1u and M2e); PS= Psychological Safety (PS1u and PS1e); STE\_STO= Employee Endorsement of Self-Transcendence\*Perceived Organisational Endorsement of Self-Transcendence(RES\_5-RES\_13); SqSTE= Squared Employee Endorsement of Self-Transcendence (RES\_14ES-RES\_19ES); SqSTO= Squared Perceived Organisational Endorsement of Self-Transcendence (RES\_20OS-RES25OS).*

**Table 4.64****Work engagement measurement model unstandardised lambda-X matrix  
(continued)**

	STO	MEANING	PS	STE_STO	SqSTE	SqSTO
WE1v	--	--	--	--	--	--
WE2d	--	--	--	--	--	--
WE3a	--	--	--	--	--	--
JCe	--	--	--	--	--	--
JCu	--	--	--	--	--	--
PCe	--	--	--	--	--	--
PCu	--	--	--	--	--	--
TL1is	--	--	--	--	--	--
TL2im	--	--	--	--	--	--
TL3ic	--	--	--	--	--	--
TL4iib	--	--	--	--	--	--
TL5ia	--	--	--	--	--	--
M1u	--	.558 (.028) 20.146	--	--	--	--
M2e	--	.557 (.026) 21.221	--	--	--	--
PS1u	--	--	.660 (.036) 18.153	--	--	--
PS1e	--	--	.735 (.042) 17.331	--	--	--
STE1	--	--	--	--	--	--
STE2	--	--	--	--	--	--
STE3	--	--	--	--	--	--
STO1	.637 (.036) 17.644	--	--	--	--	--
STO2	.724 (.034) 21.232	--	--	--	--	--
STO3	.716 (.036) 19.677	--	--	--	--	--
RES_1	--	--	--	--	--	--
RES_2	--	--	--	--	--	--
RES_3	--	--	--	--	--	--
RES_4	--	--	--	--	--	--
RES_5	--	--	--	.325 (.028) 11.509	--	--
RES_6	--	--	--	.361 (.027) 13.255	--	--
RES_7	--	--	--	.370 (.025) 14.818	--	--
RES_8	--	--	--	.382 (.034) 11.304	--	--
RES_9	--	--	--	.417 (.032) 13.069	--	--
RES_10	--	--	--	.445 (.029) 15.294	--	--

RES_11	--	--	--	.489 (.035) 13.827	--	--
RES_12	--	--	--	.503 (.035) 14.379	--	--
RES_13	--	--	--	.520 (.035) 14.695	--	--
RES_14ES	--	--	--	--	.159 (.026) 6.065	--
RES_15ES	--	--	--	--	.302 (.030) 10.010	--
RES_16ES	--	--	--	--	.306 (.028) 10.888	--
RES_17ES	--	--	--	--	.430 (.031) 14.050	--
RES_18ES	--	--	--	--	.481 (.037) 12.839	--
RES_19ES	--	--	--	--	.453 (.035) 12.846	--
RES_20OS	--	--	--	--	--	.549 (.046) 11.853
RES_21OS	--	--	--	--	--	.651 (.037) 17.357
RES_22OS	--	--	--	--	--	.651 (.039) 16.573
RES_23OS	--	--	--	--	--	.748 (.045) 16.744
RES_24OS	--	--	--	--	--	.748 (.042) 17.834
RES_25OS	--	--	--	--	--	.739 (.042) 17.625

In Table 4.64 it can be observed that the factor loadings are all statistically significant, with  $z > |1.6449|$ .  $H_{0i}: \lambda_{jk}=0; i=26, 27, \dots, 72; j=1, 2, \dots, 47; k=1, 2, \dots, 12$  were therefore all rejected in favour of  $H_{ai}: \lambda_{jk} \neq 0; i=26, 27, \dots, 72; j=1, 2, \dots, 47; k=1, 2, \dots, 12$ . Significant factor loadings demonstrate that the various indicator variables provide to some degree a valid reflection of the latent variable they were intended to measure. The significant factor loadings mean that the sample estimates of the slope of the regression of  $X_i$  on  $\xi_j$  may be generalised. However, a problem with relying solely on unstandardised loadings and associated z-scores is that it may be difficult to compare the validity of different indicators measuring a particular construct (Diamantopoulos & Siguaw, 2000). Consequently, in addition to the unstandardised

matrix, attention should also be paid to the completely standardised matrices, due to the comparative value of standardised estimates.

The completely standardised factor loadings reflect the average change, expressed in standard deviation units, in the indicator variables that directly result from a one standard deviation change in the latent variables to which they have been linked, given that the effect of all other variables are held constant (Diamantopoulos & Siguaw, 2000). The completely standardised estimates are useful in that they allow for comparison of the validity of the different indicators measuring a particular latent variable and are therefore presented in Table 4.65.

**Table 4.65**

***Work engagement measurement model completely standardised lambda-X matrix***

	WE	JC	PsyC	TL	PsyC_JC	STE
WE1v	.889	--	--	--	--	--
WE2d	.939	--	--	--	--	--
WE3a	.744	--	--	--	--	--
JCe	--	.901	--	--	--	--
JCu	--	.941	--	--	--	--
PCe	--	--	1.010	--	--	--
PCu	--	--	.869	--	--	--
TL1is	--	--	--	.878	--	--
TL2im	--	--	--	.875	--	--
TL3ic	--	--	--	.823	--	--
TL4iib	--	--	--	.863	--	--
TL5ia	--	--	--	.930	--	--
M1u	--	--	--	--	--	--
M2e	--	--	--	--	--	--
PS1u	--	--	--	--	--	--
PS1e	--	--	--	--	--	--
STE1	--	--	--	--	--	.824
STE2	--	--	--	--	--	.915
STE3	--	--	--	--	--	.900
STO1	--	--	--	--	--	--
STO2	--	--	--	--	--	--
STO3	--	--	--	--	--	--
RES_1	--	--	--	--	.774	--
RES_2	--	--	--	--	.937	--
RES_3	--	--	--	--	.721	--
RES_4	--	--	--	--	.883	--
RES_5	--	--	--	--	--	--
RES_6	--	--	--	--	--	--
RES_7	--	--	--	--	--	--
RES_8	--	--	--	--	--	--
RES_9	--	--	--	--	--	--
RES_10	--	--	--	--	--	--
RES_11	--	--	--	--	--	--
RES_12	--	--	--	--	--	--
RES_13	--	--	--	--	--	--
RES_14ES	--	--	--	--	--	--
RES_15ES	--	--	--	--	--	--
RES_16ES	--	--	--	--	--	--
RES_17ES	--	--	--	--	--	--
RES_18ES	--	--	--	--	--	--

RES_19ES	--	--	--	--	--	--
RES_20OS	--	--	--	--	--	--
RES_21OS	--	--	--	--	--	--
RES_22OS	--	--	--	--	--	--
RES_23OS	--	--	--	--	--	--
RES_24OS	--	--	--	--	--	--
RES_25OS	--	--	--	--	--	--

WE= Work Engagement (WE1v, WE2d and WE3a); JC= Job Characteristics (JCe and JCu); PsyC= Psychological Capital (PCe and PCu); TL= Transformational Leadership (TL1is, TL2im, TL3ic, TL4iib and TL5iia); PsyC\_JC= PsyCap\*Job Characteristics (RES\_1-RES\_4); STE= Employee Endorsement of Self-Transcendence (STE1-STE3); STO= Organisational Endorsement of Self-Transcendence (STO1-STO3); M= Meaningfulness (M1u and M2e); PS= Psychological Safety (PS1u and PS1e); STE\_STO= Employee Endorsement of Self-Transcendence\*Perceived Organisational Endorsement of Self-Transcendence(RES\_5-RES\_13); SqSTE= Squared Employee Endorsement of Self-Transcendence (RES\_14ES-RES\_19ES); SqSTO= Squared Perceived Organisational Endorsement of Self-Transcendence (RES\_20OS-RES25OS).

**Table 4.65**

**Work engagement measurement model completely standardised lambda-X matrix (continued)**

	STO	MEANING	PS	STE_STO	SqSTE	SqSTO
WE1v	--	--	--	--	--	--
WE2d	--	--	--	--	--	--
WE3a	--	--	--	--	--	--
JCe	--	--	--	--	--	--
JCu	--	--	--	--	--	--
PCe	--	--	--	--	--	--
PCu	--	--	--	--	--	--
TL1is	--	--	--	--	--	--
TL2im	--	--	--	--	--	--
TL3ic	--	--	--	--	--	--
TL4iib	--	--	--	--	--	--
TL5iia	--	--	--	--	--	--
M1u	--	.943	--	--	--	--
M2e	--	.926	--	--	--	--
PS1u	--	--	.926	--	--	--
PS1e	--	--	.918	--	--	--
STE1	--	--	--	--	--	--
STE2	--	--	--	--	--	--
STE3	--	--	--	--	--	--
STO1	.869	--	--	--	--	--
STO2	.967	--	--	--	--	--
STO3	.929	--	--	--	--	--
RES_1	--	--	--	--	--	--
RES_2	--	--	--	--	--	--
RES_3	--	--	--	--	--	--
RES_4	--	--	--	--	--	--
RES_5	--	--	--	.715	--	--
RES_6	--	--	--	.791	--	--
RES_7	--	--	--	.814	--	--
RES_8	--	--	--	<b>.700</b>	--	--
RES_9	--	--	--	.783	--	--
RES_10	--	--	--	.836	--	--
RES_11	--	--	--	.808	--	--
RES_12	--	--	--	.851	--	--
RES_13	--	--	--	.892	--	--
RES_14ES	--	--	--	--	<b>.428</b>	--
RES_15ES	--	--	--	--	<b>.709</b>	--
RES_16ES	--	--	--	--	<b>.659</b>	--



RES_17ES	--	--	--	--	.820	--
RES_18ES	--	--	--	--	.880	--
RES_19ES	--	--	--	--	.746	--
RES_20OS	--	--	--	--	--	.736
RES_21OS	--	--	--	--	--	.853
RES_22OS	--	--	--	--	--	.877
RES_23OS	--	--	--	--	--	.896
RES_24OS	--	--	--	--	--	.915
RES_25OS	--	--	--	--	--	.898

The factor loading estimates were considered to be satisfactory if the completely standardised factor loading estimates exceeded a cut-off of .71 (Hair et al., 2006). From Table 4.65 it is evident that all the loadings were greater than .71, except for the loading of RES\_8 on the Employee Endorsement of Self-Transcendence\*Perceived Organisational Endorsement of Self-Transcendence latent variable and the loadings of RES14\_ES, RES15\_ES and RES16\_ES on the Squared Employee Endorsement of Self-Transcendence latent variable. These identified item parcels could be regarded to some degree as problematic. However, except for the factor loading of RES14\_ES, the other three potentially problematic item parcels' factor loading were not excessively low to warrant serious concern.

In addition to the completely standardised lambda-X matrix, the squared multiple correlations ( $R^2$ ) of the indicators, depicted in Table 4.66, were interpreted. The  $R^2$  values represent the proportion of variance in an indicator that is explained by its underlying latent variable. High  $R^2$  values are preferred, as this would indicate a high reliability of an indicator. More specifically, Hair et al.'s (2006) critical factor loading of .71 suggests a critical  $R^2$  value of .50. Table 4.65 shows that all the indicators, except for RES\_8 (.490), RES14\_ES (.183), and RES16\_ES (.435) obtained values larger than .50. Item parcel RES14\_ES is the only item parcel that raised serious concern, due to the extremely low  $R^2$ . The obtained value implies that only approximately 18% of the variance in RES14\_ES is explained by *Squared Employee Endorsement of Self-Transcendence*. The possibility of deleting parcel RES14\_ES had to be considered. It should also be pointed out that the indicator PCe returned a worryingly high  $R^2$  value (1.021). Although higher values are preferred, this value implies that all (100%) of the variance<sup>33</sup> in PCe is explained by *Psychological Capital*. This is unrealistic in that it is extremely unlikely that an indicator is a perfect reflection of the latent variable it was intended to reflect. This finding erodes

<sup>33</sup> The fact that the  $R^2$  exceeds unity strictly speaking implies an inadmissible solution. In this case it is interpreted to reflect rounding errors.

confidence in the measurement model and the success with which the *Psychological Capital* latent variable has been operationalised.

**Table 4.66**

***Work engagement measurement model squared multiple correlations for X-variables***

WE1v	.791
WE2d	.882
WE3a	.554
JCe	.811
JCu	.886
PCe	<b>1.021</b>
PCu	.754
TL1is	.771
TL2im	.765
TL3ic	.678
TL4iib	.745
TL5iia	.866
M1u	.890
M2e	.857
PS1u	.857
PS1e	.843
STE1	.678
STE2	.838
STE3	.810
STO1	.755
STO2	.935
STO3	.864
RES_1	.598
RES_2	.877
RES_3	.520
RES_4	.780
RES_5	.512
RES_6	.626
RES_7	.662
RES_8	<b>.490</b>
RES_9	.613
RES_10	.698
RES_11	.653
RES_12	.725
RES_13	.795
RES_14ES	<b>.183</b>
RES_15ES	.503
RES_16ES	<b>.435</b>
RES_17ES	.672
RES_18ES	.775
RES_19ES	.557
RES_20OS	.542
RES_21OS	.727
RES_22OS	.769
RES_23OS	.803
RES_24OS	.837
RES_25OS	.807

*WE1v, WE2d and WE3a = Work Engagement; JCe and JCu= Job Characteristics; PCe and PCu= Psychological Capital; TL1is, TL2im, TL3ic, TL4iib and TL5iia = Transformational Leadership; M1u and M2e= Meaningfulness; PS1u and PS1e= Psychological Safety; STE1-STE3= Employee Endorsement of Self-Transcendence; STO1-STO3= Perceived Organisational Endorsement of Self-Transcendence; RES\_1-RES\_4= PsyCap\*Job Characteristics; RES\_5-RES\_13= Employee Endorsement of Self-Transcendence\* Perceived Organisational*

*Endorsement of Self-Transcendence; RES\_14ES-RES\_19ES= Squared Employee Endorsement of Self-Transcendence; RES\_200S-RES250S= Squared Perceived Organisational Endorsement of Self-Transcendence.*

The unstandardised theta-delta matrix is depicted in Table 4.67. Table 4.67 indicates that all the measurement error variance estimates were statistically significant ( $p < .05$ ) with the exception of the measurement error estimates associated with the indicators PCe, RES2 and RES14ES which were found to be insignificant ( $p > .05$ ).  $H_{0i}: \Theta_{\delta ij} = 0; i = 73, 89, \dots, 119; j = 1, 2, \dots, 47$  were therefore all rejected in favour of  $H_{ai}: \Theta_{\delta ij} > 0; i = 73, 89, \dots, 119; j = 1, 2, \dots, 47$  with the exception of  $H_{078}: \Theta_{\delta 66} = 0$ ,  $H_{096}: \Theta_{\delta 24, 24}$  and  $H_{0108}: \Theta_{\delta 36, 36}$ . The failure to reject  $H_{078}$  is again a manifestation of the problem alluded to earlier that the Psychological Capital latent variable explains all the variance in one of its indicators (PCe).

Table 4.67 in addition indicates that eight of the covariance estimates for the measurement error terms that were allowed to correlate were statistically insignificant ( $p > .05$ ).

**Table 4.67**

***Work engagement measurement model unstandardised theta-delta matrix***

	WE1v	WE2d	WE3a	JCe	JCu	PCe
WE1v	.253 (.038) 6.675					
WE2d	--	.101 (.025) 4.031				
WE3a	--	--	.484 (.054) 8.911			
JCe	--	--	--	.109 (.023) 4.705		
JCu	--	--	--	--	.068 (.026) 2.620	
PCe	--	--	--	--	--	-.008 (.016) -.522
PCu	--	--	--	--	--	--
TL1is	--	--	--	--	--	--
TL2im	--	--	--	--	--	--
TL3ic	--	--	--	--	--	--
TL4iib	--	--	--	--	--	--
TL5ia	--	--	--	--	--	--
M1u	--	--	--	--	--	--
M2e	--	--	--	--	--	--
PS1u	--	--	--	--	--	--
PS1e	--	--	--	--	--	--
STE1	--	--	--	--	--	--

STE2	--	--	--	--	--	--
STE3	--	--	--	--	--	--
STO1	--	--	--	--	--	--
STO2	--	--	--	--	--	--
STO3	--	--	--	--	--	--
RES_1	--	--	--	--	--	--
RES_2	--	--	--	--	--	--
RES_3	--	--	--	--	--	--
RES_4	--	--	--	--	--	--
RES_5	--	--	--	--	--	--
RES_6	--	--	--	--	--	--
RES_7	--	--	--	--	--	--
RES_8	--	--	--	--	--	--
RES_9	--	--	--	--	--	--
RES_10	--	--	--	--	--	--
RES_11	--	--	--	--	--	--
RES_12	--	--	--	--	--	--
RES_13	--	--	--	--	--	--
RES_14ES	--	--	--	--	--	--
RES_15ES	--	--	--	--	--	--
RES_16ES	--	--	--	--	--	--
RES_17ES	--	--	--	--	--	--
RES_18ES	--	--	--	--	--	--
RES_19ES	--	--	--	--	--	--
RES_20OS	--	--	--	--	--	--
RES_21OS	--	--	--	--	--	--
RES_22OS	--	--	--	--	--	--
RES_23OS	--	--	--	--	--	--
RES_24OS	--	--	--	--	--	--
RES_25OS	--	--	--	--	--	--

*WE1v, WE2d and WE3a = Work Engagement; JCe and JCu= Job Characteristics; PCe and PCu= Psychological Capital; TL1is, TL2im, TL3ic, TL4iib and TL5iia = Transformational Leadership; M1u and M2e= Meaningfulness; PS1u and PS1e= Psychological Safety; STE1-STE3= Employee Endorsement of Self-Transcendence; STO1-STO3= Perceived Organisational Endorsement of Self-Transcendence; RES\_1-RES\_4= PsyCap\*Job Characteristics; RES\_5-RES\_13= Employee Endorsement of Self-Transcendence\* Perceived Organisational Endorsement of Self-Transcendence; RES\_14ES-RES\_19ES= Squared Employee Endorsement of Self-Transcendence; RES\_20OS-RES25OS= Squared Perceived Organisational Endorsement of Self-Transcendence.*

**Table 4.67**

***Work engagement measurement model unstandardised theta-delta matrix (continued)***

	PCu	TL1is	TL2im	TL3ic	TL4iib	TL5iia
PCu	.084 (.014) 5.954					
TL1is	--	.223 (.025) 8.806				
TL2im	--	--	.165 (.019) 8.642			
TL3ic	--	--	--	.304 (.032) 9.462		
TL4iib	--	--	--	--	.181 (.028) 6.518	
TL5iia	--	--	--	--	--	.120

						(.021) 5.618
M1u	--	--	--	--	--	--
M2e	--	--	--	--	--	--
PS1u	--	--	--	--	--	--
PS1e	--	--	--	--	--	--
STE1	--	--	--	--	--	--
STE2	--	--	--	--	--	--
STE3	--	--	--	--	--	--
STO1	--	--	--	--	--	--
STO2	--	--	--	--	--	--
STO3	--	--	--	--	--	--
RES_1	--	--	--	--	--	--
RES_2	--	--	--	--	--	--
RES_3	--	--	--	--	--	--
RES_4	--	--	--	--	--	--
RES_5	--	--	--	--	--	--
RES_6	--	--	--	--	--	--
RES_7	--	--	--	--	--	--
RES_8	--	--	--	--	--	--
RES_9	--	--	--	--	--	--
RES_10	--	--	--	--	--	--
RES_11	--	--	--	--	--	--
RES_12	--	--	--	--	--	--
RES_13	--	--	--	--	--	--
RES_14ES	--	--	--	--	--	--
RES_15ES	--	--	--	--	--	--
RES_16ES	--	--	--	--	--	--
RES_17ES	--	--	--	--	--	--
RES_18ES	--	--	--	--	--	--
RES_19ES	--	--	--	--	--	--
RES_20OS	--	--	--	--	--	--
RES_21OS	--	--	--	--	--	--
RES_22OS	--	--	--	--	--	--
RES_23OS	--	--	--	--	--	--
RES_24OS	--	--	--	--	--	--
RES_25OS	--	--	--	--	--	--

**Table 4.67**

***Work engagement measurement model unstandardised theta-delta matrix  
(continued)***

	M1u	M2e	PS1u	PS1e	STE1	STE2
M1u	.039 (.012) 3.190					
M2e	--	.052 (.011) 4.653				
PS1u	--	--	.073 (.017) 4.379			
PS1e	--	--	--	.101 (.023) 4.290		
STE1	--	--	--	--	.107 (.014) 7.555	
STE2	--	--	--	--	--	.072 (.015) 4.678
STE3	--	--	--	--	--	--

STO1	--	--	--	--	--	--
STO2	--	--	--	--	--	--
STO3	--	--	--	--	--	--
RES_1	--	--	--	--	--	--
RES_2	--	--	--	--	--	--
RES_3	--	--	--	--	--	--
RES_4	--	--	--	--	--	--
RES_5	--	--	--	--	--	--
RES_6	--	--	--	--	--	--
RES_7	--	--	--	--	--	--
RES_8	--	--	--	--	--	--
RES_9	--	--	--	--	--	--
RES_10	--	--	--	--	--	--
RES_11	--	--	--	--	--	--
RES_12	--	--	--	--	--	--
RES_13	--	--	--	--	--	--
RES_14ES	--	--	--	--	--	--
RES_15ES	--	--	--	--	--	--
RES_16ES	--	--	--	--	--	--
RES_17ES	--	--	--	--	--	--
RES_18ES	--	--	--	--	--	--
RES_19ES	--	--	--	--	--	--
RES_20OS	--	--	--	--	--	--
RES_21OS	--	--	--	--	--	--
RES_22OS	--	--	--	--	--	--
RES_23OS	--	--	--	--	--	--
RES_24OS	--	--	--	--	--	--
RES_25OS	--	--	--	--	--	--

**Table 4.67**

***Work engagement measurement model unstandardised theta-delta matrix  
(continued)***

	STE3	STO1	STO2	STO3	RES_1	RES_2
STE3	.086 (.016) 5.450					
STO1	--	.132 (.020) 6.720				
STO2	--	--	.036 (.011) 3.346			
STO3	--	--	--	.081 (.016) 4.958		
RES_1	--	--	--	--	.087 (.020) 4.354	
RES_2	--	--	--	--	.018 (.018) 1.009	.024 (.020) 1.193
RES_3	--	--	--	--	.055 (.011) 5.137	--
RES_4	--	--	--	--	--	--
RES_5	--	--	--	--	--	--
RES_6	--	--	--	--	--	--
RES_7	--	--	--	--	--	--
RES_8	--	--	--	--	--	--
RES_9	--	--	--	--	--	--
RES_10	--	--	--	--	--	--

RES_11	--	--	--	--	--	--
RES_12	--	--	--	--	--	--
RES_13	--	--	--	--	--	--
RES_14ES	--	--	--	--	--	--
RES_15ES	--	--	--	--	--	--
RES_16ES	--	--	--	--	--	--
RES_17ES	--	--	--	--	--	--
RES_18ES	--	--	--	--	--	--
RES_19ES	--	--	--	--	--	--
RES_20OS	--	--	--	--	--	--
RES_21OS	--	--	--	--	--	--
RES_22OS	--	--	--	--	--	--
RES_23OS	--	--	--	--	--	--
RES_24OS	--	--	--	--	--	--
RES_25OS	--	--	--	--	--	--

**Table 4.67**

***Work engagement measurement model unstandardised theta-delta matrix  
(continued)***

	RES_3	RES_4	RES_5	RES_6	RES_7	RES_8
RES_3	.111 (.021) 5.264					
RES_4	.041 (.019) 2.125	.043 (.022) 1.986				
RES_5	--	--	.101 (.014) 7.401			
RES_6	--	--	.053 (.011) 4.991	.078 (.013) 5.985		
RES_7	--	--	.045 (.009) 4.856	.052 (.011) 4.647	.070 (.011) 6.211	
RES_8	--	--	.035 (.010) 3.606	--	--	.152 (.022) 6.830
RES_9	--	--	--	.015 (.005) 2.718	--	--
RES_10	--	--	--	--	.017 (.005) 3.225	.059 (.011) 5.200
RES_11	--	--	.033 (.012) 2.793	--	--	.067 (.014) 4.664
RES_12	--	--	--	.020 (.006) 3.326	--	--
RES_13	--	--	--	--	.003 (.009) .333	--
RES_14ES	--	--	--	--	--	--
RES_15ES	--	--	--	--	--	--
RES_16ES	--	--	--	--	--	--
RES_17ES	--	--	--	--	--	--
RES_18ES	--	--	--	--	--	--
RES_19ES	--	--	--	--	--	--
RES_20OS	--	--	--	--	--	--
RES_21OS	--	--	--	--	--	--

RES_22OS	--	--	--	--	--	--
RES_23OS	--	--	--	--	--	--
RES_24OS	--	--	--	--	--	--
RES_25OS	--	--	--	--	--	--

**Table 4.67**

***Work engagement measurement model unstandardised theta-delta matrix  
(continued)***

	RES_9	RES_10	RES_11	RES_12	RES_13	RES_14ES
RES_9	.110 (.016) 6.764					
RES_10	.062 (.012) 4.938	.085 (.013) 6.456				
RES_11	--	--	.127 (.020) 6.279			
RES_12	.031 (.009) 3.415	--	.044 (.014) 3.062	.096 (.017) 5.598		
RES_13	--	.015 (.009) 1.627	.017 (.015) 1.163	.038 (.014) 2.701	.070 (.019) 3.770	
RES_14ES	--	--	--	--	--	.113 (.012) 9.386
RES_15ES	--	--	--	--	--	.051 (.011) 4.806
RES_16ES	--	--	--	--	--	.062 (.012) 4.943
RES_17ES	--	--	--	--	--	--
RES_18ES	--	--	--	--	--	--
RES_19ES	--	--	--	--	--	--
RES_20OS	--	--	--	--	--	--
RES_21OS	--	--	--	--	--	--
RES_22OS	--	--	--	--	--	--
RES_23OS	--	--	--	--	--	--
RES_24OS	--	--	--	--	--	--
RES_25OS	--	--	--	--	--	--

**Table 4.67**

***Work engagement measurement model unstandardised theta-delta matrix  
(continued)***

	RES_15ES	RES_16ES	RES_17ES	RES_18ES	RES_19ES	RES_20OS
RES_15ES	.090 (.014) 6.367					
RES_16ES	.054 (.013) 4.071	.121 (.018) 6.830				
RES_17ES	.018	--	.090			



	(.015)		(.023)			
	1.242		3.996			
RES_18ES	.003	.027	-.001	.067		
	(.010)	(.018)	(.018)	(.032)		
RES_19ES	.313	1.538	-.058	2.126		
	--	.044	--	.032	.163	
		(.013)		(.016)	(.027)	
RES_20OS	--	3.299	--	2.028	6.010	
	--	--	--	--	--	.254
						(.046)
RES_21OS	--	--	--	--	--	5.491
						.077
						(.029)
RES_22OS	--	--	--	--	--	2.676
						.062
						(.020)
						3.027
RES_23OS	--	--	--	--	--	--
RES_24OS	--	--	--	--	--	--
RES_25OS	--	--	--	--	--	--

**Table 4.67**

***Work engagement measurement model unstandardised theta-delta matrix  
(continued)***

	RES_21OS	RES_22OS	RES_23OS	RES_24OS	RES_25OS
RES_21OS	.159 (.031) 5.124				
RES_22OS	.057 (.018) 3.205	.127 (.029) 4.396			
RES_23OS	.053 (.019) 2.844	--	.137 (.037) 3.675		
RES_24OS	.031 (.015) 2.150	.056 (.022) 2.532	.036 (.012) 2.956	.109 (.030) 3.607	
RES_25OS	--	.046 (.025) 1.863	--	.089 (.033) 2.746	.131 (.041) 3.202

The argument presented earlier to justify the interpretation of the completely standardised factor loadings also extend to the measurement error variances. The completely standardised theta-delta matrix is depicted in Table 4.68. The observed values indicate the proportion of item parcel variance not explained by the underlying latent variable. In other words, these values represent the proportion of item parcel variance that is due to systematic non-relevant variance and random error variance that cannot be explained in terms of the underlying latent variable. Values below .50 are considered satisfactory; indicating that less than 50% of the item parcel variance can be attributed to measurement error variance. As expected, RES\_8 (.510),

RES14\_ES (.817), and RES16\_ES (.565) obtained values larger than .50. Essentially, the conclusion drawn from these results remains the same as the conclusion drawn from the interpretation of the R2 values; the only serious concern is RES\_14ES. An extremely large proportion of the variance (81.7%) in RES14\_ES can be ascribed to systematic non-relevant variance and random error variance. After careful consideration, it was decided to retain item parcel RES14\_ES. However, if the structural model did not obtain close fit, item parcel RES14\_ES would be deleted and the structural model would be fitted again. The negative error variance obtained for the PCe indicator of the latent variable *Psychological Capital* strictly speaking points to an inadmissible solution. However, even when the small negative value is interpreted as a rounding error, a finding of no measurement error erodes confidence in the measurement model, and the success with which the *Psychological Capital* latent variable has been operationalised

**Table 4.68**

***Work engagement measurement model completely standardised theta-delta matrix***

	WE1v	WE2d	WE3a	JCe	JCu	PCe
WE1v	.209					
WE2d	--	.118				
WE3a	--	--	.446			
JCe	--	--	--	.189		
JCu	--	--	--	--	.114	
PCe	--	--	--	--	--	-.021
PCu	--	--	--	--	--	--
TL1is	--	--	--	--	--	--
TL2im	--	--	--	--	--	--
TL3ic	--	--	--	--	--	--
TL4iib	--	--	--	--	--	--
TL5iia	--	--	--	--	--	--
M1u	--	--	--	--	--	--
M2e	--	--	--	--	--	--
PS1u	--	--	--	--	--	--
PS1e	--	--	--	--	--	--
STE1	--	--	--	--	--	--
STE2	--	--	--	--	--	--
STE3	--	--	--	--	--	--
STO1	--	--	--	--	--	--
STO2	--	--	--	--	--	--
STO3	--	--	--	--	--	--
RES_1	--	--	--	--	--	--
RES_2	--	--	--	--	--	--
RES_3	--	--	--	--	--	--
RES_4	--	--	--	--	--	--
RES_5	--	--	--	--	--	--
RES_6	--	--	--	--	--	--
RES_7	--	--	--	--	--	--
RES_8	--	--	--	--	--	--
RES_9	--	--	--	--	--	--
RES_10	--	--	--	--	--	--

RES_11	--	--	--	--	--	--
RES_12	--	--	--	--	--	--
RES_13	--	--	--	--	--	--
RES_14ES	--	--	--	--	--	--
RES_15ES	--	--	--	--	--	--
RES_16ES	--	--	--	--	--	--
RES_17ES	--	--	--	--	--	--
RES_18ES	--	--	--	--	--	--
RES_19ES	--	--	--	--	--	--
RES_20OS	--	--	--	--	--	--
RES_21OS	--	--	--	--	--	--
RES_22OS	--	--	--	--	--	--
RES_23OS	--	--	--	--	--	--
RES_24OS	--	--	--	--	--	--
RES_25OS	--	--	--	--	--	--

*WE1v, WE2d and WE3a = Work Engagement; JCe and JCu= Job Characteristics; PCe and PCu= Psychological Capital; TL1is, TL2im, TL3ic, TL4iib and TL5iia = Transformational Leadership; M1u and M2e= Meaningfulness; PS1u and PS1e= Psychological Safety; STE1-STE3= Employee Endorsement of Self-Transcendence; STO1-STO3= Perceived Organisational Endorsement of Self-Transcendence; RES\_1-RES\_4= PsyCap\*Job Characteristics; RES\_5-RES\_13= Employee Endorsement of Self-Transcendence\* Perceived Organisational Endorsement of Self-Transcendence; RES\_14ES-RES\_19ES= Squared Employee Endorsement of Self-Transcendence; RES\_20OS-RES25OS= Squared Perceived Organisational Endorsement of Self-Transcendence.*

**Table 4.68**

***Work engagement measurement model completely standardised theta-delta matrix (continued)***

	PCu	TL1is	TL2im	TL3ic	TL4iib	TL5iia
PCu	.246					
TL1is	--	.229				
TL2im	--	--	.235			
TL3ic	--	--	--	.322		
TL4iib	--	--	--	--	.255	
TL5iia	--	--	--	--	--	.134
M1u	--	--	--	--	--	--
M2e	--	--	--	--	--	--
PS1u	--	--	--	--	--	--
PS1e	--	--	--	--	--	--
STE1	--	--	--	--	--	--
STE2	--	--	--	--	--	--
STE3	--	--	--	--	--	--
STO1	--	--	--	--	--	--
STO2	--	--	--	--	--	--
STO3	--	--	--	--	--	--
RES_1	--	--	--	--	--	--
RES_2	--	--	--	--	--	--
RES_3	--	--	--	--	--	--
RES_4	--	--	--	--	--	--
RES_5	--	--	--	--	--	--
RES_6	--	--	--	--	--	--
RES_7	--	--	--	--	--	--
RES_8	--	--	--	--	--	--
RES_9	--	--	--	--	--	--
RES_10	--	--	--	--	--	--
RES_11	--	--	--	--	--	--
RES_12	--	--	--	--	--	--
RES_13	--	--	--	--	--	--
RES_14ES	--	--	--	--	--	--

RES_15ES	--	--	--	--	--	--
RES_16ES	--	--	--	--	--	--
RES_17ES	--	--	--	--	--	--
RES_18ES	--	--	--	--	--	--
RES_19ES	--	--	--	--	--	--
RES_20OS	--	--	--	--	--	--
RES_21OS	--	--	--	--	--	--
RES_22OS	--	--	--	--	--	--
RES_23OS	--	--	--	--	--	--
RES_24OS	--	--	--	--	--	--
RES_25OS	--	--	--	--	--	--

**Table 4.68**

***Work engagement measurement model completely standardised theta-delta matrix (continued)***

	M1u	M2e	PS1u	PS1e	STE1	STE2
M1u	.110					
M2e	--	.143				
PS1u	--	--	.143			
PS1e	--	--	--	.157		
STE1	--	--	--	--	.322	
STE2	--	--	--	--	--	.162
STE3	--	--	--	--	--	--
STO1	--	--	--	--	--	--
STO2	--	--	--	--	--	--
STO3	--	--	--	--	--	--
RES_1	--	--	--	--	--	--
RES_2	--	--	--	--	--	--
RES_3	--	--	--	--	--	--
RES_4	--	--	--	--	--	--
RES_5	--	--	--	--	--	--
RES_6	--	--	--	--	--	--
RES_7	--	--	--	--	--	--
RES_8	--	--	--	--	--	--
RES_9	--	--	--	--	--	--
RES_10	--	--	--	--	--	--
RES_11	--	--	--	--	--	--
RES_12	--	--	--	--	--	--
RES_13	--	--	--	--	--	--
RES_14ES	--	--	--	--	--	--
RES_15ES	--	--	--	--	--	--
RES_16ES	--	--	--	--	--	--
RES_17ES	--	--	--	--	--	--
RES_18ES	--	--	--	--	--	--
RES_19ES	--	--	--	--	--	--
RES_20OS	--	--	--	--	--	--
RES_21OS	--	--	--	--	--	--
RES_22OS	--	--	--	--	--	--
RES_23OS	--	--	--	--	--	--
RES_24OS	--	--	--	--	--	--
RES_25OS	--	--	--	--	--	--

**Table 4.68*****Work engagement measurement model completely standardised theta-delta matrix (continued)***

	STE3	STO1	STO2	STO3	RES_1	RES_2
STE3	.190					
STO1	--	.245				
STO2	--	--	.065			
STO3	--	--	--	.136		
RES_1	--	--	--	--	.402	
RES_2	--	--	--	--	.087	.123
RES_3	--	--	--	--	.248	--
RES_4	--	--	--	--	--	--
RES_5	--	--	--	--	--	--
RES_6	--	--	--	--	--	--
RES_7	--	--	--	--	--	--
RES_8	--	--	--	--	--	--
RES_9	--	--	--	--	--	--
RES_10	--	--	--	--	--	--
RES_11	--	--	--	--	--	--
RES_12	--	--	--	--	--	--
RES_13	--	--	--	--	--	--
RES_14ES	--	--	--	--	--	--
RES_15ES	--	--	--	--	--	--
RES_16ES	--	--	--	--	--	--
RES_17ES	--	--	--	--	--	--
RES_18ES	--	--	--	--	--	--
RES_19ES	--	--	--	--	--	--
RES_20OS	--	--	--	--	--	--
RES_21OS	--	--	--	--	--	--
RES_22OS	--	--	--	--	--	--
RES_23OS	--	--	--	--	--	--
RES_24OS	--	--	--	--	--	--
RES_25OS	--	--	--	--	--	--

**Table 4.68*****Work engagement measurement model completely standardised theta-delta matrix (continued)***

	RES_3	RES_4	RES_5	RES_6	RES_7	RES_8
RES_3	.480					
RES_4	.194	.220				
RES_5	--	--	.488			
RES_6	--	--	.255	.374		
RES_7	--	--	.217	.248	.338	
RES_8	--	--	.142	--	--	.510
RES_9	--	--	--	.061	--	.223
RES_10	--	--	--	--	.072	.202
RES_11	--	--	.121	--	--	.201
RES_12	--	--	--	.074	--	--
RES_13	--	--	--	--	.011	--
RES_14ES	--	--	--	--	--	--
RES_15ES	--	--	--	--	--	--
RES_16ES	--	--	--	--	--	--
RES_17ES	--	--	--	--	--	--
RES_18ES	--	--	--	--	--	--
RES_19ES	--	--	--	--	--	--
RES_20OS	--	--	--	--	--	--
RES_21OS	--	--	--	--	--	--

RES_22OS	--	--	--	--	--	--
RES_23OS	--	--	--	--	--	--
RES_24OS	--	--	--	--	--	--
RES_25OS	--	--	--	--	--	--

**Table 4.68*****Work engagement measurement model completely standardised theta-delta matrix (continued)***

	RES_9	RES_10	RES_11	RES_12	RES_13	RES_14ES
RES_9	.387					
RES_10	.217	.302				
RES_11	--	--	.347			
RES_12	.098	--	.122	.275		
RES_13	--	.047	.049	.111	.205	
RES_14ES	--	--	--	--	--	.817
RES_15ES	--	--	--	--	--	.324
RES_16ES	--	--	--	--	--	.358
RES_17ES	--	--	--	--	--	--
RES_18ES	--	--	--	--	--	--
RES_19ES	--	--	--	--	--	--
RES_20OS	--	--	--	--	--	--
RES_21OS	--	--	--	--	--	--
RES_22OS	--	--	--	--	--	--
RES_23OS	--	--	--	--	--	--
RES_24OS	--	--	--	--	--	--
RES_25OS	--	--	--	--	--	--

**Table 4.68*****Work engagement measurement model completely standardised theta-delta matrix (continued)***

	RES_15ES	RES_16ES	RES_17ES	RES_18ES	RES_19ES	RES_20OS
RES_15ES	.497					
RES_16ES	.273	.565				
RES_17ES	.082	--	.328			
RES_18ES	.014	.107	-.004	.225		
RES_19ES	--	.156	--	.098	.443	
RES_20OS	--	--	--	--	--	.458
RES_21OS	--	--	--	--	--	.136
RES_22OS	--	--	--	--	--	.111
RES_23OS	--	--	--	--	--	--
RES_24OS	--	--	--	--	--	--
RES_25OS	--	--	--	--	--	--

**Table 4.68*****Work engagement measurement model completely standardised theta-delta matrix (continued)***

	RES_21OS	RES_22OS	RES_23OS	RES_24OS	RES_25OS
RES_21OS	.273				
RES_22OS	.100	.231			
RES_23OS	.083	--	.197		
RES_24OS	.050	.092	.052	.163	
RES_25OS	--	.076	--	.133	.193

Finally the  $\Phi$  matrix depicted in Table 4.69, was interpreted. The  $\Phi$  matrix describes the covariance between the latent variables in the measurement model. The critical question is whether the latent variables were successfully distinguished as inter-related but qualitatively distinct latent variables by the instruments that were used to operationalise the latent variables. Table 4.69 indicates that all the correlations fall substantially below the critical value of .90. The manner in which all the latent variables were operationalised therefore succeeded in distinguishing between the latent variables comprising the structural model as inter-related but qualitatively distinct latent variables. Numerous statistically insignificant ( $p > .05$ ) correlations are observed in the  $\Phi$  matrix.  $H_{0166}: \phi_{51} = 0$ ,  $H_{0167}: \phi_{52} = 0$ ,  $H_{0169}: \phi_{54} = 0$ ,  $H_{0174}: \phi_{65} = 0$ ,  $H_{0179}: \phi_{75} = 0$ ;  $H_{0185}: \phi_{85} = 0$ ,  $H_{0198}: \phi_{10,3} = 0$ ,  $H_{0200}: \phi_{10,5} = 0$ ;  $H_{0205}: \phi_{11,1} = 0$ ;  $H_{0207}: \phi_{11,3} = 0$ ;  $H_{0212}: \phi_{11,8} = 0$ ;  $H_{0215}: \phi_{12,1} = 0$ ;  $H_{0217}: \phi_{12,3} = 0$ ;  $H_{0218}: \phi_{12,4} = 0$ ;  $H_{0219}: \phi_{12,5} = 0$ ;  $H_{0223}: \phi_{12,9} = 0$  have to be rejected. Most of these insignificant correlations, however, involve the five polynomial latent variables that were included in the structural model not because of substantive theoretical interest in the latent variable *per se* but because of the role the latent plays in the conceptualisation of value congruence. The correlation between the latent *Psychological Capital - Job Characteristics* interaction-effect (PsyC\_JC) and *Work Engagement* (WE), *Job Characteristics* (JC) and *Transformational Leadership* (TL) are three exceptions. The lack of correlation between PSYC\_JC and JC can be explained in terms of the orthogonalising procedure (Little et al., 2006) used to create the indicator variables for the latent interaction-effect. Mobilising this line of reasoning to explain the insignificant correlation between PSYC\_JC and JC, however, then leads to the somewhat disconcerting question why the correlations between STE and STE\_STO, and SqSTE, between STO, STE\_STO and SqSTO were not also statistically insignificant.

No convincing logical explanation for this finding could be found. This erodes confidence in the findings on the fit of the model to some degree.

**Table 4.69**

***Work engagement measurement model phi matrix***

	WE	JC	PsyC	TL	PsyC_JC	STE
WE	1.000					
JC	.528 (.062)	1.000				
PsyC	8.505 .607 (.049)	.506 (.051)	1.000			
TL	12.499 .417 (.066)	9.854 .371 (.061)	.296 (.071)	1.000		
PsyC_JC	6.274 .058 (.081)	6.038 .134 (.102)	4.152 .156 (.092)	.090 (.074)	1.000	
STE	.714 .435 (.063)	1.318 .404 (.058)	1.702 .414 (.060)	1.207 .301 (.063)	.114 (.087)	1.000
STO	6.876 .320 (.064)	6.963 .434 (.053)	6.866 .300 (.067)	4.776 .512 (.056)	1.310 .074 (.082)	.609 (.051)
MEANING	5.017 .676 (.044)	8.171 .445 (.061)	4.493 .593 (.050)	9.180 .364 (.070)	.911 -.008 (.083)	12.027 .501 (.061)
PS	15.225 .527 (.056)	7.355 .532 (.050)	11.824 .441 (.060)	5.191 .587 (.055)	-1.101 .198 (.076)	8.171 .443 (.059)
STE_STO	9.494 .157 (.087)	10.720 .135 (.077)	7.399 .093 (.083)	10.756 .201 (.081)	2.609 .116 (.085)	7.524 .239 (.108)
SqSTE	1.800 .131 (.083)	1.761 .166 (.085)	1.122 .093 (.086)	2.498 .230 (.071)	1.369 .199 (.082)	2.206 .268 (.119)
SqSTO	1.580 .065 (.076)	1.953 .169 (.070)	1.080 .048 (.075)	3.225 .133 (.087)	2.440 .082 (.076)	2.246 .419 (.086)
	.854	2.395	.632	1.524	1.080	4.893

*WE= Work Engagement; JC= Job Characteristics; PsyC= Psychological Capital; TL= Transformational Leadership; PsyC\_JC= PsyCap\*Job Characteristics; STE= Employee Endorsement of Self-Transcendence; STO= Organisational Endorsement of Self-Transcendence; M= Meaningfulness; PS= Psychological Safety; STE\_STO= Employee Endorsement of Self-Transcendence\*Perceived Organisational Endorsement of Self-Transcendence; SqSTE= Squared Employee Endorsement of Self-Transcendence; SqSTO= Squared Perceived Organisational Endorsement of Self-Transcendence.*



**Table 4.69*****Work engagement measurement model phi matrix (continued)***

	STO	MEANING	PS	STE_STO	SqSTE	SqSTO
STO	1.000					
MEANING	.387 (.067) 5.769	1.000				
PS	.520 (.056) 9.256	.451 (.062) 7.249	1.000			
STE_STO	.254 (.100) 2.540	.211 (.091) 2.317	.232 (.079) 2.945	1.000		
SqSTE	.373 (.088) 4.223	.091 (.092) .997	.247 (.073) 3.399	.472 (.088) 5.340	1.000	
SqSTO	.391 (.114) 3.425	.230 (.084) 2.743	.135 (.087) 1.553	.505 (.075) 6.692	.336 (.082) 4.094	1.000

**4.7.6 OVERALL DECISION ON THE MEASUREMENT MODEL**

The important question to reflect on is whether or not the operationalisation of the latent variables comprising the *Work Engagement* structural model was successful? Successful operationalisation of the latent variables comprising the structural model is indicated if: a) the measurement model fits the data reasonably well, b) the completely standardised factor loadings  $\lambda_{ij}^x$  are large ( $\lambda_{ij} \geq .71$ ) and statistically significant ( $p < .05$ ), c) the variance terms ( $\theta_{\delta}$ ) in the completely standardised solution are small and statistically significant ( $p < .05$ ) all items, and d) the  $R^2$  indices are large. If at least reasonable fit is obtained for the *Work Engagement* measurement model and if the parameter estimates satisfy the stipulated conditions discussed above, then the *Work Engagement* structural model will be tested by fitting the comprehensive LISREL model.

From the goodness of fit statistics, good close fit was obtained for the measurement model. Reasonably high lambda-X parameter estimates and reasonably low measurement error terms were observed (with the exception of RES14\_ES), indicating that parameter estimates are credible. All of the indicator variables loaded significantly onto the latent variables they were intended to reflect. It can therefore be concluded that the indicator variables used to operationalise the latent variables reasonably successfully reflect the latent variables they were intended to represent.

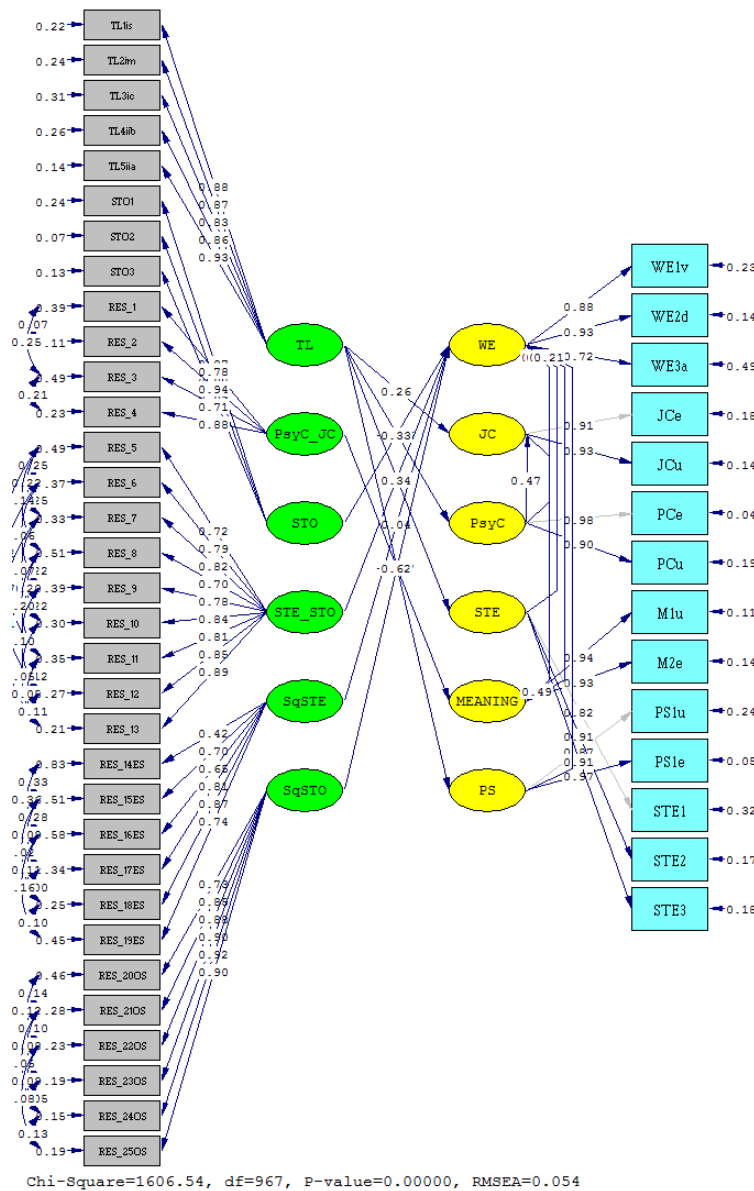
As a result of successful operationalisation, an unambiguous verdict on the fit of the structural model is now possible.

#### 4.8 EVALUATING THE FIT OF THE WORK ENGAGEMENT STRUCTURAL MODEL

It has been concluded that the indicator variables used to operationalise the latent variables successfully reflect the latent variables they were intended to represent. Only now that this has been demonstrated can an attempt be made to interpret the comprehensive LISREL model fit indices unambiguously for or against the fitted structural model. LISREL 8.8 (Du Toit & Du Toit, 2001) was used to evaluate the fit of the comprehensive *Work Engagement* structural model. Due to the inclusion of the polynomial latent effects in the structural model there parameterisation of the comprehensive model differed from the usual single-model case. In addition to allowing the measurement error terms associated with specific indicators of the latent product and powered effects to correlate (see the freed off-diagonal elements in the theta-delta matrix depicted in Table 4.67), the covariance between the exogenous latent variable *Perceived Organisational Endorsement of Self-Transcendence* and the latent interaction effect and the latent squared term in which it is involved was set to zero to reflect the effect of the orthogonalising procedure used to calculate the indicators for the latter two exogenous latent variables (Little et al., 2006). In addition the structural error variance of the endogenous latent variables (*Work Engagement* and *Meaningfulness*) that were hypothesised to be affected by a latent interaction effect and (in the case of *Work Engagement*) a latent squared term were set to unity as recommended by Little et al. (2006).

When the *Work Engagement* structural model as portrayed in Figure 2.3 was originally fitted to the data, the solution failed to converge. The preliminary output provided by LISREL produced the following warning message: “W\_A\_R\_N\_I\_N\_G: parameter Psi (3,3) may not be identified. Standard error estimates, T-values, Modification Indices and Standardised residuals cannot be computed”. This indicates that the structural error variance estimate (Psi (3, 3)) associated with the *PsyCap* latent variable may not be identified. Excessively large and negative initial

structural error variance estimates were obtained. Multiple attempts were made to solve the problem. In a final, somewhat desperate attempt, it was decided to delete one of the paths which involved the *PsyCap* latent variable. The path from *Job Characteristics* to *PsyCap* showed the largest problematic PSI value. A decision was therefore made to delete this path and to refit the model. The reduced *Work Engagement* structural model successfully converged. A visual representation of the fitted revised *Work Engagement* structural model is presented in Figure 4.4.



**Figure 4.4.** Representation of the fitted revised work engagement structural model

Structural model fit was interpreted by examining the full spectrum of goodness of fit indices provided by LISREL (Diamantopoulos & Siguaw, 2000). In addition to the goodness of fit statistics, the magnitude and distribution of the standardised residuals and the magnitude of model modification indices calculated for the beta, gamma and psi matrices were also examined to assess the quality of model fit. If the model showed at least reasonable fit, the structural model parameter estimates and squared multiple correlations ( $R^2$ ) for the endogenous latent variables were interpreted.

#### **4.8.1 COMPREHENSIVE LISREL MODEL FIT INDICES**

The full spectrum of goodness of fit indices provided by LISREL 8.8 for the comprehensive LISREL model (Du Toit & Du Toit, 2001) is depicted in Table 4.70.

**Table 4.70*****Goodness of fit statistics for the comprehensive Work Engagement structural model***


---

Degrees of Freedom = 967
Minimum Fit Function Chi-Square = 2437.193 (P = 0.0)
Normal Theory Weighted Least Squares Chi-Square = 2240.938 (P = 0.0)
<b>Satorra-Bentler Scaled Chi-Square = 1606.537 (P = 0.0)</b>
Estimated Non-centrality Parameter (NCP) = 639.537
90 Percent Confidence Interval for NCP = (533.198 ; 753.747)
Minimum Fit Function Value = 10.784
Population Discrepancy Function Value (F0) = 2.830
90 Percent Confidence Interval for F0 = (2.359 ; 3.335)
<b>Root Mean Square Error of Approximation (RMSEA) = 0.0541</b>
90 Percent Confidence Interval for RMSEA = (0.0494 ; 0.0587)
<b>P-Value for Test of Close Fit (RMSEA &lt; 0.05) = 0.0752</b>
<b>Expected Cross-Validation Index (ECVI) = 8.533</b>
90 Percent Confidence Interval for ECVI = (8.063 ; 9.039)
<b>ECVI for Saturated Model = 9.982</b>
<b>ECVI for Independence Model = 110.604</b>
Chi-Square for Independence Model with 1081 Degrees of Freedom = 24902.437
<b>Independence AIC = 24996.437</b>
<b>Model AIC = 1928.537</b>
<b>Saturated AIC = 2256.000</b>
<b>Independence CAIC = 25204.409</b>
<b>Model CAIC = 2640.954</b>
<b>Saturated CAIC = 7247.344</b>
<b>Normed Fit Index (NFI) = 0.935</b>
<b>Non-Normed Fit Index (NNFI) = 0.970</b>
<b>Parsimony Normed Fit Index (PNFI) = 0.837</b>
<b>Comparative Fit Index (CFI) = 0.973</b>
<b>Incremental Fit Index (IFI) = 0.973</b>
<b>Relative Fit Index (RFI) = 0.928</b>
<b>Critical N (CN) = 151.837</b>
Root Mean Square Residual (RMR) = 0.0641
<b>Standardised RMR = 0.126</b>
<b>Goodness of Fit Index (GFI) = 0.703</b>
<b>Adjusted Goodness of Fit Index (AGFI) = 0.654</b>
Parsimony Goodness of Fit Index (PGFI) = 0.603

---

The following exact fit null hypothesis was tested:

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

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

The exact fit null hypothesis ( $H_{01a}$ ) that the *Work Engagement* model provides a perfect account of the psychological dynamics underlying *Work Engagement* was tested via the Satorra-Bentler chi square ( $\chi^2$ ) statistic, which returned a value of 1606.537 ( $P=.00$ ). As a consequence, the exact fit null hypothesis ( $H_{01a}: \text{RMSEA}=0$ ) was rejected ( $p<.05$ ), thereby implying imperfect model fit.

The following close fit null hypothesis was tested:

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

$$H_{a1b}: \text{RMSEA} > .05$$

Table 4.70 shows that the close fit null hypothesis ( $\text{RMSEA} \leq .05$ ) should not be rejected ( $p > .05$ ; .0541). This implies that the claim that the model fits closely in the parameter is a valid (i.e. permissible) claim to hold. The RMSEA value of .0541 indicated that the *Work Engagement* structural model achieved reasonable close fit in the sample. In addition to the Satorra-Bentler chi square statistic, RMSEA and the p-value for test of close fit, a wide variety of goodness of fit indices were discussed in detail in section 4.7.1. The same array of indices will be interpreted in this section in order further comment on the fit of the structural model.

The expected cross-validation index (ECVI), which focuses on overall error, serves as a useful indicator of a model's overall fit. The ECVI (8.533) was smaller than the values obtained for the independence model (110.604) and the saturated model (9.982). This serves as evidence that a model more closely resembling the fitted model seemed to have a better chance of being replicated in a cross-validation sample than the saturated or independence models (Prinsloo, 2014). The model AIC (1928.537) was smaller than the values obtained for the independence model (24996.437) and the saturated model (2256.000). The CAIC (25204.409) also achieved a smaller value than the independence model (25204.409) and the saturated model (7247.344). In sum, these criteria provide further support for the fitted model.

The normed fit index ( $\text{NFI} = .935$ ), the non-normed fit index ( $\text{NNFI} = .970$ ), the comparative fit index ( $\text{CFI} = .973$ ), the incremental fit index ( $\text{IFI} = .973$ ) and the relative fit index ( $\text{RFI} = .928$ ) demonstrate how much better the given model fits in comparison to a baseline model (usually the independence model). As can be observed in Table 4.70, all the values closely approach unity, which strongly suggests a well-fitting model.

The critical N value ( $\text{CN} = 151.837$ ) falls below the generally accepted rule-of-thumb ( $\text{CN} > 200$ ). However, as already noted, the CN statistic should be used with caution (Diamantopoulos & Sigauw, 2000). The standardised root mean residual (SRMR; .126), a summary measure of standardised residuals, is shown in Table 4.70. This value falls above the cut-off value ( $< .05$ ). The GFI (.703) and AGFI (.654) also fall to

the wrong side of the benchmark value of acceptable fit ( $>.90$ ). These two indices indicate how closely the model comes to perfectly reproducing the observed covariance matrix. In sum, the SRMR, GFI, and AGFI paint a slightly less positive picture of the fit of the model in comparison to the other indices discussed in this section. However, in general, the array of fit indices seemed to indicate that reasonable close fit was obtained. The standardised residuals and modification indices, discussed in the next sections, also serve the purpose of commenting on the quality of the model fit.

#### 4.8.2 COMPREHENSIVE LISREL MODEL STANDARDISED RESIDUALS

A summary of the standardised variance-covariance residuals is presented in Table 4.71. Two-hundred-and-ten large residuals were observed (residuals greater than  $|2.58|$ ). This implies that 18.62% of unique observed variance-covariance terms were poorly estimated by the fitted model. This is a satisfactory, although not ideal, result.

**Table 4.71**

##### ***Summary statistics for the comprehensive Work Engagement model standardised residuals***

<b>Description</b>	<b>Values</b>
Smallest Standardised Residual	-9.029
Median Standardised Residual	1.154
Largest Standardised Residual	24.593
<b>Largest Negative Standardised Residuals</b>	
Residual for TL1is and STE2	-3.432
Residual for TL4iib and STE2	-3.436
Residual for TL4iib and STE3	-3.882
Residual for TL5iia and JCe	-2.873
Residual for TL5iia and PS1u	-2.677
Residual for STO2 and TL2im	-9.029
Residual for STO2 and TL4iib	-3.979
Residual for STO2 and TL5iia	-4.053
Residual for RES_23OS and RES_13	-3.257
<b>Largest Positive Standardised Residuals</b>	
Residual for WE1v and WE1v	3.722
Residual for WE2d and WE1v	3.633
Residual for WE2d and WE2d	24.593
Residual for JCe and WE3a	3.442
Residual for JCu and WE3a	3.420
Residual for PCe and WE1v	4.412
Residual for PCe and WE2d	3.239
Residual for PCe and WE3a	3.206
Residual for PCu and WE1v	3.164

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Residual for PCu and WE3a	2.992
Residual for M1u and WE2d	3.424
Residual for M1u and WE3a	2.714
Residual for M1u and PCe	4.958
Residual for M1u and PCu	3.872
Residual for M2e and WE1v	2.639
Residual for M2e and WE2d	3.486
Residual for M2e and WE3a	2.971
Residual for M2e and PCe	5.512
Residual for M2e and PCu	4.252
Residual for PS1u and WE1v	3.488
Residual for PS1u and WE2d	4.360
Residual for PS1u and WE3a	3.782
Residual for PS1u and JCe	4.807
Residual for PS1u and JCu	5.406
Residual for PS1u and PCe	4.387
Residual for PS1u and PCu	4.456
Residual for PS1u and M1u	4.617
Residual for PS1u and M2e	4.893
Residual for PS1e and WE2d	3.514
Residual for PS1e and JCe	3.159
Residual for PS1e and JCu	4.341
Residual for PS1e and PCe	3.159
Residual for PS1e and PCu	2.770
Residual for PS1e and M1u	3.726
Residual for PS1e and M2e	3.664
Residual for STE1 and WE1v	2.721
Residual for STE1 and WE2d	3.696
Residual for STE1 and WE3a	4.082
Residual for STE1 and JCe	3.231
Residual for STE1 and JCu	3.322
Residual for STE1 and PCe	4.181
Residual for STE1 and PCu	4.120
Residual for STE1 and M1u	5.311
Residual for STE1 and M2e	5.211
Residual for STE1 and PS1u	4.547
Residual for STE1 and PS1e	3.716
Residual for STE2 and WE1v	3.531
Residual for STE2 and WE2d	5.281
Residual for STE2 and WE3a	3.811
Residual for STE2 and JCe	4.007
Residual for STE2 and JCu	4.088
Residual for STE2 and PCe	4.513
Residual for STE2 and PCu	4.196
Residual for STE2 and M1u	5.386
Residual for STE2 and M2e	5.472
Residual for STE2 and PS1u	5.232
Residual for STE2 and PS1e	2.709
Residual for STE3 and WE2d	3.623
Residual for STE3 and WE3a	3.309
Residual for STE3 and JCe	3.512
Residual for STE3 and JCu	3.299
Residual for STE3 and PCe	3.555
Residual for STE3 and PCu	3.247
Residual for STE3 and M1u	4.718
Residual for STE3 and M2e	4.458
Residual for STE3 and PS1u	4.786
Residual for STE3 and PS1e	2.685
Residual for TL3ic and M1u	3.052
Residual for TL3ic and M2e	3.452
Residual for TL5iia and M2e	2.694
Residual for STO1 and WE2d	2.590
Residual for STO1 and JCe	2.962
Residual for STO1 and JCu	2.796
Residual for STO1 and M1u	2.887
Residual for STO1 and M2e	2.895
Residual for STO1 and STE1	6.244

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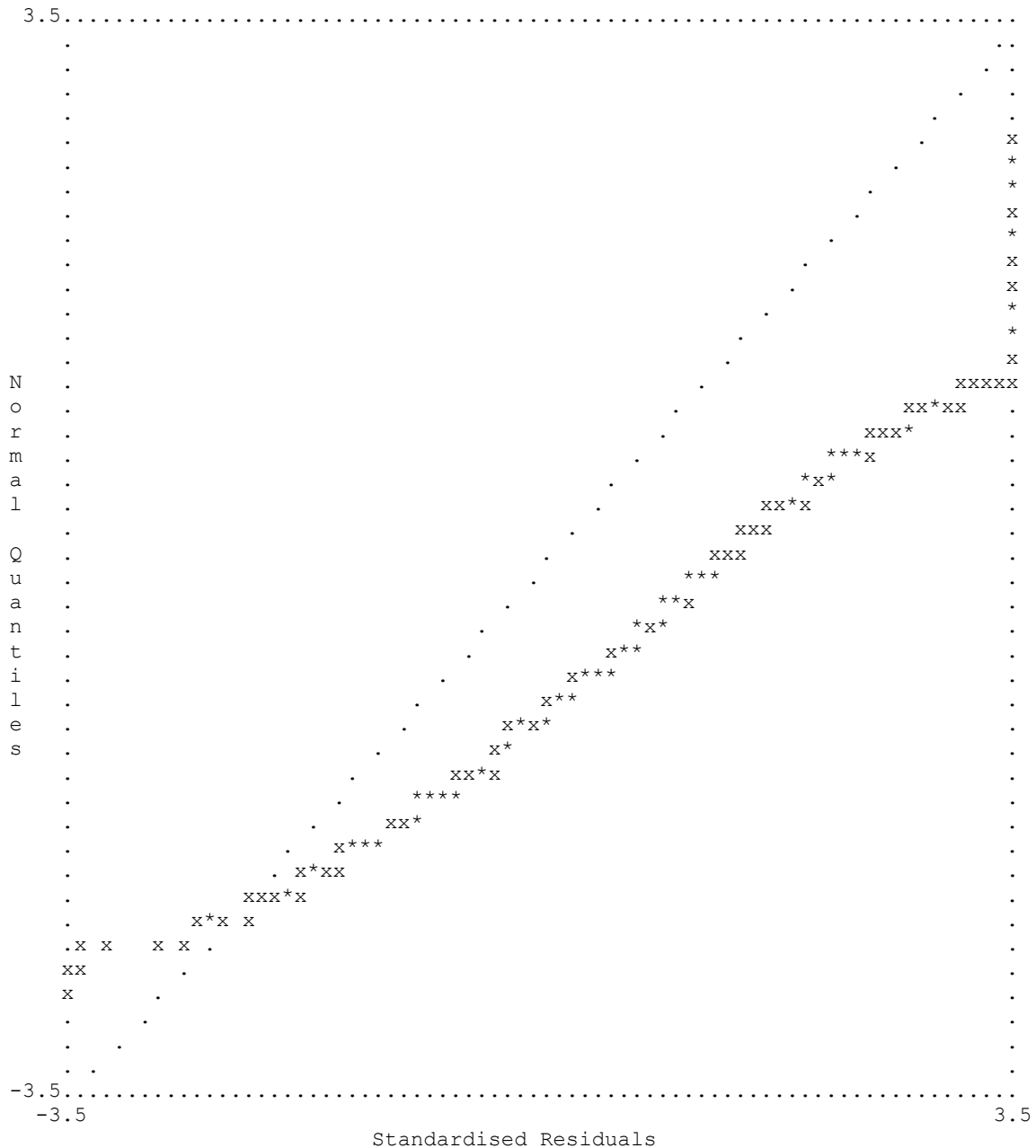
Residual for STO1 and STE2	5.037
Residual for STO1 and STE3	4.155
Residual for STO2 and WE2d	4.598
Residual for STO2 and WE3a	3.597
Residual for STO2 and JCe	4.503
Residual for STO2 and JCu	3.951
Residual for STO2 and M1u	4.052
Residual for STO2 and M2e	3.815
Residual for STO2 and PS1u	3.610
Residual for STO2 and PS1e	2.759
Residual for STO2 and STE1	6.249
Residual for STO2 and STE2	6.682
Residual for STO2 and STE3	6.140
Residual for STO3 and WE2d	3.620
Residual for STO3 and JCe	3.622
Residual for STO3 and JCu	3.072
Residual for STO3 and M1u	3.307
Residual for STO3 and M2e	3.203
Residual for STO3 and PS1u	3.647
Residual for STO3 and STE1	6.176
Residual for STO3 and STE2	6.434
Residual for STO3 and STE3	7.115
Residual for RES_5 and PS1e	2.652
Residual for RES_6 and WE2d	2.692
Residual for RES_11 and PS1e	3.080
Residual for RES_11 and TL3ic	3.475
Residual for RES_11 and TL5iia	2.777
Residual for RES_11 and STO1	2.812
Residual for RES_11 and STO2	2.688
Residual for RES_11 and RES_7	5.251
Residual for RES_12 and WE3a	3.038
Residual for RES_12 and PS1e	2.798
Residual for RES_12 and TL5iia	2.595
Residual for RES_13 and WE3a	3.095
Residual for RES_13 and M1u	2.592
Residual for RES_13 and PS1e	3.138
Residual for RES_14ES and STE1	3.823
Residual for RES_14ES and RES_5	2.587
Residual for RES_15ES and RES_8	2.648
Residual for RES_16ES and RES_7	3.170
Residual for RES_16ES and RES_11	2.688
Residual for RES_17ES and PS1e	2.665
Residual for RES_17ES and STE2	2.647
Residual for RES_17ES and STE3	3.764
Residual for RES_17ES and TL1is	2.819
Residual for RES_17ES and STO3	3.938
Residual for RES_17ES and RES_17ES	3.596
Residual for RES_18ES and STO3	2.704
Residual for RES_18ES and RES_10	3.002
Residual for RES_19ES and RES_13	3.252
Residual for RES_19ES and RES_19ES	3.496
Residual for RES_20OS and WE2d	2.849
Residual for RES_20OS and WE3a	2.866
Residual for RES_20OS and STE1	3.493
Residual for RES_20OS and STE2	4.504
Residual for RES_20OS and STE3	3.925
Residual for RES_20OS and STO2	3.401
Residual for RES_20OS and RES_5	3.231
Residual for RES_21OS and WE2d	2.844
Residual for RES_21OS and STE1	4.151
Residual for RES_21OS and STE2	5.304
Residual for RES_21OS and STE3	4.896
Residual for RES_21OS and TL3ic	2.759
Residual for RES_21OS and STO1	3.684
Residual for RES_21OS and STO2	4.029
Residual for RES_21OS and STO3	3.153
Residual for RES_22OS and WE3a	2.602

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Residual for RES_22OS and STE1	4.045
Residual for RES_22OS and STE2	5.146
Residual for RES_22OS and STE3	4.732
Residual for RES_22OS and TL3ic	3.157
Residual for RES_22OS and STO1	3.139
Residual for RES_22OS and STO2	3.520
Residual for RES_22OS and STO3	2.774
Residual for RES_22OS and RES_11	3.105
Residual for RES_23OS and WE2d	2.792
Residual for RES_23OS and WE3a	2.704
Residual for RES_23OS and JCu	3.193
Residual for RES_23OS and M1u	2.856
Residual for RES_23OS and M2e	2.773
Residual for RES_23OS and STE1	4.555
Residual for RES_23OS and STE2	5.324
Residual for RES_23OS and STE3	4.723
Residual for RES_23OS and TL1is	2.686
Residual for RES_23OS and TL2im	3.373
Residual for RES_23OS and TL3ic	3.608
Residual for RES_23OS and TL4iib	2.663
Residual for RES_23OS and TL5iia	2.610
Residual for RES_23OS and STO1	4.528
Residual for RES_23OS and STO2	4.350
Residual for RES_23OS and STO3	3.361
Residual for RES_23OS and RES_18ES	3.330
Residual for RES_24OS and WE1v	2.824
Residual for RES_24OS and WE2d	3.161
Residual for RES_24OS and WE3a	3.621
Residual for RES_24OS and JCu	2.895
Residual for RES_24OS and M1u	3.294
Residual for RES_24OS and M2e	2.960
Residual for RES_24OS and STE1	4.747
Residual for RES_24OS and STE2	5.738
Residual for RES_24OS and STE3	5.076
Residual for RES_24OS and TL2im	3.121
Residual for RES_24OS and TL3ic	3.629
Residual for RES_24OS and TL5iia	2.865
Residual for RES_24OS and STO1	3.507
Residual for RES_24OS and STO2	3.832
Residual for RES_24OS and STO3	2.783
Residual for RES_24OS and RES_18ES	2.595
Residual for RES_25OS and WE1v	3.017
Residual for RES_25OS and WE2d	3.263
Residual for RES_25OS and WE3a	3.982
Residual for RES_25OS and JCe	2.664
Residual for RES_25OS and JCu	3.241
Residual for RES_25OS and M1u	3.588
Residual for RES_25OS and M2e	3.245
Residual for RES_25OS and STE1	5.032
Residual for RES_25OS and STE2	5.500
Residual for RES_25OS and STE3	5.046
Residual for RES_25OS and TL2im	3.819
Residual for RES_25OS and TL3ic	3.724
Residual for RES_25OS and TL4iib	2.669
Residual for RES_25OS and TL5iia	3.147
Residual for RES_25OS and STO1	3.507
Residual for RES_25OS and STO2	3.746
Residual for RES_25OS and STO3	2.815

A stem-and-leaf plot and a Q-plot allow for the collective examination of all standardised residuals (Diamantopoulos & Siguaaw, 2000). The stem-and-leaf plot of the comprehensive *Work Engagement* model is depicted in Figure 4.5. A good fitting





**Figure 4.6.** Q-plot plot of the comprehensive *Work Engagement* model standardised residuals

### 4.8.3 STRUCTURAL MODEL MODIFICATION INDICES

In the confirmatory factor analysis, inspection of the measurement model modification indices served the sole purpose of commenting on the model fit. Interpretation of the structural model modification indices also serves this primary purpose. However, in addition to this the modification indices (calculated for gamma and beta) indicate possible ways of modifying the *Work Engagement* structural

model, therefore serving as empirical suggestions for future research. Possible structural model modifications will be explored in Chapter 5. The focus of the current section is on the fit of the structural model. Modification index values calculated for the gamma matrix, beta matrix and psi matrix are presented in Table 4.72, Table 4.73 and Table 4.74.

**Table 4.72**

***Modification indices calculated for the gamma matrix***

	TL	PsyC_JC	STO	STE_STO	SqSTE	SqSTO
WE	5.274	.180	--	--	--	--
JC	--	.469	<b>11.046</b>	.678	1.744	3.303
PsyC	--	3.288	<b>6.931</b>	.138	.100	.077
STE	--	1.335	<b>59.820</b>	<b>7.098</b>	<b>10.738</b>	<b>29.439</b>
MEANING	<b>13.088</b>	--	<b>9.677</b>	5.944	.677	6.560
PS	--	5.036	<b>13.409</b>	4.604	5.580	.595

*WE= Work Engagement; JC= Job Characteristics; PsyC= Psychological Capital; TL= Transformational Leadership; PsyC\_JC= PsyCap\*Job Characteristics; STE= Employee Endorsement of Self-Transcendence; STO= Organisational Endorsement of Self-Transcendence; M= Meaningfulness; PS= Psychological Safety; STE\_STO= Employee Endorsement of Self-Transcendence\*Perceived Organisational Endorsement of Self-Transcendence; SqSTE= Squared Employee Endorsement of Self-Transcendence; SqSTO= Squared Perceived Organisational Endorsement of Self-Transcendence.*

A value that exceeds the critical chi-square value of 6.64 indicates parameters that, if set free, would improve the fit of the model significantly ( $p < .01$ ). From Table 4.72, it is evident that nine parameters, if set free, would improve the fit of the model significantly ( $p > .01$ ). In other words, 9 out of the 27 possible additional paths between exogenous and endogenous latent variables currently not included in the model (33.33%) would result in a significant improvement in the fit of the comprehensive LISREL model fit. This percentage is not ideal; however, it supports earlier findings that the model fits the data only reasonably well. This finding also echoes the predominance of positive residuals amongst the large variance-covariance residuals.

**Table 4.73****Modification indices calculated for the beta matrix**

	WE	JC	PsyC	STE	MEANING	PS
WE	--	<b>7.618</b>	--	--	--	--
JC	.068	--	--	6.348	<b>24.004</b>	<b>9.688</b>
PsyC	<b>36.767</b>	--	--	<b>27.232</b>	<b>34.110</b>	<b>20.215</b>
STE	<b>23.376</b>	<b>22.633</b>	<b>26.413</b>	--	<b>31.746</b>	<b>11.881</b>
MEANING	<b>7.308</b>	--	<b>49.265</b>	<b>25.293</b>	--	<b>9.895</b>
PS	<b>7.758</b>	<b>24.024</b>	<b>17.015</b>	<b>11.766</b>	<b>10.111</b>	--

WE= Work Engagement; JC= Job Characteristics; PsyC= Psychological Capital; STE= Employee Endorsement of Self-Transcendence; M= Meaningfulness; PS= Psychological Safety.

From Table 4.73, it is evident that twenty-one parameters, if set free, out of the twenty-five possible additional paths between endogenous latent variables (84%) would result in a significant improvement in model fit. This percentage does not comment favourably on the fit of the *Work Engagement* structural model. This finding again echoes the predominance of positive residuals amongst the large variance-covariance residuals.

**Table 4.74****Modification indices calculated for the psi matrix**

	WE	JC	PsyC	STE	MEANING	PS
WE	--					
JC	3.765	--				
PsyC	1.100	--	--			
STE	.679	6.485	<b>26.259</b>	--		
MEANING	3.445	<b>47.509</b>	<b>29.924</b>	<b>17.094</b>	--	
PS	2.441	<b>10.679</b>	<b>16.839</b>	<b>11.746</b>	1.823	--

WE= Work Engagement; JC= Job Characteristics; PsyC= Psychological Capital; STE= Employee Endorsement of Self-Transcendence; M= Meaningfulness; PS= Psychological Safety.

Table 4.74 shows the modification indices calculated for the psi matrix. Seven covariance terms out of seventeen covariance terms in the psi matrix currently fixed to zero, if set free, would significantly improve the fit of the comprehensive model. This implies that 42.18% of the parameters, if set free, would result in a significant ( $p < .01$ ) improvement in the model fit. This percentage of significant modification indices is not ideal. However, it is not high enough to point towards poor model fit. Rather, it is indicative of reasonable close fit opposed to good model fit.

#### 4.8.4 DECISION ON THE FIT OF THE STRUCTURAL MODEL

Based on the results discussed thus far, the comprehensive *Work Engagement* model has achieved reasonable close fit. The p-value for the test of close fit, depicted in Table 4.70, indicated that it is a permissible stance to hold that in the population the model fits closely and that the sample finding of somewhat poorer fit than close fit can be regarded as a chance deviation from the close fit scenario in the parameter.

The research interest is, however, not first and foremost in the comprehensive model. The composite model is a composite of the measurement model defining the structural relations between the composite indicator variables and the latent variables and the structural model defining the structural relations that have been hypothesised to exist between the latent variables. In the final analysis the research interest is focussed on the structural model. The structural model on its own cannot, however, be empirically tested directly. The comprehensive model is tested. An inference about the fit of the structural model has to be derived from the fit of the comprehensive model. To support this inference the measurement model is fitted first. A measurement model that fits well and a subsequently comprehensive model that also fits well is, however, no guarantee that the structural model fits well. The danger exists that the well-fitting comprehensive and measurement models may actually mask a poor fitting structural model (Vandenberg & Grelle, 2009). The possibility that a well-fitting measurement model might mask a poor fitting structural model exists because the measurement model contributes a larger proportion of the total degree of freedom to the comprehensive model (Vandenberg & Grelle, 2009).

Vandenberg and Grelle (2009) propose that it is possible to guard against this danger by decomposing the final fit of the comprehensive model independent additive non centrality chi-squares for the measurement and the structural models separately. Such a decomposition of the chi-square statistic is permissible because the structural model is nested within the measurement model and the measurement model is nested within the comprehensive model (Vandenberg & Grelle, 2009; Tomarken & Waller, 2003).

The difference in Satorra-Bentler chi-square values obtained for the comprehensive and the measurement models was firstly calculated. The scaled Satorra-Bentler chi-square difference was calculated (Satorra & Bentler, 2001). The probability of observing this chi-square difference under the null hypothesis of exact fit in the parameter was subsequently determined. In addition the RMSEA of the structural model was calculated by subtracting the population discrepancy function value ( $F_0$ ) of the measurement model from that obtained by the comprehensive model, dividing the difference by the difference in the degrees of freedom of the two models and taking the square root (Steiger, date unknown). The obtained results are shown in Table 4.75. A significant Satorra-Bentler scaled  $\chi^2$  difference value (295.1870505) ( $p=.56258E-41$ ) was obtained for the structural model. No test for the significance of the structural RMSEA value inferred from the difference in the  $F_0$  values of the comprehensive and measurement models seem to exist. In terms of the conventional guidelines for the descriptive interpretation of sample RMSEA estimates (Diamantopoulos & Sigua, 2000), the value of .009461 indicates excellent structural model fit. The conclusion is therefore that the restrictions constituting the structural/model are meaningful and interpretable (Vandenberg & Grelle, 2009). The acceptable close fit obtained for the structural model on the sample warrants the interpretation of the structural model parameter estimates.

**Table 4.75**

***Decomposition of the Satorra-Bentler chi-square fit statistic of the comprehensive LISREL model***

Hypothesis	Satorra-Bentler chi-square	Normal theory chi-square	df	cd	Scaled difference in S-B chi-square	Prob scaled S-B chi-square diff	$F_0$	RMSEA
Comprehensive model	1606.53 7	2240.93 8	96 7				2.83	.05409 8
Measurement model	1347.40 5	1891.02 4	92 9				1.85 1	.04463 7
Structural model	259.132	349.914	38	1.18539 8	295.187050 5	1.56258E- 41		.00946 1

The aim of further evaluation was to determine whether each of the hypothesised theoretical relationships was supported by the data (Diamantopoulos & Sigua, 2000).



#### 4.8.5 STRUCTURAL MODEL PARAMETER ESTIMATES AND SQUARED MULTIPLE CORRELATIONS

In order to determine whether each of the hypothesised theoretical relationships was supported by the collected data, the focus was on the linkages between the various endogenous ( $\eta$ ) latent variables and between the exogenous ( $\xi$ ) and endogenous ( $\eta$ ) latent variables. Diamantopoulos and Siguaw (2000) mention the following four relevant issues when assessing the structural model: 1) The signs of the parameters representing the paths between the latent variables, 2) the statistical significance ( $p < .05$ ) of the parameter estimates, 3) assuming statistical significance, the magnitude of the parameter estimates, and 4) the squared multiple correlation ( $R^2$ ) for each of the endogenous latent variables in the model.

The parameters of interest are the freed elements of the beta ( $\mathbf{B}$ ), gamma ( $\mathbf{\Gamma}$ ) and psi ( $\mathbf{\Psi}$ ) matrices. As mentioned in the earlier discussion on measurement model parameter estimates, the unstandardised matrices consist of three values of importance - unstandardised parameter estimates, standard error terms and z-values. However, unlike in the measurement model, the unstandardised parameter estimates related to the structural model indicates the resulting average change in an endogenous latent variable from a unit change in an exogenous or endogenous latent variable, assuming all other exogenous and endogenous latent variables are being held constant (Diamantopoulos & Siguaw, 2000). The unstandardised beta matrix depicted in Table 4.76 provides the unstandardised parameter estimates, standard errors and z-values for the relationships hypothesised to exist between the endogenous latent variables. The unstandardised gamma matrix depicted in Table 4.77 shows the unstandardised parameter estimates, standard errors and z-values for the relationships hypothesised to exist between the exogenous latent variables and the endogenous latent variables. The unstandardised psi matrix depicted in Table 4.78 shows the error variance estimates, standard errors and z-values for the residual terms of the structural part of the model.

**Table 4.76*****Work engagement structural model unstandardised beta matrix***

	WE	JC	PsyC	STE	MEANING	PS
WE	--	--	.423 (.081) 5.222	.157 (.070) 2.253	.578 (.076) 7.613	.294 (.075) 3.945
JC	--	--	.467 (.063)	--	--	--
		7.419				
PsyC	--	--	--	--	--	--
STE	--	--	--	--	--	--
MEANING	--	.564 (.093) 6.075	--	--	--	--
PS	--	--	--	--	--	--

*WE= Work Engagement; JC= Job Characteristics; PsyC= Psychological Capital; STE= Employee Endorsement of Self-Transcendence; M= Meaningfulness; PS= Psychological Safety.*

The unstandardised beta matrix was used to assess the significance of the estimated path coefficients  $\beta_{ij}$ , expressing the strength of the influence of  $\eta_j$  on  $\eta_i$ . The unstandardised  $\beta_{ij}$  estimates are statistically significant ( $p < .05$ ) if the corresponding z-value is greater than  $|1.6449|$  (Diamantopoulos & Sigauw, 2000).<sup>34</sup> In Table 4.76 it can be observed that all z-values were greater than  $|1.6449|$ . This demonstrates that all path estimates between endogenous latent variables are statistically significant ( $p < .05$ ). The following null hypotheses can therefore be rejected:  $H_{02}$ ,  $H_{03}$ ,  $H_{04}$ ,  $H_{07}$ ,  $H_{09}$ , and  $H_{012}$ . Furthermore, it is evident that all the parameter estimates and z-values are positive, which is in line with the nature of the hypothesised effects. Support is therefore obtained for the path-specific substantive research hypotheses 2, 3, 4, 7, 9, and 12.

<sup>34</sup> Since the alternative hypotheses are typically formulated as directional alternative hypotheses the test of the significance of the unstandardised parameter estimates should be treated as a directional test. Assuming a 5% significance level the critical z-score should therefore be  $|1.6449|$  rather than  $|1.96|$ . A critical z-value of 1.96 would have been appropriate if the alternative hypothesis would be formulated as a non-directional hypothesis.

**Table 4.77*****Work engagement structural model unstandardised gamma matrix***

	TL	PsyC_JC	STO	STE_STO	SqSTE	SqSTO
WE	--	--	-.085 (.069) <b>-1.236</b>	.045 (.102) <b>.438</b>	.057 (.085) <b>.668</b>	-.177 (.092) <b>-1.921</b>
JC	.259 (.059) 4.393	--	--	--	--	--
PsyC	.333 (.073) 4.564	--	--	--	--	--
STE	.341 (.069) 4.957	--	--	--	--	--
MEANING	--	-.084 (.081) <b>-1.049</b>	--	--	--	--
PS	.623 (.077) 8.125	--	--	--	--	--

*WE= Work Engagement; JC= Job Characteristics; PsyC= Psychological Capital; TL= Transformational Leadership; PsyC\_JC= PsyCap\*Job Characteristics; STE= Employee Endorsement of Self-Transcendence; STO= Organisational Endorsement of Self-Transcendence; M= Meaningfulness; PS= Psychological Safety; STE\_STO= Employee Endorsement of Self-Transcendence\*Perceived Organisational Endorsement of Self-Transcendence; SqSTE= Squared Employee Endorsement of Self-Transcendence; SqSTO= Squared Perceived Organisational Endorsement of Self-Transcendence.*

The unstandardised gamma matrix was used to assess the significance of the estimated path coefficients  $\gamma_{ij}$ , expressing the strength of the influence of  $\xi_j$  on  $\eta_i$ . From Table 4.77, it is evident that the following null hypotheses can be rejected ( $p < .05$ ):  $H_{08}$ ,  $H_{010}$ ,  $H_{011}$ ,  $H_{016}$ , and  $H_{025}$ . However, four z-values were smaller than  $|1.6449|$ . This is indicative of path estimates between exogenous and endogenous latent variables that are statistically insignificant ( $p > .05$ ). The following hypotheses could therefore not be rejected:  $H_{05}$ ,  $H_{013}$ ,  $H_{014}$ , and  $H_{015}$ . More specifically, this implies that the influence of *PsyCap\*Job Characteristics* on *Meaningfulness*, *Perceived Organisational Endorsement of Self-Transcendence* on *Work Engagement*, *Squared Employee Endorsement of Self-Transcendence* on *Work Engagement*, and the influence of *Employee Endorsement of Self-Transcendence\* Perceived Organisational Endorsement of Self-Transcendence* on *Work Engagement* were insignificant.

**Table 4.78*****Work engagement structural model unstandardised psi matrix***

<b>WE</b>	<b>JC</b>	<b>PsyC</b>	<b>STE</b>	<b>MEANING</b>	<b>PS</b>
1.000	.634	.889	.884	1.000	.612
	(.091)	(.114)	(.103)		(.076)
	6.949	7.793	8.569		8.073

*WE= Work Engagement; JC= Job Characteristics; PsyC= Psychological Capital; STE= Employee Endorsement of Self-Transcendence; M= Meaningfulness; PS= Psychological Safety.*

The psi matrix depicts the variances in the structural error terms. Table 4.78 shows that all the z-values are greater than  $|1.6449|$ .<sup>35</sup> The estimated variances are therefore all statistically significant ( $p < .05$ ). A statistically significant proportion of the variance in each of the latent variables in the model is therefore not explained by the model. It was expected that the psi variances would be significant, since the model cannot be regarded as perfect/complete.

As mentioned in the earlier discussion with regards to measurement model parameter estimates, additional insights can be gained from the completely standardised parameter estimates (Diamantopoulos and Siguaw, 2000). The completely standardised parameter estimates related to the structural model reflect the average change, expressed in standard deviation units, in the endogenous latent variables that directly result from one standard deviation change in an endogenous or exogenous latent variable to which it has been linked, given that the effect of all other variables are held constant (Diamantopoulos & Siguaw, 2000). According to Diamantopoulos and Siguaw (2000), standardised parameter estimates are not affected by differences in the unit of measurement of the independent variable, allowing for comparison across equations. In addition to the unstandardised matrices, it would therefore be useful to interpret the magnitude of the parameter estimates in the completely standardised beta, gamma and psi matrices depicted in Table 4.79, Table 4.80, and Table 4.81.

<sup>35</sup> The error variance of *Work Engagement* and *Meaningfulness* was set to 1 in accordance with the recommendation of Little et al. (2006) when including latent interaction and/or latent powered effects in the structural model.

**Table 4.79****Work engagement structural model completely standardised beta matrix**

	WE	JC	PsyC	STE	MEANING	PS
WE	--	--	.296	.110	.465	.206
JC	--	--	.467	--	--	--
PsyC	--	--	--	--	--	--
STE	--	--	--	--	--	--
MEANING	--	.491	--	--	--	--
PS	--	--	--	--	--	--

WE= Work Engagement; JC= Job Characteristics; PsyC= Psychological Capital; STE= Employee Endorsement of Self-Transcendence; M= Meaningfulness; PS= Psychological Safety.

**Table 4.80****Work engagement structural model completely standardised gamma matrix**

	TL	PsyC_JC	STO	STE_STO	SqSTE	SqSTO
WE	--	--	-.060	.031	.040	-.124
JC	.259	--	--	--	--	--
PsyC	.333	--	--	--	--	--
STE	.341	--	--	--	--	--
MEANING	--	-.073	--	--	--	--
PS	.623	--	--	--	--	--

WE= Work Engagement; JC= Job Characteristics; PsyC= Psychological Capital; TL= Transformational Leadership; PsyC\_JC= PsyCap\*Job Characteristics; STE= Employee Endorsement of Self-Transcendence; STO= Organisational Endorsement of Self-Transcendence; M= Meaningfulness; PS= Psychological Safety; STE\_STO= Employee Endorsement of Self-Transcendence\*Perceived Organisational Endorsement of Self-Transcendence; SqSTE= Squared Employee Endorsement of Self-Transcendence; SqSTO= Squared Perceived Organisational Endorsement of Self-Transcendence.

**Table 4.81****Work engagement structural model completely standardised psi matrix**

WE	JC	PsyC	STE	MEANING	PS
.490	.634	.889	.884	.756	.612

WE= Work Engagement; JC= Job Characteristics; PsyC= Psychological Capital; STE= Employee Endorsement of Self-Transcendence; M= Meaningfulness; PS= Psychological Safety.

Table 4.79 and Table 4.80 indicate that for the significant effects, generally quite modest values were obtained. The effect of *Transformational Leadership* on *Psychological Safety* is the most pronounced (.623), followed by the effect of *Job Characteristics* on *Meaningfulness* (.491), the effect of *PsyCap* on *Job Characteristics* (.467), and the effect of *Meaning* on *Work Engagement* (.465).

Table 4.81 depicts the magnitude of the variance coefficients in the structural error terms. Table 4.81 indicated that a statistically significant proportion of the variance in each of the latent variables in the model is not explained by the model. Although it was expected that the psi variances would be significant, since the model cannot be regarded as perfect/complete, the magnitude of some of the structural error variances was nonetheless somewhat disappointing. It is, however, acknowledged that the long-term aim of cumulative research studies is to whittle down the magnitude of the psi variances over successive studies that elaborate and modify the current *Work Engagement* structural model. The psi estimate obtained for the focal endogenous latent variable ( $\psi_{11}$ ) is, however, relatively gratifying.

The squared multiple correlations,  $R^2$ , reflect the proportion of variance in each endogenous latent variable that can be explained by the weighted linear composite of effects linked to it in the model (Diamantopoulos & Siguaw, 2000). A higher  $R^2$  value is desirable, as a smaller value would indicate areas in the model that need elaboration (Theron, 2012). The squared multiple correlations for the 6 endogenous latent variables in the *Work Engagement* structural model are presented in Table 4.82.

**Table 4.82**

***Squared multiple correlations for the endogenous latent variables in the Work Engagement structural model***

WE	.510
JC	.366
PsyC	.111
STE	.116
MEANING	.244
PS	.388

*WE= Work Engagement; JC= Job Characteristics; PsyC= Psychological Capital; STE= Employee Endorsement of Self-Transcendence; M= Meaningfulness; PS= Psychological Safety.*

From Table 4.82 it can be inferred that the *Work Engagement* structural model is able to explain 51% of the variance in *Work Engagement*. The model is therefore reasonably successful in terms of attempts made to explain variance in *Work Engagement*. Furthermore, it can be observed that the model fails to substantially explain variance in *Job Characteristics*, *Psychological Capital*, *Meaningfulness*, *Psychological Safety*, and *Employee Endorsement of Self-Transcendence*. However,

the  $R^2$  values for *Job Characteristics* (.366) and *Psychological Safety* (.388) were still reasonably high. In order to gain a better understanding of the dynamics underlying *Work Engagement*, an attempt should be made to gain a better understanding of the nomological network of latent variables that account for variance in *Work Engagement*. The low percentages of variance in the various latent variables explained by the model demonstrate the need for elaboration of the *Work Engagement* model. The need for further research is addressed in further detail in Chapter 5.

#### 4.9 STRUCTURAL EQUATION MODELLING WITH RESPONSE SURFACE ANALYSIS

In order to gain a greater understanding of the manner in which congruence and incongruence in *Self-Transcendence* affects *Work Engagement* when included in a larger structural model, it was decided to perform structural equation modelling with response surface analysis. The response surface analysis allows one to take a closer look at the manner in which *Work Engagement* responds to combinations of levels of the organisations perceived endorsement of the *Self-Transcendence* value and the employee's endorsement of the same value (i.e. to "zoom in" on the nature of *Work Engagement* response surface) in order to paint a more detailed picture (on a 3-dimensional response surface graph) of the influence of congruence and incongruence between the organisations perceived endorsement of the *Self-Transcendence* value and the employee's endorsement of the same value on *Work Engagement*.

The specific response surface hypotheses formulated in section 3.4.2 hypothesised about four characteristics of the response surface as described by four response surface test values ( $a_1 - a_4$ ): 1) the slope of the line of congruence ( $a_1$ ), 2) the curvature along the line of congruence ( $a_2$ ), 3) the slope of the line of incongruence ( $a_3$ ), and 4) the curvature along the line of incongruence ( $a_4$ ). The response surface hypotheses were tested by examining the sign and statistical significance of the response surface test values ( $a_1$ - $a_4$ ) and interpreting the graph visually. The core of the response surface analysis is therefore to plot the response surface in three-

dimensions, to calculate and interpret the significance of the four response surface test values ( $a_1 - a_4$ ), and to interpret the response surface graph/pattern.

The Cunningham Excel macro (Shanock et al., 2010) was used to calculate the surface test values and test their statistical significance (i.e. to test the specific response surface hypotheses) and to produce the three-dimensional response surface graph. The unstandardised gamma ( $\gamma_{13}, \gamma_{14}, \gamma_{15}, \gamma_{16}$ ) and beta ( $\beta_{14}$ ) estimates were used as estimates of the partial regression coefficient of the first-order polynomial regression model. The required associated standard error values were obtained from the unstandardised  $\Gamma$  and  $\mathbf{B}$  matrices. Since the structural intercept terms ( $\alpha$ ) were not freed to be estimated when fitting the *Work Engagement* structural model the intercept of the polynomial regression model was set to zero. The covariance between the partial regression coefficient estimates required by the Cunningham Excel macro (Shanock et al., 2010) to calculate the response surface test values were derived from the covariance matrix obtained via the EC command inserted on the LISREL Output command line in the comprehensive model syntax file (G. Mels, personal communication, 22 September 2014). The calculated response surface test values and their statistical significance ( $p < .05$ ) are depicted in Table 4.83.

**Table 4.83**

**Statistical significance of the calculated response surface test values: Self-transcendence**

Effect	Coefficient	Standard Error	Test Stat (t)	p-value	
$a_1$ : Slope along $X = Y$ (as related to $Z$ )	.07	.11	.628	.531	
$a_2$ : Curvature on $X = Y$ (as related to $Z$ )	-.08	.17	-.439	.661	
$a_3$ : Slope along $X = -Y$ (as related to $Z$ )	.24	.08	3.077	.002	<b>Sig!</b>
$a_4$ : Curvature on $X = -Y$ (as related to $Z$ )	-.017	.21	-.796	.427	

*Where X represents Employee Endorsement of Self-Transcendence, Y represents Perceived Organisational Endorsement of Self-Transcendence and Z represents Work Engagement*

The insignificant  $a_1$  and  $a_2$ , shown in Table 4.83, indicates that no significant relationship exists between *Work Engagement* and movement along the line of *Self-*



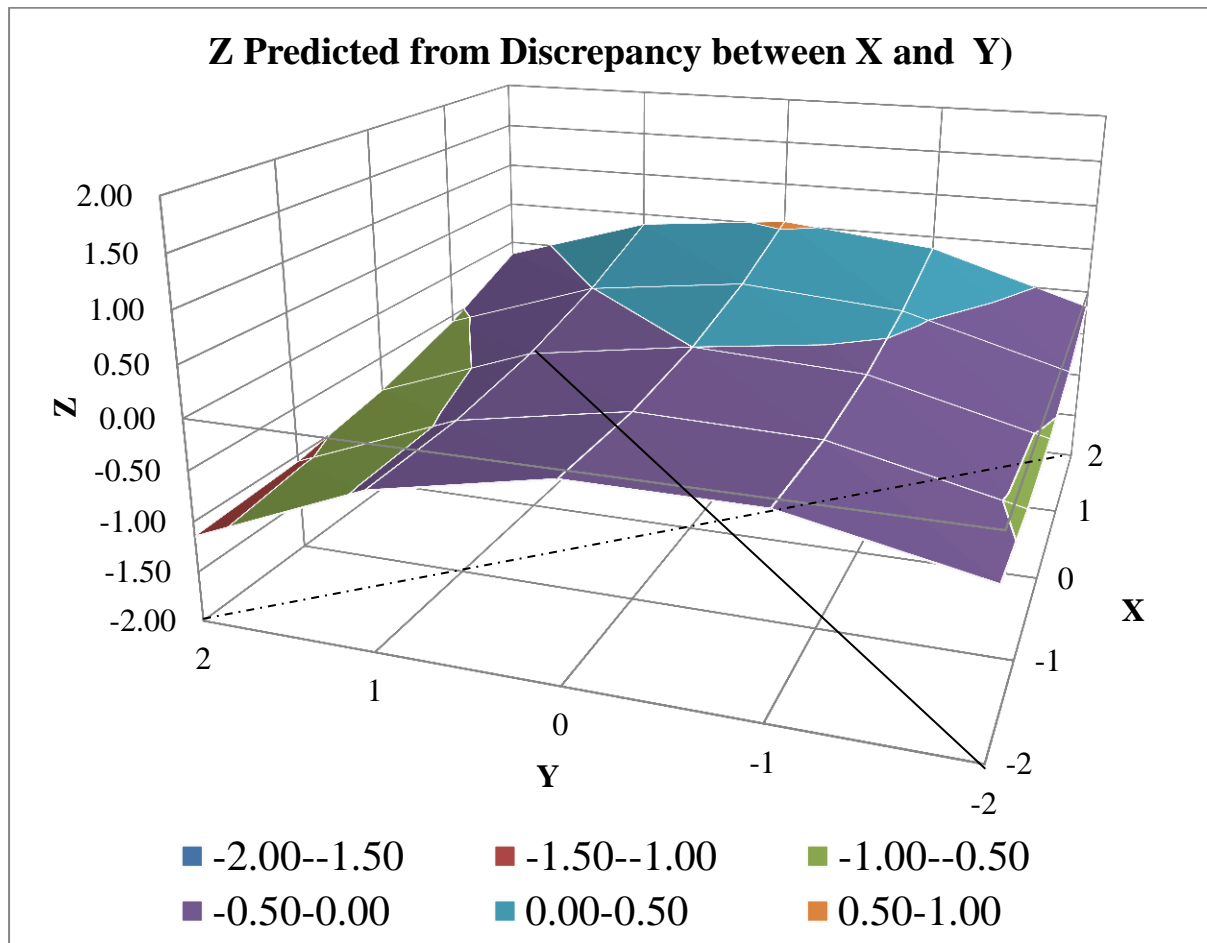
*Transcendence* congruence from - - to + +<sup>36</sup>. As a consequence, hypothesis H<sub>017a</sub>:  $a_1=0$  and hypothesis H<sub>017b</sub>:  $a_2=0$  could not be rejected. Support was therefore not found for the hypothesised increase in *Work Engagement* along the line of congruence as congruence moves from low *Employee Endorsement of Self-Transcendence* and low *Perceived Organisational Endorsement of Self-Transcendence* to high *Employee Endorsement of Self-Transcendence* and high *Perceived Organisational Endorsement of Self-Transcendence*. Neither was support found for the hypothesised convex relationship between *Self-Transcendence* congruence and *Work Engagement*.

The positive and statistically significant  $a_3$  implies that *Work Engagement* increases along the line of incongruence as incongruence moves from low *Employee Endorsement of Self-Transcendence* and high *Perceived Organisational Endorsement of Self-Transcendence* to high *Employee Endorsement of Self-Transcendence* and low *Perceived Organisational Endorsement of Self-Transcendence* (i.e from -+ incongruence to +- in congruence). In the theorising on the effect of value incongruence on *Work Engagement* it was, however, hypothesised that a negative relationship should exist between *Work Engagement* and movement along the line of incongruence from - + to + -. *Work Engagement* was expected to be relatively higher when *Employee Endorsement of Self-Transcendence* was low and *Perceived Organisational Endorsement of Self-Transcendence* was high (- +) than when *Employee Endorsement of Self-Transcendence* was high and *Perceived Organisational Endorsement of Self-Transcendence* was low (+ -). Consequently, hypothesis H<sub>018a</sub>:  $a_3=0$  was not rejected despite the low exceedence probability associated with  $a_3$ . When testing null hypotheses against directional alternative hypotheses a (risky) stance is taken on the sign of the parameter as well as the magnitude. Support was therefore not found for the hypothesised negative change in *Work Engagement* along the line of incongruence moving from -+ to +- incongruence. The insignificant  $a_4$  (taken in conjunction with the positive and statistically significant  $a_3$  estimate) indicates that *Work Engagement* increases linearly along the line of incongruence as incongruence moves from low *Employee Endorsement of Self-Transcendence* and high *Perceived*

<sup>36</sup> The first sign refers to the relative position on the *Employee Endorsement of Self-Transcendence* scale (i.e. below or above the scale mean) and the second sign to the relative position on the *Perceived Organisational Endorsement of Self-Transcendence* scale.

*Organisational Endorsement of Self-Transcendence to high Employee Endorsement of Self-Transcendence and low Perceived Organisational Endorsement of Self-Transcendence. Support was therefore not found for the hypothesised concave relationship between Work Engagement and Self-Transcendence incongruence. Consequently, hypothesis H<sub>018b</sub>:  $a_4 = 0$  was not rejected ( $p < .05$ ).*

The response surface graph is depicted in Figure 4.7



**Figure 4.7. Response surface graph: Self-transcendence**

Where X represents Employee Endorsement of Self-Transcendence, Y represents Perceived Organisational Endorsement of Self-Transcendence and Z represents Work Engagement

A visual inspection of the response surface obtained in the sample suggests that Work Engagement is at its highest level when Employee Endorsement of Self-Transcendence is high and Perceived Organisational Endorsement of Self-Transcendence is average. Work Engagement is at its lowest level when Employee Endorsement of Self-Transcendence is low and Perceived Organisational

*Endorsement of Self-Transcendence* is high. A slight, but significant ( $p < .05$ ) increase occurs as one moves along the line of incongruence from - + to + -. The response surface moreover seems to be concave relative to the Y-axis (i.e. *Perceived Organisational Endorsement of Self-Transcendence*) with lower *Work Engagement* at both extremes of the *Perceived Organisational Endorsement of Self-Transcendence* scale. This trend is not formally evaluated in terms of statistical significance. Along the line of congruence the level of *Work Engagement* seems to subtly change concavely as one moves from - - to + + but shows no systematic linear trend of increasing or decreasing. The slight negative curvature along the line of congruence was not statistically significant ( $p > .05$ ).

#### **4.10 OBSERVED SCORE POLYNOMIAL REGRESSION ANALYSIS WITH RESPONSE SURFACE ANALYSIS**

The primary focus of the current study is on the development and empirical testing of a comprehensive explanatory *Work Engagement* structural model. Structural equation modelling was used as the statistical analysis technique to test the proposed *Work Engagement* structural model. Furthermore, SEM with response surface analysis was used in order to gain a greater understanding of the manner in which congruence and incongruence in the extent to which the employee and his organisation (as perceived through the eyes of the employee) endorses the *Self-Transcendence* value affects *Work Engagement* when included in the larger structural model. Thus far, Chapter 4 reported on the findings of these analyses.

In addition to the proposed *Work Engagement* structural model, the current study proposed two narrow-focus structural models. These two models were proposed in order to gain an even greater understanding of the relationship between congruence/incongruence in *Self-Transcendence* and *Work Engagement*. The first narrow-focus structural model depicts the manner in which the congruence and incongruence in the employee's perception of the degree to which the organisation endorses the *Altruism* value and the employees own endorsement of the *Altruism* value affects *Work Engagement*. The second narrow-focus structural model depicts the manner in which the congruence and incongruence in the employee's perception

of the degree to which the organisation endorses the *Relationships with others* value and the employees own endorsement of the *Relationships with others* value affects *Work Engagement*. In other words, a narrow-focus model was proposed for the manner in which congruence and incongruence in each of the two first-order values (*Altruism* and *Relationships with others*) loading on the higher-order *Self-Transcendence* value type affect *Work Engagement*.

In order to test the two additional proposed models, depicted in Figure 2.3 and Figure 2.4, observed score polynomial regression with response surface analysis was conducted. The following section reports on the results of the analysis.

#### 4.10.1 INCIDENCE OF CONGRUENCE

Before performing the observed score polynomial regression analysis, the incidence of congruence and incongruence needed to be described in order to evaluate whether there is sufficient incidences of congruence and both types of incongruence (+- and -+) to warrant the study. In other words, the question of whether the response surface space is sufficiently covered to allow a credible estimate of the response surface needed to be examined before proceeding with the procedure of obtaining estimates of the response surface.

The incidence of congruence and incongruence were described using bar charts and scatter plots. To obtain these graphs the two sets of predictor variables (*Employee Endorsement of Altruism* and *Perceived Organisational Endorsement of Altruism* and *Employee Endorsement of Relationships with others* and *Perceived Organisational Endorsement of Relationships with others*) were mean centred (rather than mid-point centred). The centred predictor variables were then standardised. The difference in the standardised predictor variables ( $Z_{Employee\ Endorsement\ of\ Altruism}$  and  $Z_{Perceived\ Organisational\ Endorsement\ of\ Altruism}$  as well as  $Z_{Employee\ Endorsement\ of\ Relationships}$  and  $Z_{Perceived\ Organisational\ Endorsement\ of\ Relationships}$ ) were subsequently calculated and these difference variables were then recoded into a trichotomous discrepancy variable ( $Z_{Discrep}$ ) where values in the range -.5 to +.5 were considered to represent congruence, values smaller than -.5 were considered to represent incongruence (where  $Z_{Employee\ Endorsement\ of\ Altruism} < Z_{Perceived\ Organisational\ Endorsement\ of\ Altruism}$  /  $Z_{Employee\ Endorsement\ of\ Relationships}$

*Relationships with Others* <  $Z_{\text{Perceived Organisational Endorsement of Relationships with others}}$ ) and values larger than +.5 were considered to represent incongruence (where  $Z_{\text{Employee Endorsement of Altruism}} > Z_{\text{Perceived Organisational Endorsement of Altruism}} / Z_{\text{Employee Endorsement of Relationships with others}} > Z_{\text{Perceived Organisational Endorsement of Relationships with others}}$ ). The bar charts were obtained by plotting the number of observations that fell in each of the three  $Z_{\text{Discrep}}$  categories for the two first-order *Self-Transcendence* values. The scatter plots were obtained by plotting the values of the two sets of standardised predictor variables.

Ideally, the bar chart should depict relatively equal representation in the incidence of congruence and both types of incongruence and observations should be randomly scattered across the whole of the scatter plot and not restricted to certain areas.

#### 4.10.1.1 INCIDENCE OF ALTRUISM CONGRUENCE

The bar chart and scatter plot used to describe the incidence of *Altruism* congruence/incongruence are depicted in Figure 4.8 and Figure 4.9. Relatively equal representation of congruence and incongruence (i.e. the combined incidence of - + and + - incongruence) can be observed from the bar chart. In addition to merely considering the relative incidence of congruence/incongruence, the scatter plot also considers the position of the observations in the response space. The scatter plot therefore creates a more detailed picture. A somewhat more disconcerting picture is evident from the scatter plot compared to the bar chart. There appears to be a lack of congruence, but especially incongruence cases in the bottom half of the graph demarcated by the red shaded triangle in Figure 4.9. In sum, there are sufficient incidence of congruence and both types of incongruence to warrant the calculation of the response surface test values and drawing of the response surface graph. However, when interpreting the response surface graph it should be kept in mind that in the area demarcated by the red shaded triangle in Figure 4.9 the graph was drawn on extensive extrapolation of trends that was observed in more populated area of the floor of the response surface space.

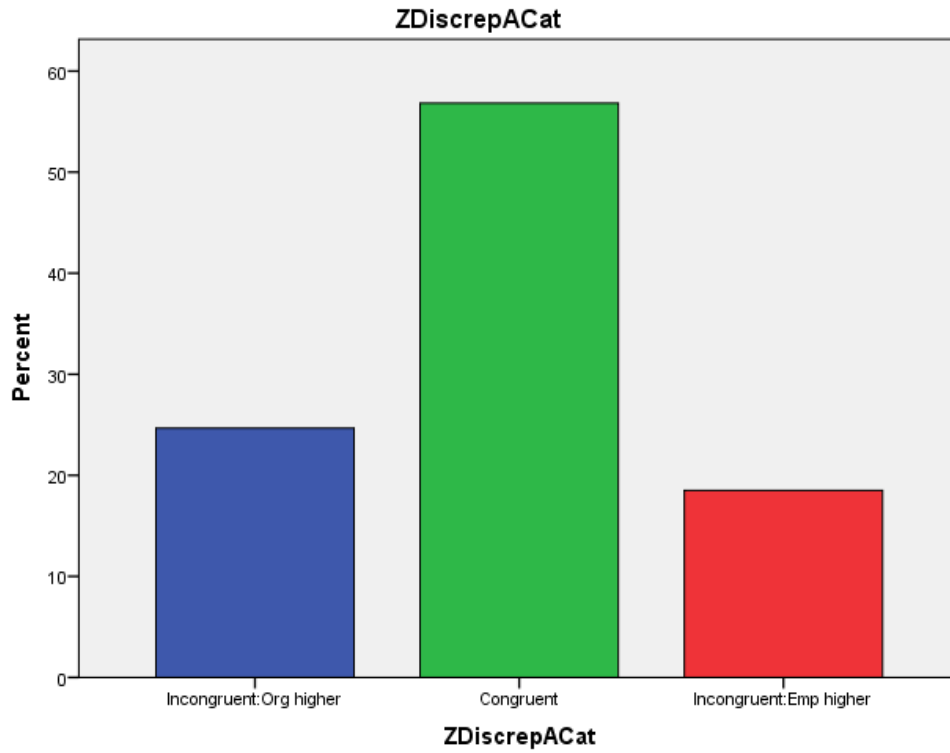


Figure 4.8. Bar chart: Incidence of Altruism congruence / incongruence

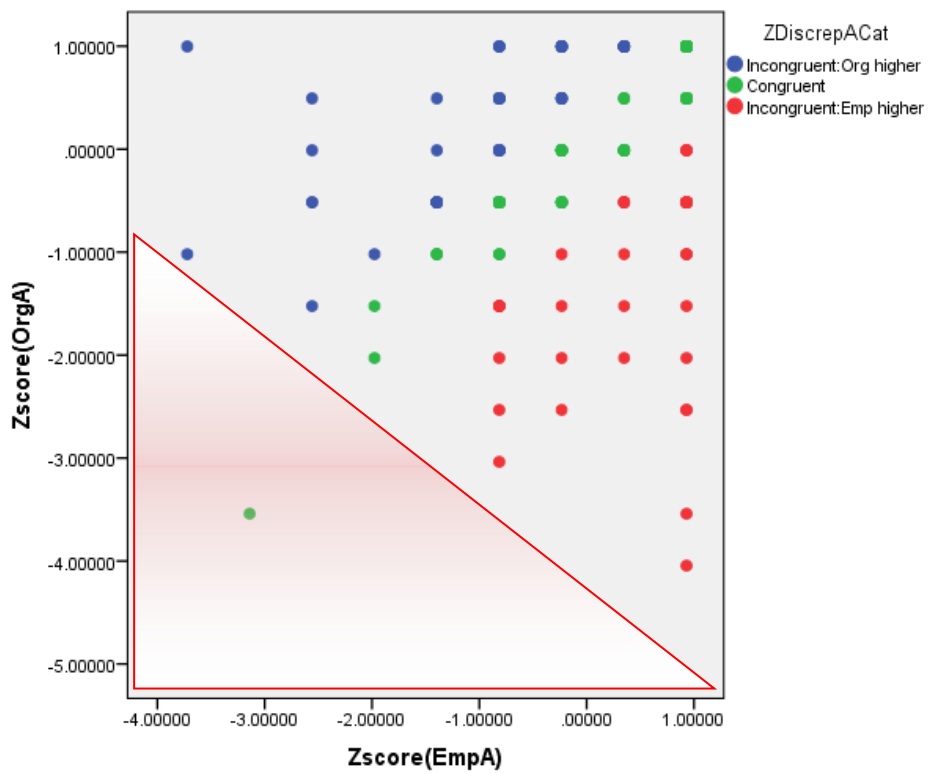
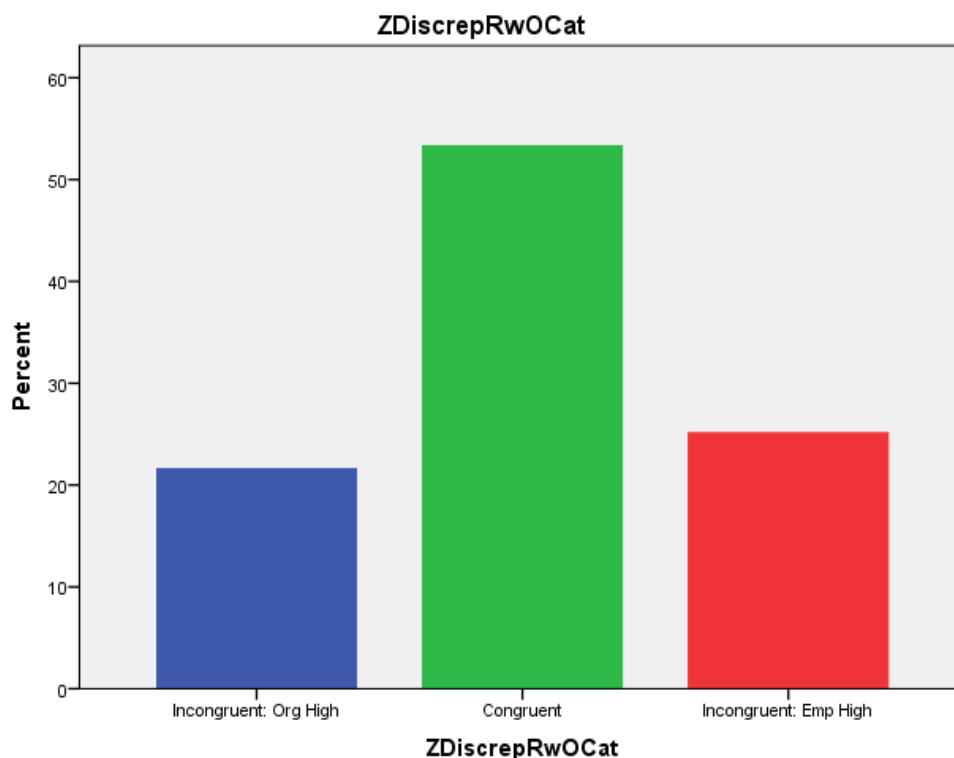


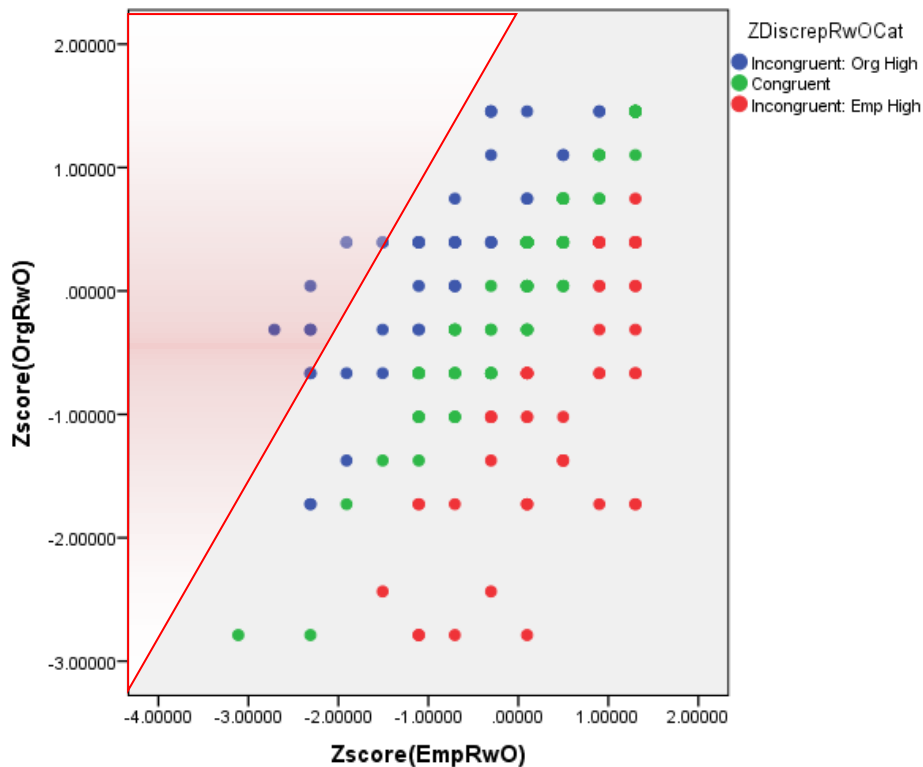
Figure 4.9. Scatter plot: Incidence of Altruism congruence/incongruence

#### 4.10.1.2 INCIDENCE OF RELATIONSHIPS WITH OTHERS CONGRUENCE

The bar chart and scatter plot used to describe the incidence of *Relationships with others* congruence/incongruence are depicted in Figure 4.10 and Figure 4.11. Relatively equal representation of congruence and incongruence (i.e. the combined incidence of  $- +$  and  $+ -$  incongruence) can be observed from the bar chart. Although the scatter plot is less problematic compared to the *Altruism* scatter plot, there are also certain areas in the floor of the space demarcated by the red shaded triangle in Figure 4.11 where there are no observations. However, it does seem likely that extreme  $+ -$  and  $- +$  combinations would be less likely. In conclusion, there appears to be sufficient incidence of congruence and both types of incongruence to allow a plausible estimate of the response surface.



**Figure 4.10. Bar chart: Incidence of Relationships with others congruence/incongruence**



**Figure 4.11. Scatter plot: Incidence of Relationships with others congruence/incongruence**

#### **4.10.2 INTERPRETING THE FIT OF THE TWO NARROW-FOCUS STRUCTURAL MODELS**

Given that it was concluded that there exists sufficient incidence of congruence and both types of incongruence to warrant the polynomial regression with response surface analysis, the polynomial regression model was fitted on the sample data via SPSS version 21 (<http://www.ibm.com/za/en/>). The two polynomial regression models were earlier expressed as Equation 2 and Equation 3 in section 3.3.2 and section 3.9.4.2. The regression output for each of the narrow-focus structural models will be reported and interpreted in this section. Only if the multiple correlation (R) is significant ( $p < .05$ ), will the specific response surface hypotheses be tested.



#### 4.10.2.1 INTERPRETING THE FIT OF THE ALTRUISM VALUE CONGRUENCE WORK ENGAGEMENT STRUCTURAL MODEL

The over-arching substantive research hypothesis (**Hypothesis 19**) that the *Altruism Value Congruence Work Engagement* structural model depicted in Figure 2.3 provides a valid account of the psychological process that determines the levels of *Work Engagement* was tested by testing the following null hypothesis:

$$H_{019}: \rho = 0^{37}$$

$$H_{a19}: \rho > 0$$

The over-arching substantive research hypothesis (**Hypothesis 19**) that the *Altruism Value Congruence Work Engagement* structural model depicted in Figure 2.3 provides a valid account of the psychological process that determines the levels of *Work Engagement* was tested by inspecting the significance ( $p < .05$ ) of the multiple correlation ( $R$ ). The regression output is depicted in Table 4.84 and Table 4.85.

Table 4.85 indicated that the  $R$  value (.409), depicted in Table 4.84, was statistically significant ( $p < .05$ ). As a consequence,  $H_{019}: \rho = 0$  was rejected. This implies that the *Altruism Value Congruence Work Engagement* model statistically significantly explains variance in *Work Engagement*. The  $R^2$  value (.167) shown in Table 4.84 reflects the proportion of variance in *Work Engagement* that can be explained by the weighted linear composite of five effects linked to it in the model. It can therefore be concluded that the model explains 16.7% of variance in *Work Engagement*. At first impression, this finding is to some degree disappointingly small.

However, after considering the fact that *Altruism* is but one first-order value out of a number of values in a value taxonomy, combined with the fact that values in general only account for one small part of the complex dynamics underlying *Work Engagement*, it seemed unrealistic to expect that *Altruism* would explain a very large percentage of the variance in *Work Engagement*.

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<sup>37</sup>  $\rho$  represents the population multiple correlation depicted with the capital Greek letter rho.

**Table 4.84****Regression output: model summary (Altruism)**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.409	.167	.148	7.72483

**Table 4.85****Regression output: Anova (Altruism)**

	Sum of Squares	df	Mean Square	F	Sig.
Regression	2650.204	5	530.041	8.882	.000
Residual	13187.743	221	59.673		
Total	15837.947	226			

#### 4.10.2.2 INTERPRETING THE FIT OF THE RELATIONSHIPS WITH OTHERS VALUE CONGRUENCE WORK ENGAGEMENT STRUCTURAL MODEL

The over-arching substantive research hypothesis (**Hypothesis 22**) that the *Relationships with others Value Congruence Work Engagement* structural model depicted in Figure 2.4 provides a valid account of the psychological process that determines the levels of *Work Engagement* was tested:

$$H_{022}: P= 0$$

$$H_{a22}: P> 0$$

The over-arching substantive research hypothesis (**Hypothesis 22**) that the *Relationships with others Value Congruence Work Engagement* structural model depicted in Figure 2.4 provides a valid account of the psychological process that determines the levels of *Work Engagement* was tested by inspecting the statistical significance ( $p<.05$ ) of the multiple correlation (R). The regression output is depicted in Table 4.86 and Table 4.87.

As shown in Table 4.87, the R value (.331) depicted in Table 4.86, was statistically significant ( $p<.05$ ). Hypothesis 22 ( $H_{022}: P= 0$ ) was therefore rejected, which implies that the *Relationships with others Value Congruence Work Engagement* model statistically significantly explains variance in *Work Engagement*. Furthermore, Table

4.86 showed that the model explains 11% ( $R^2 = .110$ ) of variance in *Work Engagement*. This obtained  $R^2$  is low, yet it is a realistic finding.

**Table 4.86**

***Regression output: model summary (Relationships with others)***

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.331	.110	.089	7.98818

**Table 4.87**

***Regression output: Anova (Relationships with others)***

	Sum of Squares	df	Mean Square	F	Sig.
Regression	1735.700	5	347.140	5.440	.000
Residual	14102.248	221	59.673		
Total	15837.947	226			

### 4.10.3 INTERPRETING THE RESPONSE SURFACE TEST VALUES AND GRAPH

Given that a significant ( $p < .05$ )  $R^2$  was obtained for both narrow-focus structural models, the specific response surface hypotheses formulated for each model was tested. The response surface hypotheses were tested by examining the sign and statistical significance of the response surface test values ( $a_1$ - $a_4$ ) and interpreting the graph visually.

The Cunningham Excel macro (Shanock et al., 2010) was used to calculate the surface test values and test their statistical significance (i.e. to test the specific response surface hypotheses) and to produce the three-dimensional response surface graph. The unstandardised partial regression coefficients and their associated standard errors, the intercept term and the required covariance estimates were obtained by fitting the two polynomial regression models that were earlier expressed as Equation 2 and Equation 3 in section 3.3.2 and section 3.9.4.2 in SPSS version 21 (<http://www.ibm.com/za/en/>) and requesting the covariances

between the partial regression coefficients via the BCOV command (Shanock et al., 2010).

#### 4.10.3.1 INTERPRETING THE RESPONSE SURFACE TEST VALUES AND GRAPH FOR THE ALTRUISM VALUE CONGRUENCE WORK ENGAGEMENT STRUCTURAL MODEL

Table 4.88 depicts the calculated response surface test values and their statistical significance. The positive and statistically significant  $a_1$  ( $p < .05$ ) implies that *Work Engagement* increases along the line of congruence as congruence moves from low *Employee Endorsement of Altruism* and low *Perceived Organisational Endorsement of Altruism* to high *Employee Endorsement of Altruism* and high *Perceived Organisational Endorsement of Altruism*. Consequently, hypothesis  $H_{020a}$ :  $a_1=0$  was rejected ( $p < .05$ ). The insignificant  $a_2$  implies that *Work Engagement* increases linearly along the line of congruence as congruence moves from low *Employee Endorsement of Altruism* and low *Perceived Organisational Endorsement of Altruism* to high *Employee Endorsement of Altruism* and high *Perceived Organisational Endorsement of Altruism*. Consequently, hypothesis  $H_{020b}$ :  $a_2=0$  was not rejected ( $p < .05$ ). Support was therefore not found for the hypothesised convex relationship between *Altruism* congruence and *Work Engagement*.

A positive and statistically significant  $a_3$  was obtained, which implies that *Work Engagement* increases along the line of incongruence as incongruence moves from low *Employee Endorsement of Altruism* and high *Perceived Organisational Endorsement of Altruism* to high *Employee Endorsement of Altruism* and low *Perceived Organisational Endorsement of Altruism*. It was however hypothesised that *Work Engagement* decreases along the line of incongruence as incongruence moves from low *Employee Endorsement of Altruism* and high *Perceived Organisational Endorsement of Altruism* to high *Employee Endorsement of Altruism* and low *Perceived Organisational Endorsement of Altruism*. As a consequence, hypothesis  $H_{021a}$ :  $a_3=0$  could not be rejected. The negative and statistically significant  $a_4$  indicates that *Work Engagement* changes concavely along the line of incongruence as incongruence moves from 00 outward to low *Employee*

*Endorsement of Altruism* and high *Perceived Organisational Endorsement of Altruism* and from 00 outward to high *Employee Endorsement of Altruism* and low *Perceived Organisational Endorsement of Altruism*. Consequently, hypothesis H<sub>021b</sub>:  $a_4 = 0$  was rejected.

**Table 4.88**

**Statistical significance of the calculated response surface test values: Altruism**

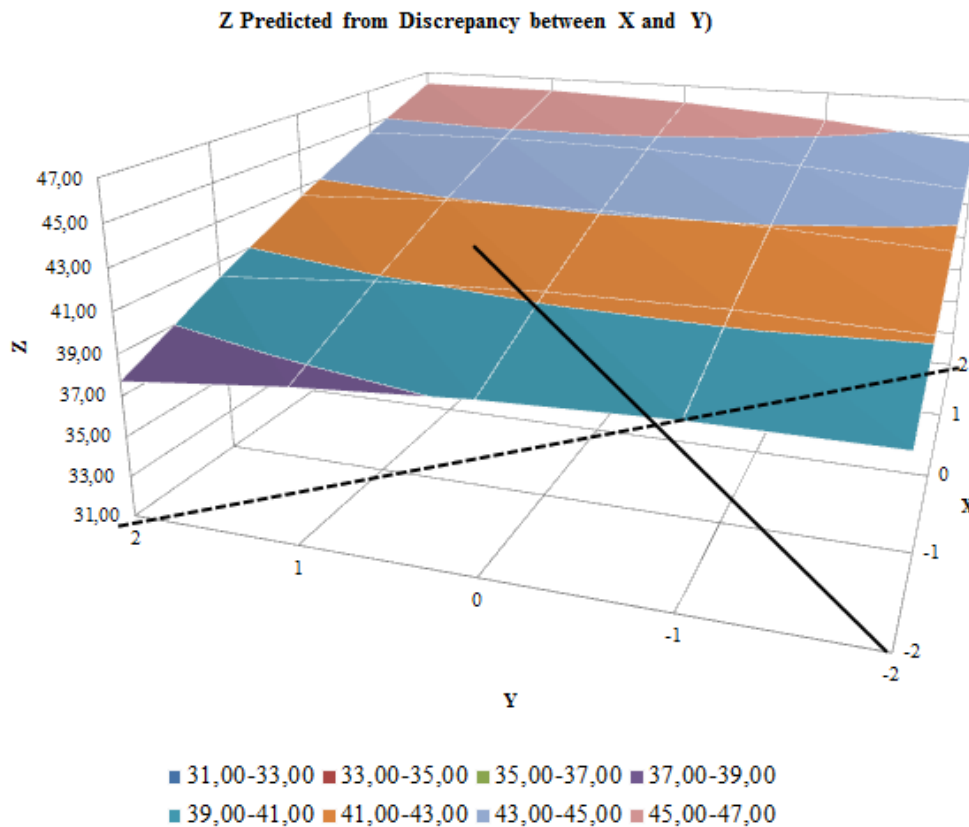
Effect	Coefficient	Standard Error	Test Stat (t)	p-value	
a <sub>1</sub> : Slope along X = Y (as related to Z)	1.71	.40	4.233	.000	<b>Sig!</b>
a <sub>2</sub> : Curvature on X = Y (as related to Z)	-.05	.17	-.315	.753	
a <sub>3</sub> : Slope along X = -Y (as related to Z)	1.72	.73	2.357	.019	<b>Sig!</b>
a <sub>4</sub> : Curvature on X = -Y (as related to Z)	-.49	.24	-1.996	.047	<b>Sig!</b>

Where X represents *Employee Endorsement of Altruism*, Y represents *Perceived Organisational Endorsement of Altruism* and Z represents *Work Engagement*

Figure 4.12 shows the response surface graph. It was evident that the interpretations of a<sub>1</sub>-a<sub>4</sub> were visibly reflected in the graph. Along the line of congruence, it was clear that *Work Engagement* (Z) increased from the employee (X) and organisation (Y) not endorsing *Altruism* to the employee (X) and organisation (Y) endorsing *Altruism* (i.e. increased from - - to + + congruence). Furthermore, *Work Engagement* (Z) appeared to increase linearly along the line of congruence from - - to + + congruence. Along the line of incongruence, it was clear that *Work Engagement* (Z) increased moving from the employee (X) not endorsing *Altruism* and the organisation (Y) endorsing *Altruism* to the employee (X) endorsing *Altruism* and the organisation (Y) not endorsing *Altruism* (i.e. from - + to + - incongruence). The concave relationship between *Work Engagement* and *Altruism* incongruence was somewhat less visible in the graph. At first glance, it appeared to be a linear relationship. However, upon closer inspection, it was evident that the two corners along the line of incongruence curve downward, in a concave manner.

Furthermore, the following *Work Engagement* predictions can be made based on the response surface graph: a) *Work Engagement* (Z) can be expected to be highest in a situation where an employee (X) endorses *Altruism* and the organisation (Y) is perceived to endorse *Altruism*; b) the second highest *Work Engagement* (Z) can be

expected to occur in a situation when an employee (X) endorses *Altruism* irrespective of whether the organisation (Y) is perceived as not endorsing *Altruism* or endorsing *Altruism* ; c) *Work Engagement* (Z) can be expected to be lower in a situation where an employee (X) does not endorse *Altruism* and an organisation is perceived to not endorse *Altruism*, as well as in a situation where an employee does not endorse *Altruism* and the organisation (Y) is perceived to endorse *Altruism*.



**Figure 4.12. Response surface graph: Altruism**

Where X represents Employee Endorsement of Altruism, Y represents Perceived Organisational Endorsement of Altruism and Z represents Work Engagement

#### 4.10.3.2 INTERPRETING THE RESPONSE SURFACE TEST VALUES AND GRAPH FOR THE RELATIONSHIPS WITH OTHERS VALUE CONGRUENCE WORK ENGAGEMENT STRUCTURAL MODEL

The calculated response surface test values and their statistical significance are shown in Table 4.89. The positive and statistically significant  $a_1$  ( $p < .05$ ) indicates that *Work Engagement* increases along the line of congruence as congruence moves from low *Employee Endorsement of Relationships with others* and low *Perceived Organisational Endorsement of Relationships with others* to high *Employee Endorsement of Relationships with others* and high *Perceived Organisational Endorsement of Relationships with others*. As a consequence, hypothesis  $H_{023a}: a_1 = 0$  was rejected ( $p < .05$ ). The negative and significant  $a_2$  implies that *Work Engagement* changes concavely along the line of congruence as congruence moves from 00 outwards to low *Employee Endorsement of Relationships with others* and low *Perceived Organisational Endorsement of Relationships with others* and from 00 outward to high *Employee Endorsement of Relationships with others* and high *Perceived Organisational Endorsement of Relationships with others*. Initial theorising however hypothesised a convex curvilinear change in *Work Engagement* as one moves outward from 00. Consequently, hypothesis  $H_{023b}: a_2 = 0$  was not rejected ( $p < .05$ ). Even though the conditional probability of observing the  $a_2$  sample estimate under  $H_{023b}$  was sufficiently small the second part of the bet made under the null hypothesis was that the relationship would be convex curvilinear. Support was therefore not found for the hypothesised convex relationship between *Relationships with others* congruence and *Work Engagement*.

An insignificant  $a_3$  and  $a_4$  were obtained, which implies that no relationship exists between *Work Engagement* and *Relationships with others* incongruence. As a consequence, hypothesis  $H_{024a}: a_3 = 0$  and hypothesis  $H_{024b}: a_4 = 0$  could not be rejected. Support was therefore not found for the hypothesised decrease in *Work Engagement* along the line of incongruence as incongruence moves from low *Employee Endorsement of Relationships with others* and high *Perceived Organisational Endorsement of Relationships with others* to high *Employee Endorsement of Relationships with others* and low *Perceived Organisational Endorsement of Relationships with others*. Neither was support found for the

hypothesised concave relationship between *Relationships with others* incongruence and *Work Engagement*.

**Table 4.89**

**Statistical significance of the calculated response surface test values:  
Relationships with others**

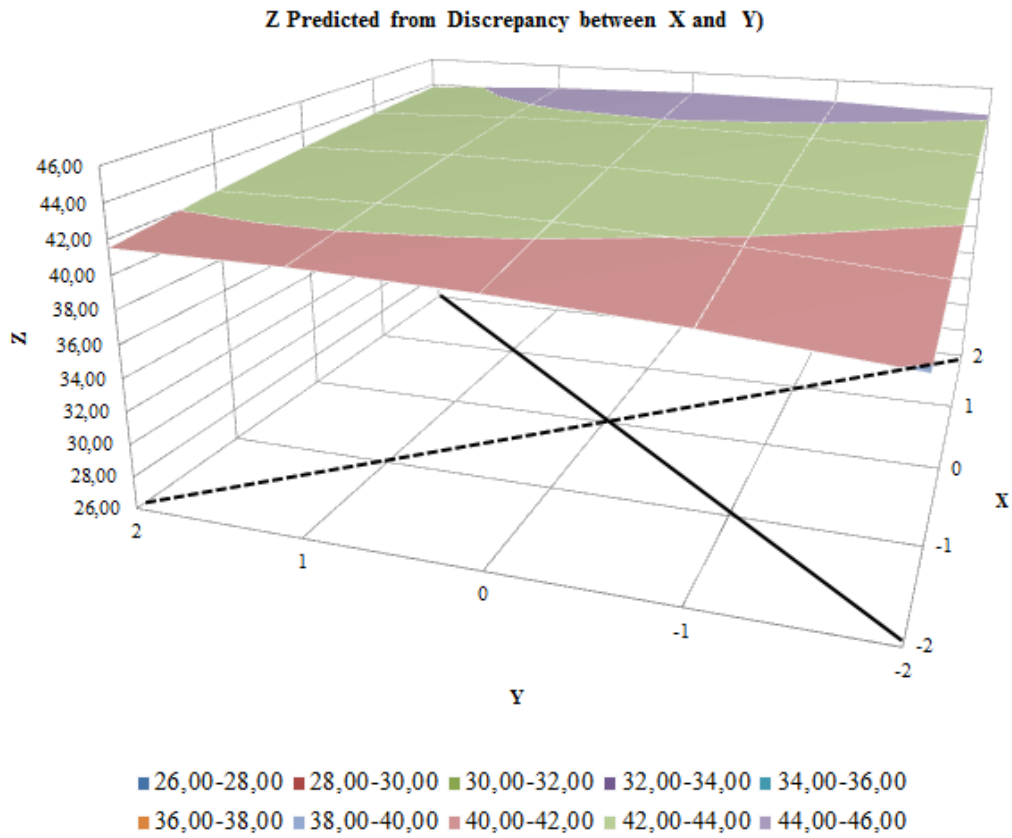
Effect	Coefficient	Standard Error	Test Stat (t)	p-value	
a <sub>1</sub> : Slope along X = Y (as related to Z)	.98	.25	3.834	.000	<b>Sig!</b>
a <sub>2</sub> : Curvature on X = Y (as related to Z)	-.33	.07	-4.424	.000	<b>Sig!</b>
a <sub>3</sub> : Slope along X = -Y (as related to Z)	.65	.50	1.297	.196	
a <sub>4</sub> : Curvature on X = -Y (as related to Z)	-.08	.16	-.527	.599	

Where X represents Employee Endorsement of Relationship with Others, Y represents Perceived Organisational Endorsement of Relationship with Others and Z represents Work Engagement

The response surface graph is depicted in Figure 4.13. Along the line of congruence, it was clear that *Work Engagement* (Z) increased from the employee (X) and organisation (Y) not endorsing *Relationships with others* to the employee (X) and organisation (Y) endorsing *Relationships with others* (i.e. increased from - - to + + congruence). Furthermore, a subtle concave relationship appeared to exist between *Relationships with Others* congruence and *Work Engagement* as indicated by the small negative but statistically significant a<sub>2</sub> estimate shown in Table 4.89. Along the line of incongruence, a flat linear surface was evident, which implied that no relationship existed between *Work Engagement* and *Relationships with others* incongruence. This was supported by the insignificant a<sub>3</sub> and a<sub>4</sub> estimates shown in Table 4.89.

The following *Work Engagement* predictions can be made based on the response surface graph: *Work Engagement* (Z) can be expected to be higher in a situation where an employee (X) endorses *Relationships with others* and the organisation (Y) is perceived to endorse *Relationships with others* than in a situation where an employee (X) does not endorse *Relationships with others* and the organisation (Y) is perceived to also not endorse *Relationships with others*.





**Figure 4.13. Response surface graph: Relationships with others**

Where X represents Employee Endorsement of Relationship with Others, Y represents Perceived Organisational Endorsement of Relationship with Others and Z represents Work Engagement

## CHAPTER 5

### CONCLUSIONS, RECOMMENDATIONS AND PRACTICAL IMPLICATIONS

#### 5.1 INTRODUCTION

The research initiating question in the current study, formulated in Chapter 1, was the question why variance in *Work Engagement* exists amongst different employees working in different organisational contexts. The research objective in this study was to develop and empirically test an explanatory *Work Engagement* structural model that would provide a valid answer to the research initiating question. In the first chapter, a logical argument motivating the importance of research in *Work Engagement* was presented. The importance of *Work Engagement* was motivated both from an organisational as well as a humanistic viewpoint.

A systematic, reasoned argument in response to the research initiating question why variance in *Work Engagement* exists amongst different employees working in different organisational contexts was generated via theorising in the literature study in Chapter 2. The literature study culminated in an answer to the research initiating question in the form of a *Work Engagement* structural model and two narrow-focus structural models (the narrow-focus *Altruism Value Congruence Work Engagement* structural model and the narrow-focus *Relationships with others Value Congruence Work Engagement* structural model), which were then empirically tested. Chapter 3 described and motivated the research methodology used in the current study to test all three structural models. The results of the various statistical analyses performed were reported in Chapter 4.

In this final chapter, the research results as presented in Chapter 4 are summarised and discussed in greater detail, allowing for inferences on whether or not theorising led to a valid explanation of the dynamics underlying *Work Engagement*. Limitations to the study are also highlighted. Furthermore, this chapter aims to make recommendations for future research. Finally, it is essential that research findings do not simply remain in the academic domain, but that they can be put to practice in the

world of work. The need to practically affect the level of *Work Engagement* that the employee experiences formed the backbone of the funnel-like argument in terms of which the research objective was motivated in Chapter 1. Ultimately, the developing and testing of an explanatory structural model should serve the purpose of being able to use such a model to proactively and/or reactively influence the behaviour of working man. It is therefore essential to uncover the practical managerial implications of the current study, allowing for the development of interventions aimed at influencing *Work Engagement* levels.

## **5.2 RESULTS**

The results of the various statistical analyses performed were reported and evaluated in Chapter 4. A summary of the results and brief discussion of the findings is presented in this section.

### **5.2.1 EVALUATION OF THE WORK ENGAGEMENT MEASUREMENT MODEL**

The purpose of testing the overall goodness-of-fit of the measurement model was to determine whether the operationalisation of the latent variables comprising the structural model was successful. The fit of the measurement model was tested with structural equation modelling (SEM) as the analysis technique, via LISREL 8.8 (Du Toit & Du Toit, 2001).

From the goodness-of-fit statistics good close fit was obtained for the measurement model, thereby indicating that the model fitted the data well. The null hypothesis of exact fit was rejected. Subsequently, the null hypothesis of close fit was tested and was not rejected. In addition to the goodness-of-fit statistics, the standardised residuals and modification indices were examined. The small percentage of large residuals and the small percentage of parameters in the lambda-X and theta-delta matrices that, if set free, would improve the fit of the model significantly served as additional evidence indicating good model fit.

All the indicators loaded statistically significantly ( $p < .05$ ) on the latent variables they were intended to reflect. Excluding one indicator variable (RES14\_ES), high lambda-X parameter estimates, low measurement error parameter estimates, and high  $R^2$  values were observed. In sum, the indicator variables provided a reasonably uncontaminated reflection of the latent variables they were tasked to reflect. As a result of successful operationalisation, an unambiguous verdict on the fit of the structural model was possible.

### 5.2.2 EVALUATION OF THE WORK ENGAGEMENT STRUCTURAL MODEL

The proposed comprehensive *Work Engagement* model was fitted to the data and originally the model failed to converge. The path from *Job Characteristics* to *PsyCap* showed the largest PSI problematic value. Consequently, it was decided to delete this path and refit the model.

The goodness-of-fit statistics demonstrated that the comprehensive *Work Engagement* model achieved reasonable close fit. The exact fit null hypothesis ( $H_{01a}$ ) was rejected but the close fit null hypothesis was not rejected ( $H_{01b}$ ). The relatively small percentage (18.62%) of large standardised residuals further confirmed the reasonable good close fit of the model. The percentage of statistically significant modification indices calculated for  $\Gamma$  and  $\Psi$  was not ideal, yet supported the findings that the model fitted reasonably well. The percentage of statistically significant modification indices calculated for  $\mathbf{B}$  was disappointing and did not comment favourably on the fit of the model. In sum, the p-value of close fit indicated that it is a permissible stance to hold that the comprehensive model fits the data closely.

The fit of the comprehensive model was subsequently decomposed into two independent additive non centrality chi-squares estimates for the measurement and the structural models. The RMSEA of the structural model was also calculated from the population discrepancy function values ( $F_0$ ) of the measurement model and the comprehensive model. A significant Satorra-Bentler scaled  $\chi^2$  difference value (295.1870505;  $p = .56258E-41$ ) was obtained for the structural model. The RMSEA value obtained for the structural model (.009461), however, indicated excellent

structural model fit. The conclusion was therefore that the interpretation of the structural model parameter estimates was warranted.

The  $\mathbf{B}$  and  $\mathbf{\Gamma}$  matrices were examined in order to evaluate whether each of the hypothesised theoretical relationships was supported by the data. Inspection of the beta matrix revealed that all path estimates between endogenous latent variables were statistically significant ( $p < .05$ ), thereby implying the rejection of  $H_{02}$ ,  $H_{03}$ ,  $H_{04}$ ,  $H_{07}$ ,  $H_{09}$ , and  $H_{012}$ . Support was therefore found for the hypothesised theoretical influence of *Job Characteristics* on *Meaningfulness*, *Meaningfulness* on *Work Engagement*, *PsyCap* on *Work Engagement*, *PsyCap* on *Job Characteristics*, *Psychological Safety* on *Work Engagement*, and *Employee Endorsement of Self-Transcendence* on *Work Engagement*.

The gamma matrix revealed that five path estimates between exogenous and endogenous latent variables were statistically significant and four path estimates were insignificant. This implied that  $H_{08}$ ,  $H_{010}$ ,  $H_{011}$ ,  $H_{016}$ , and  $H_{025}$  were rejected, whereas  $H_{05}$ ,  $H_{013}$ ,  $H_{014}$ , and  $H_{015}$  could not be rejected. Support was therefore found for the hypothesised theoretical influence of *Transformational Leadership* on *Psychological Safety*, *Transformational Leadership* on *PsyCap*, *Transformational Leadership* on *Job Characteristics*, *Squared Perceived Organisational Endorsement of Self-Transcendence* on *Work Engagement*, and *Transformational Leadership* on *Employee Endorsement of Self-Transcendence*.

Support was not found for the hypothesised theoretical influence of *PsyCap\*Job Characteristics* on *Meaningfulness*, *Perceived Organisational Endorsement of Self-Transcendence* on *Work Engagement*, *Squared Employee Endorsement of Self-Transcendence* on *Work Engagement*, and *Employee Endorsement of Self-Transcendence\* Perceived Organisational Endorsement of Self-Transcendence*.

The fact that the hypothesised positive influence of *PsyCap\*Job Characteristics* on *Meaningfulness* (hypothesis 5) was not supported by the data was a rather disappointing finding. A systematic, logical theoretical argument was presented in Chapter 2 in support of the moderating effect of *PsyCap*. Firstly it was argued that a job high on *Job Characteristics* offers potential benefits like experiencing *Meaningfulness*. The positive influence of *Job Characteristics* on *Meaningfulness* (hypothesis 2) was supported by the data findings (i.e. the path was found to be

statistically significant). In addition, it was argued that employees are more likely to experience this *Meaningfulness* if they psychologically embrace/accept the offer made by the characteristics of the job (e.g. the offer to have greater *Autonomy* or the offer to use a greater variety of skills). Furthermore, it was reasoned that employees will embrace the offer of increased *Job Characteristics* on the job if they perceive that they possess the personal resources that will allow them to effectively use the *Job Characteristics* to respond to the demands of the job and harvest the growth opportunities offered by the *Job Characteristics*. In other words, employees are more likely to embrace the *Job Characteristics* if they perceive that they have high levels of *PsyCap*. Embracing the *Job Characteristics* offered by the job will in turn result in higher levels of *Meaningfulness*. In sum, the claim that *PsyCap* has a moderating effect on the influence of *Job Characteristics* on *Meaningfulness* appears to be a sound theoretical stance, despite the data suggesting otherwise.

In addition to the hypothesised positive influence of *PsyCap\*Job Characteristics* on *Meaningfulness*, support was also not found for the influence of *Perceived Organisational Endorsement of Self-Transcendence* on *Work Engagement*, *Squared Employee Endorsement of Self-Transcendence* on *Work Engagement*, and *Employee Endorsement of Self-Transcendence\*Perceived Organisational Endorsement of Self-Transcendence* on *Work Engagement*. These three latent variables that were hypothesised to influence *Work Engagement* represent three of the five terms in the polynomial regression equation, depicted in equation 1 in section 2.3.2.4. As mentioned in Chapter 2, each of the five terms in the polynomial regression equation represents a separate latent variable in the proposed *Work Engagement* structural model. In other words, the level of *Work Engagement* is a function of these five latent effects. Consequently, five separate path-specific substantive hypotheses were formulated.

In essence, these five terms were added to the model in an attempt to derive the response surface test values so as to test hypotheses on the response surface of the manner combinations of *Employee Endorsement of Self-Transcendence* and *Perceived Organisational Endorsement of Self-Transcendence* affect *Work Engagement*. The emphasis therefore falls on testing the response surface hypotheses. The idea was not to interpret the influence of each of these five latent variables on *Work Engagement*. However, it is in a sense worrying that three of

these paths were found to be insignificant, as this suggests a less complex response surface than was hypothesised. Yet, the ultimate test is in the significance of the response surface test values.

However, the fact that the influence of *Employee Endorsement of Self-Transcendence* on *Work Engagement* was found to be significant should not be overlooked. The current study only hypothesised about the influence of *Value Congruence* on *Work Engagement*. The *Employee Endorsement of Self-Transcendence* latent variable was incorporated in the *Work Engagement* structural model in order to gain a greater understanding of the manner in which *Self-Transcendence* congruence influences *Work Engagement*. The possible influence of individual values, as opposed to *Value Congruence*, was not investigated in the current study. The rejection of  $H_{012}$  seems to suggest that an employee who endorses the *Self-Transcendence* value type, irrespective of whether or not the organisation endorses the *Self-Transcendence* value type, is likely to experience higher levels of *Work Engagement*. This is a noteworthy point for future studies, which will again be raised when discussing possible recommendations for future research.

The squared multiple correlations ( $R^2$ ) for the endogenous latent variables in the *Work Engagement* structural model indicated that the model was able to explain 51% of the variance in *Work Engagement* but that the model was unable to explain more than 50% of the variance in any of the remaining five endogenous latent variables in the model. The model is therefore reasonably successful in explaining variance in *Work Engagement*. This is gratifying since *Work Engagement* was the focal endogenous latent variable in the study. However, in order to gain a better understanding of the complex dynamics underlying *Work Engagement*, attempts should be made to better understand the nomological network of latent variables that account for variance in *Work Engagement*. This suggests the need to further elaborate the *Work Engagement* structural model in future studies. Recommendations for future research will be discussed in section 5.4.

An important point to stress is that the path-specific substantive hypotheses developed throughout Chapter 2 and that were collated into the *Work Engagement* structural model that was empirically tested in this study all contain a silent condition

that is implied by the combining of the path-specific hypotheses in a single integrated model. All the hypotheses implicitly claim that the specific exogenous latent variable ( $\xi_j$ ) or endogenous latent variable ( $\eta_j$ ) is hypothesised to influence the level of the target endogenous latent variable ( $\eta_i$ ) when the variance in the other exogenous and endogenous latent variable linked to  $\eta_i$  is controlled. The  $\gamma_{ij}$  and  $\beta_{ij}$  estimates are partial regression coefficients. This condition needs to be kept in mind when comparing findings on specific structural linkages across studies. The same structural path embedded in a different structural model represents two different hypotheses.

### 5.2.3 EVALUATION OF THE RESPONSE SURFACE ANALYSES

Structural equation modelling with response surface analysis was performed in order to gain a greater understanding of the manner which congruence and incongruence in employee and perceived organisational endorsement of the *Self-Transcendence* value affects *Work Engagement* when included in the *Work Engagement* structural model. The latter *proviso* warrants to be emphasised. The current analysis attempted to describe the response of *Work Engagement* to different degrees of *Self-Transcendence* value congruence and incongruence when controlling for the effect of *Meaningfulness*, *Psychological Capital* and *Psychological Safety*. The response surface test values were examined in order to evaluate whether the hypotheses formulated on the slope and the curvature of the *Work Engagement* response surface along the lines of congruence and incongruence were supported. Inspection of the results revealed that an insignificant  $a_1$  and  $a_2$  were obtained, thereby implying that  $H_{017a}$  and  $H_{017b}$  could not be rejected. No significant relationship was found to exist between *Work Engagement* and *Self-Transcendence* congruence. A positive and statistically significant  $a_3$  was obtained, thereby implying that  $H_{018a}$  could not be rejected. Support was not found for the hypothesised negative relationship between *Work Engagement* and movement along the line of incongruence from - + to + -. Furthermore, an insignificant  $a_4$  was obtained. Consequently,  $H_{018b}$  could not be rejected. Support was not found for the hypothesised concave relationship between *Work Engagement* and *Self-Transcendence* incongruence.



In addition to structural equation modelling with response surface analysis, observed score polynomial regression with response surface analyses was performed in order to gain a greater understanding of the manner in which congruence and incongruence in each of the two first-order values (*Altruism* and *Relationships with others*) loading on the higher-order *Self-Transcendence* value type affect *Work Engagement*.

Inspection of the response surface test values calculated for the *Altruism Value Congruence Work Engagement* structural model revealed a positive and statistically significant  $a_1$ , thereby implying that  $H_{020a}$  could be rejected. An insignificant  $a_2$  was obtained, thereby implying that  $H_{020b}$  could not be rejected. Thus, support was found for the hypothesised increase in *Work Engagement* along the line of congruence as congruence moves from low *Employee Endorsement of Altruism* and low *Perceived Organisational Endorsement of Altruism* to high *Employee Endorsement of Altruism* and high *Perceived Organisational Endorsement of Altruism*, but support was not found for the hypothesised convex relationship between *Altruism* congruence and *Work Engagement*. Furthermore, a positive and significant  $a_3$  was obtained, thereby implying that  $H_{021a}$  could not be rejected. Support was not found for the hypothesised decreases in *Work Engagement* along the line of incongruence as incongruence moves from - + to + -. Finally, the results revealed a negative and statistically significant  $a_4$ , thereby implying that  $H_{021b}$  could be rejected. Support was found for the hypothesised concave relationship between *Work Engagement* and *Altruism* incongruence.

Inspection of the response surface test values calculated for the *Relationships with others Value Congruence Work Engagement* structural model revealed a positive and statistically significant  $a_1$  and a negative and statistically significant  $a_2$ , thereby implying that  $H_{023}$  could be rejected and  $H_{023b}$  could not be rejected. Support was found for the hypothesised increase in *Work Engagement* along the line of congruence as congruence moves from low *Employee Endorsement of Relationships with others* and low *Perceived Organisational Endorsement of Relationships with others* to high *Employee Endorsement of Relationships with others* and high *Perceived Organisational Endorsement of Relationships with others*. Lack of support was found for the hypothesised convex relationship between *Work Engagement* and *Relationships with others* incongruence. Furthermore, an

insignificant  $a_3$  and  $a_4$  were obtained, implying that  $H_{024a}$  and  $H_{024b}$  could not be rejected. Support was not found for the hypothesised decrease in *Work Engagement* along the line of incongruence as incongruence moves from - + to + -. Neither was support found for the hypothesised concave relationship between *Work Engagement* and *Relationships with others* incongruence.

### 5.3 LIMITATIONS TO THE STUDY

Research methodology limitations or shortcomings were mentioned throughout the research dissertation. However, the most important limitations will be discussed again in this section.

Firstly, it should be highlighted that good model fit in SEM does not imply causality. Even though the structural model being evaluated hypothesised specific causal linkages between the latent variables comprising the structural model, good model fit and significant path coefficients constitute insufficient evidence to deduce that these causal linkages have been confirmed. In the final analysis this is not the result of limitations in the analysis technique implemented, but is rather due to the *ex post facto* nature of the study that precludes the experimental manipulation of the relevant latent variables (Kerlinger & Lee, 2000).

Secondly, the proposed *Work Engagement* structural model, the narrow-focus *Altruism Value Congruence Work Engagement* structural model and the narrow-focus *Relationships with others Value Congruence Work Engagement* structural model were developed to explain variance in *Work Engagement* in permanent South African employees. The *Work Engagement* structural model and the two narrow-focussed models were, however, tested on a non-probability, convenience sample of teachers working in public sector schools falling under the jurisdiction of the Western Cape Education Department (WCED). Due to this sampling procedure it cannot be claimed that the sample was representative of the population of South African teachers. Due to the non-probability sampling procedure taken in conjunction with the nature of the sampling population (teachers registered with the WCED) the sample can also not be considered representative of the target population of permanent South African employees. The results of the current study should

therefore be generalised to the sampling population with great circumspection. Replication of this study in the sampling population is therefore encouraged. This warning applies with even greater gravity to generalising the findings to the target population,

The current study attempted to gain a greater understanding of why variance in *Work Engagement* exists amongst different employees working in different organisational contexts. It was assumed that the psychological mechanism that operates to determine the level of *Work Engagement* experienced by individual employees is essentially the same across all organisational contexts. In other words, the psychological mechanism that operates to determine the level of *Work Engagement* experienced by teachers in the Western Cape is the same psychological mechanism that operates to determine the level of *Work Engagement* amongst all employees in South Africa, irrespective of their particular organisational context. It is thereby, however, not implied that the levels of the latent variables comprising the psychological mechanism are the same across organisational contexts. The possibility that specific contextual factors unique to teaching positions might also act as moderators can, however, not be totally ruled out. Consequently, the results of the current study should be generalised to the target population with great circumspection. In addition to encouraging replication of this study in the sampling population, it is recommended that this study should be replicated in other organisational contexts.

Finally, the sample size represents another major shortcoming in the current study. The sample size meets the bare minimum requirement that the freed model parameters that have to be estimated (160) does not exceed the number of observations in the sample ( $n=227$ ). The sample size also ensured that the statistical power of the testing of the hypothesis of close fit had sufficiently high power (.80). However, the sample size fell substantially short of the Bentler and Chou (as cited in Kelloway, 1998) guidelines on the ratio of sample size to number of parameters estimated. The sample size ( $n=227$ ) in the current study is therefore not ideal. As a consequence, the study runs the risk of not accurately reflecting the population the sample was drawn from.

## 5.4 RECOMMENDATIONS FOR FUTURE RESEARCH

In Chapter 2, attempts were made to accurately understand the complexity of the nomological network of latent variables underlying *Work Engagement*, in order to gain a greater understanding of the nature of the psychological mechanism that produces variance in *Work Engagement* across employees and work contexts. Although the focus was on accurately understanding the complexity of the nomological network of latent variables underlying *Work Engagement*, it was acknowledged that it is virtually impossible for any one researcher to do so without an immense and seemingly impossible investment in terms of time and energy. Instead, developing a comprehensive *Work Engagement* model that closely approximates reality requires a collaborated effort from various researchers who build upon each other's research findings. This section aims to make recommendations for future research based on: a) data findings in the current study, and b) the literature review process.

### 5.4.1 DATA DRIVEN RECOMMENDATIONS

Structural model modification has in the past often been performed and reported on in a manner that can be interpreted to suggest that exploring ways of improving the fit of the model forms an integral part of the statistical analysis aimed at testing the proposed model (e.g. van Heerden & Theron, 2014). A data-driven exploration of possible ways of refining the structural model is thereby not questioned or criticised. Rather a concern is expressed that insufficient effort is made to clearly separate the empirical testing of the overarching and path-specific substantive hypotheses that have been developed through theorising in response to the research initiating question from subsequent attempts to modify the original comprehensive hypothesis based on findings derived from the study.

The data findings suggest two possible ways of modifying the *Work Engagement* structural model. Essentially two questions need to be asked when considering possible structural model modifications for future studies: 1) should the insignificant

paths in the current *Work Engagement* model be removed, and 2) should additional paths be added to the proposed *Work Engagement* structural model.

The question of whether an insignificant path should be removed depends on the strength/persuasiveness of the theoretical argument that led to the path. The results indicated that four path coefficient estimates in the *Work Engagement* structural model were statistically insignificant ( $p > .05$ ). These insignificant paths were discussed in greater detail in section 5.2.2. Firstly, it was argued that there exists a strong theoretical rationale for the inclusion of the *PsyCap\*Job Characteristics* latent interaction effect in the model, despite the data suggesting otherwise. The theoretical argument presented in support of the influence of *PsyCap* as a moderator in the relationship between *Job Characteristics* and *Meaningfulness* still holds merit. It would therefore be somewhat premature to remove this path from the *Work Engagement* structural model. Instead, it is recommended that the significance of this path should be tested again in a follow-up study.

Secondly, in terms of the insignificant paths between *Perceived Organisational Endorsement of Self-Transcendence* and *Work Engagement*, *Squared Employee Endorsement of Self-Transcendence* and *Work Engagement*, and *Employee Endorsement of Self-Transcendence\*Perceived Organisational Endorsement of Self-Transcendence* and *Work Engagement*, it was argued that these paths were added in the *Work Engagement* structural model as necessary components of the polynomial model that allowed for the possibility of describing a non-linear response surface. The insignificant path estimates suggest that the response surface is less complex than was originally hypothesised. However, the ultimate test is in the significance of the response surface test values. The decision of whether to delete these paths therefore depends on the findings of the response surface analysis.

The results of the response surface analyses were summarised and discussed in greater detail in section 5.2.3. The findings of the influence of *Self-Transcendence* congruence/incongruence, *Altruism* congruence/incongruence and *Relationships with others* congruence/incongruence on *Work Engagement* were mixed. It should however be highlighted again that the descriptive analyses performed at the outset of the (observed score) polynomial regression analyses to fathom the extent to which the sample of observations adequately covered the two-dimensional congruence

space to allow the derivation of a credible response surface revealed that some areas of the two-dimensional congruence space lacked observations. The response surface in these areas therefore did not describe empirically observed trends but rather represented an extrapolation of trends observed elsewhere in the space. The question specifically arises whether the presence of more extreme cases of - - congruence would not have resulted in a more aggressively negatively sloped and concave response surface along the line of congruence? It therefore seems to be somewhat premature to discard the theoretical argument presented in Chapter 2 that lead to the formulation of hypotheses on the nature of the relationship between *Value Congruence* (i.e. *Self-Transcendence Congruence*, *Altruism Congruence* and *Relationships with others Congruence*) and *Work Engagement*. Instead, it is recommended that the various response surface hypotheses (i.e.  $H_{017}$ ,  $H_{018}$ ,  $H_{020}$ ,  $H_{021}$ ,  $H_{023}$  and  $H_{024}$ ) should be tested again in a follow-up study.

In Chapter 4, inspection of the structural model modification indices served the purpose of commenting on structural model fit. However, the modification indices calculated for the beta and gamma matrices also serve the purpose of indicating possible ways of modifying the *Work Engagement* structural model. More specifically, the modification indices calculated for  $\Gamma$  and  $\mathbf{B}$  indicate paths in the model that, if set free, would significantly ( $p < .05$ ) improve the fit of the model. The adding of particular paths should however only be considered if the proposed structural changes make substantive theoretical sense. Furthermore, it should be noted that the possibility of additional paths between any of the five latent variables that represent the five polynomial terms in the polynomial model and any other latent variables in the model was ignored in the current study. These paths were added in the *Work Engagement* structural model as necessary components of the polynomial model that allowed for the possibility of a non-linear response surface.<sup>38</sup>

The modification indices calculated for the gamma and beta matrices, depicted in Table 4.72 and 4.73, demonstrated that the path from *PsyCap* to *Meaningfulness*, if set free, would result in the largest significant improvement in model fit. It does not seem to make theoretical sense that an employee is likely to experience the job as

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<sup>38</sup> If future studies investigate the influence of individual values or of organisational values on *Work Engagement*, then it is recommended that future research theorise about the manner these latent variables are interconnected to the other latent variables in the current *Work Engagement* model. However, the focus in the current study remains on the influence of *Value Congruence* on *Work Engagement*.

valuable and worthwhile (i.e. to experience *Meaningfulness*) as a result of high levels of personal resources (i.e. *PsyCap*). The second highest modification index that exceeded the critical chi-square value of 6.64 was observed for the path from *Work Engagement* to *PsyCap*. Llorens et al. (2007) proposed that a positive gain spiral exists between *Work Engagement* and personal resources. Bakker (2011) explained that employees who are engaged and perform well on the job are able to create their own personal resources, which in turn fosters even higher levels of *Work Engagement*. It was consequently, based on the spiral hypothesis, decided to refit the model after adding the path from *Work Engagement* to *PsyCap*. Unfortunately, LISREL issued the following warning message: “W\_A\_R\_N\_I\_N\_G: *Serious problems were encountered during minimization. Unable to continue iterations. Check your model and data.*” A shortcoming of LISREL is that it is often unable to fit models with reciprocal paths. The feedback from *Work Engagement* to *PsyCap* therefore seems to be more indirect. It is recommended that future studies consider the inclusion of a *Performance* latent variable, such as *In-role Performance*, as an outcome of *Work Engagement*. Higher levels of *Performance* are likely to result in enhanced levels of *PsyCap*. In sum, it is recommended that future research studies should theorise about the mediating role that *Performance* is likely to play in the relationship between *Work Engagement* and *PsyCap*.

The next highest modification index that exceeded the critical chi-square value of 6.64 and that made substantive theoretical sense was for the path from *Transformational Leadership* to *Meaningfulness*. Transformational leaders are capable of having a profound effect on their followers (Robbins & Judge, 2010). They provide a vision for the future and a collective sense of purpose, challenge followers to think for themselves and help followers to continuously achieve their full potential and develop (Shuck & Herd, 2012). It seems logical to argue that these behaviours that characterise transformational leaders are likely to result in followers experiencing the job as valuable, worthwhile and personally meaningful. Structural Equation Modelling (SEM) was performed on the model after adding the additional path from *Transformational Leadership* to *Meaningfulness*. The results obtained for the modified model were compared to the original proposed *Work Engagement* structural model results. It was observed that the chi-square decreased marginally from 1606.537 to 1606.025 and the RMSEA value remained the same. The p-value

for the test of close fit (.729) demonstrated that the hypothesis of close model fit could not be rejected ( $p > .05$ ). The gamma matrix indicated that the path from *Transformational Leadership* to *Meaningfulness* was statistically significant ( $p < .05$ ). All paths that were significant in the original model remained significant in the modified model. In addition, the modified model explained 52.7% of variance in *Work Engagement*, whereas the original model explained 51%. In conclusion, the data seems to suggest that future studies should include the path from *Transformational Leadership* to *Meaningfulness* in the *Work Engagement* structural model. The modification indices in the modified model were subsequently evaluated. However, none of the modification indices that exceeded the critical chi-square value seemed to make substantive theoretical sense. No further additional paths were therefore considered.

In addition to the suggestions on possible additional structural linkages between existing latent variables derived from the modifications calculated for  $\Gamma$  and  $\mathbf{B}$ , the significant path from *Employee Endorsement of Self-Transcendence* to *Work Engagement* suggests that future studies should consider the possible influence of individual values on *Work Engagement*. The current study only hypothesised about the influence of *Value Congruence* on *Work Engagement*. It is recommended that future research should investigate the possible influence of the degree to which an employee endorses a particular higher-order value types (i.e. *Self-Transcendence*, *Self-Enhancement*, *Openness to Change*, and *Conservation*) on *Work Engagement*, irrespective of the degree of congruence that exists between an employee endorsing a particular value type and an organisation endorsing the same value type.

Thus far, attempts were made to explore possible ways of modifying the *Work Engagement* structural model by removing paths from the model and/or adding paths between existing latent variables in the model based on an investigation of insignificant path findings and modification indices. The findings on the multiple correlation calculated for the endogenous latent variables suggest that an adequate explanation of *Work Engagement* cannot be reached without infusing additional latent variables into the model. The squared multiple correlations ( $R^2$ ) for the endogenous latent variables in the *Work Engagement* structural model indicated that the model was able to explain 51% of the variance in *Work Engagement* but was unable to explain more than 50% of the variance in *Job Characteristics*, *PsyCap*,



*Employee Endorsement of Self-Transcendence, Meaningfulness and Psychological Safety*. Future research should attempt to uncover the additional factors that influence *Job Characteristics, PsyCap, Employee Endorsement of Self-Transcendence, Meaningfulness and Psychological Safety* that are currently still classified under structural error variance. A greater understanding of the factors underlying these endogenous latent variables in the *Work Engagement* structural model should result in a greater understanding as to how to influence levels of these variables in organisations, which should in turn contribute to the overall goal of controlling *Work Engagement* in the workplace. These additional latent variables should earn their place in an elaborated *Work Engagement* structural model through the persuasiveness of the theoretical argument presented to justify their inclusion.

#### 5.4.2 THEORY DRIVEN RECOMMENDATIONS

Due to practical considerations the current study only investigated the influence of *Self-Transcendence* congruence, *Altruism* congruence, and *Relationships with Others* congruence on *Work Engagement*. It is suggested that future research investigates the influence of congruence in the other three higher-order values, namely *Self-Enhancement, Openness to Change, and Conservation*, on *Work Engagement* (Cable & Edwards, 2004). In addition, polynomial regression with response surface analysis should be performed for the lower-order values loading on these three higher-order values. This will provide valuable additional insights in order to better understand the manner which *Value Congruence* influences *Work Engagement*. A methodological challenge that seems to face the use of polynomial regression as a tool to examine the effect of value congruence on response variables like *Work Engagement* is to find fruitful ways of accommodating multiple pairs of predictor variables ( $X_{1i}, X_{2i}$ ) in the analysis. In the current analysis, and all the other cases in which polynomial regression was used to study the effect of congruence on a response variable, only a single pair of predictor variables ( $X_1, X_2$ ) was used.

Secondly, the literature review process revealed that co-worker relations may have an important role to play in the dynamics underlying *Work Engagement* (Bakker &

Demerouti, 2008; Kahn, 1990; May, Gilson & Harter, 2004). It seems logical to argue that supportive relationships with co-workers is likely to influence the degree to which an employee experiences *Meaningfulness* at work, as well as the degree to which an employee experiences *Psychological Safety*, which in turn influence *Work Engagement*. Future research studies should theorise about the manner which *Co-worker Support* is interconnected to the various latent variables in the proposed *Work Engagement* structural model. It seems especially fitting that research on *Work Engagement* in Africa should formally pursue the very convincing argument put forward under the concept of *Ubuntu* that individuals find meaning through others.

Future research should focus on gaining a greater understanding of the manner which the three psychological conditions of experience (i.e. *Meaningfulness*, *Psychological Safety*, and *Psychological Availability*) proposed by Kahn (1990) influence *Work Engagement*. No attention has been paid to the role that *Psychological Availability* is likely to play in the psychological mechanism underlying *Work Engagement*. *Meaningfulness* and *Psychological Safety* have been included as variables that influence *Work Engagement* in the current *Work Engagement* structural model. However, future research should investigate possible additional paths between these latent variables and of the other latent variables in the proposed *Work Engagement* structural model.

Finally, there does not appear to be a measure in existing literature that fully captures the connotative meaning of the *Psychological Safety* construct, which points to the need for the development and validation of a *Psychological Safety* measure.

## **5.5 PRACTICAL MANAGERIAL IMPLICATIONS**

The research objective in the current study was to develop and empirically test an explanatory *Work Engagement* structural model that would provide a valid answer to the research initiating question. In the first chapter, a logical argument was presented in order to attempt to motivate the importance of pursuing the research objective. Given the importance of *Work Engagement* in the world of work, it is therefore essential that research findings can be put to practice. Developing and

testing an explanatory *Work Engagement* structural model would bear no use if the attempts to understand *Work Engagement* do not shed light on the ways in which *Work Engagement* can be controlled in the workplace. This demonstrates the importance of deriving practical managerial solutions on how to influence *Work Engagement*, based on the findings obtained in the current study.

The data findings suggest that in order to influence *Work Engagement*, attempts should be made to a) increase the degree of *Autonomy, Feedback, Skill Variety, Task Identity* and *Task Significance* present in jobs within an organisation, b) enhance the degree to which employees experience their work as meaningful, c) improve employees' levels of *Psychological Capital*, d) ensure that superiors act as transformational leaders, and e) enhance the degree to which employees experience a sense of *Psychological Safety* at work. The findings on the influence of *Value Congruence* (i.e. *Self-Transcendence Congruence, Altruism Congruence and Relationships with others Congruence*) were mixed. As a result, the current section will not explore ways of improving the level of congruence between an employee's endorsement of a particular value and an organisation's endorsement of the same value.

The problem is that although the findings from the current study have pointed to the above mentioned ways in which *Work Engagement* can be influenced, the current structural model offers no practical solutions with regards to how the above mentioned factors can be implemented or brought about within an organisation. This demonstrates that within the model a lack of understanding of the complexities underlying *Work Engagement* still exists and therefore points to the need for future research to elaborate the model. This line of reasoning does, however, not necessarily imply that no meaningful managerial recommendations can be derived from the current model. If that was the case the introductory argument should have prevented the empirical testing of the model as premature. Specific suggestions can be derived from available scientific literature on these latent variables on how to promote *Work Engagement*.

It is suggested that organisations should redesign jobs in order increase the degree of *Autonomy, Feedback, Skill Variety, Task Identity* and *Task Significance* present in jobs within an organisation. Increasing the *Job Characteristics* of a job is likely to

enhance the degree to which employees experience their work as meaningful. Enhancing the degree of *Meaningfulness* is likely to result in higher levels of *Work Engagement*. Hackman and Oldham (1980) suggest that in order to increase *Job Characteristics*, jobs should be enriched. Job enrichment, a method of redesigning jobs, consists of five action steps: 1) combining tasks, 2) forming natural work units, 3) establishing client relationships, 4) expanding job vertically, and 5) opening feedback channels (Hackman, Oldham, Janson & Purdy, 1975). Before implementing the abovementioned steps, managers should diagnose jobs in order to determine the degree to which each of the five core dimensions are present in a particular job. The Job Diagnostic Survey (JDS; Hackman & Oldham, 1975) is the most popular tool used to diagnose a job (Cummings & Worley, 2009). Once a job has been diagnosed, one or more of the five job enrichment actions can be performed, depending on which job dimensions are low. Tasks should be combined if the aim is to increase the degree of *Skill Variety* and/or *Task Identity* present in a job. Forming natural work units is a useful action for increasing *Task Identity* and *Task Significance*. Establishing client relationships is likely to increase the degree of *Skill Variety*, *Autonomy*, and *Feedback*. A job can be expanded vertically if the aim is to increase the degree of *Autonomy*. Opening feedback channels is useful for increasing the degree of *Feedback* present in a particular job.

Job crafting can be used in addition to job redesign approaches to increase the levels of the core job dimensions present in a job. Job crafting refers to the process whereby employees alter their tasks or *Job Characteristics* on their own initiative (Tims, Bakker & Derks, 2012). Organisations can therefore not instruct employees how to craft their jobs, as this would defeat the purpose of job crafting - an employee initiative. However, organisations can create the conditions that facilitate job crafting behaviour (Demerouti, 2014). Van den Heuvel, Demerouti and Peeters (as cited in Demerouti, 2014) developed an intervention aimed at increasing the awareness of employees regarding the ways in which they can adapt their jobs to their own needs. Demerouti (2014, p. 8) states that “job crafting interventions can be effectively used to encourage employees to proactively modify their own work environment in order to stay engaged.” This line of reasoning in turn suggests that serious consideration should be given to including *Job Crafting* as a latent variable in the elaborated *Work*

*Engagement* structural model. *Psychological Safety* most likely also will serve as a prerequisite for *Job Crafting*.

*PsyCap* is seen as a malleable, statelike construct that can be developed. (Luthans et al., 2007a; Luthans, Avey, Avolio & Peterson, 2010). Luthans et al. (2006) designed a short training intervention known as the Psychological Capital Intervention (PCI). The PCI is a 2-3 hour training intervention that consists of a series of exercises and group discussions designed to impact participants' levels of *Self-Efficacy*, *Hope*, *Optimism*, and *Resiliency*. For example, in order to develop *Hope* the participants practice setting work-related goals that are challenging and personally valuable, as well as generating pathways to their goals and identifying obstacles for which to plan. Once participants have completed this exercise individually, they receive suggestions from the group about additional pathways to goals and obstacles to expect. Empirical evidence suggests that short training interventions such as the PCI have successfully been used to increase employees' *PsyCap* levels (Luthans et al., 2010).

Finally, organisations should ensure that superiors act as transformational leaders. According to the data findings in the current study, building *Transformational Leadership* enhances the degree to which employees experience a sense of *Psychological Safety* at work, which in turn results in higher *Work Engagement* levels. Bass (1990) suggests two methods for building *Transformational Leadership*, namely counselling and training/workshops. Prior to the counselling sessions, the leader as well as his/her subordinates rates the leader's transformational leadership style. During counselling, the counsellor highlights the discrepancies between subordinate and self-ratings of leadership behaviours. Based on these ratings, the counselling facilitates the leader to develop specific action plans for increasing transformational leadership behaviour. In sum, the counselling sessions comprise two key components, namely feedback and individual goal setting. In the second method (i.e. training), leaders participate in a transformational leadership workshop. The workshops should focus on transformational leadership theory, on identifying behaviours characteristic of transformational leaders and should also involve the development of specific action plans for implementing transformational leadership behaviours.

Barling, Weber and Kelloway (1996) conducted a field experiment on the effectiveness of a transformational leadership intervention comprising a one-day workshop and four individual counselling sessions. Findings suggested that subordinates perceptions of their leader's transformational leadership behaviours were significantly enhanced after the intervention. Kelloway, Barling and Helleur (2000) conducted similar research on the effect of leadership training and personal feedback as means of developing *Transformational Leadership*. The findings suggested that the combination of feedback and training was not associated with higher ratings of transformational leadership than either intervention alone, which may suggest that organisations can implement either approach on its own as an effective intervention for building *Transformational Leadership*.

In sum, given the importance of *Work Engagement* in the world of work, organisations should strongly consider implementing a *Work Engagement* intervention based on the guidelines discussed in this section. In other words, the *Work Engagement* intervention could include the following components: a) job diagnosis and job enrichment, b) an informative workshop that encourages job crafting, c) a short training intervention to enhance *PsyCap* levels, d) leadership training, and/or e) providing personal feedback to leaders during counselling sessions.

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## **APPENDIX 1**

### **WESTERN CAPE EDUCATION DEPARTMENT RESEARCH APPROVAL LETTER**



Directorate: Research

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**REFERENCE:** 20140613-31349

**ENQUIRIES:** Dr A T Wyngaard

Ms Megan van Deventer  
21 Ludwig Muhi Street  
Somerset West  
7130

**Dear Ms Megan van Deventer**

**RESEARCH PROPOSAL: THE DEVELOPMENT AND EMPIRICAL EVALUATION OF A WORK ENGAGEMENT STRUCTURAL MODEL**

Your application to conduct the above-mentioned research in schools in the Western Cape has been approved subject to the following conditions:

1. Principals, educators and learners are under no obligation to assist you in your investigation.
2. Principals, educators, learners and schools should not be identifiable in any way from the results of the investigation.
3. You make all the arrangements concerning your investigation.
4. Educators' programmes are not to be interrupted.
5. The Study is to be conducted from **21 July 2014 till 30 September 2014**
6. No research can be conducted during the fourth term as schools are preparing and finalizing syllabi for examinations (October to December).
7. Should you wish to extend the period of your survey, please contact Dr A.T Wyngaard at the contact numbers above quoting the reference number?
8. A photocopy of this letter is submitted to the principal where the intended research is to be conducted.
9. Your research will be limited to the list of schools as forwarded to the Western Cape Education Department.
10. A brief summary of the content, findings and recommendations is provided to the Director: Research Services.
11. The Department receives a copy of the completed report/dissertation/thesis addressed to:

**The Director: Research Services  
Western Cape Education Department  
Private Bag X9114  
CAPE TOWN  
8000**

We wish you success in your research.

Kind regards.

Signed: Dr Audrey T Wyngaard

**Directorate: Research**

**DATE: 13 June 2014**

## **APPENDIX 2**

### **EXAMPLE OF PERMISSION TEMPLATE ADRESSED TO PARTICIPATING SCHOOLS**





UNIVERSITEIT • STELLENBOSCH • UNIVERSITY  
jou kennisvenoot • your knowledge partner

TO WHOM IT MAY CONCERN

Letter of permission for research project

I am currently enrolled for my Master's thesis in Industrial Psychology at the University of Stellenbosch under the supervision of Prof. C.C. Theron ([ccth@sun.ac.za](mailto:ccth@sun.ac.za)).

The topic of my research study is "The Development and Empirical Evaluation of an Explanatory Work Engagement Structural Model." The current study raises the research initiating question why variance in Work Engagement exists amongst different employees working in different organisational contexts. The research objective of this study is to develop and empirically test an explanatory Work Engagement structural model that will provide a valid answer to this question.

I hereby request permission to conduct my research within (*school's name inserted*). The information I need will be gathered through an electronic questionnaire completed by the teachers at (*school's name inserted*). Participation is voluntary. Every teacher has the right to accept/reject the invitation to participate in the electronic questionnaire via an informed consent form attached at the start of the questionnaire.

This letter also serves to inform you that all information will solely be utilised for research purposes and the anonymity of all will be guaranteed.

I trust that you will kindly grant me the consent to conduct the envisaged research project.

Thanking you in anticipation

Yours

Megan van Deventer

Date: 12 June 2014

I \_\_\_\_\_, the principal/headmaster of \_\_\_\_\_ (*insert school's name*) give permission for Megan van Deventer to conduct her research at (*insert school's name*).

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

## APPENDIX 3

### WORK ENGAGEMENT SURVEY (WES)<sup>39</sup>

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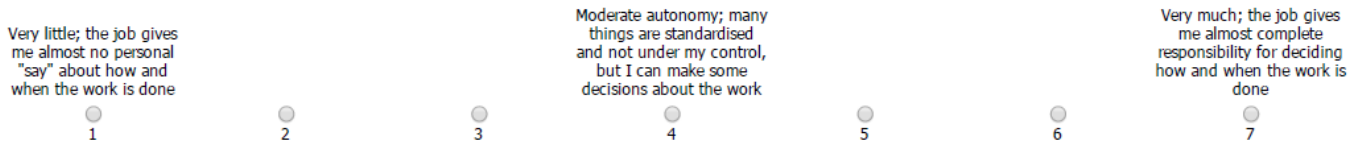
<sup>39</sup> Appendix three does not contain the complete Work Engagement Survey (WES). An agreement was signed stating that the full Psychological Capital Questionnaire (PCQ) and Multifactor Leadership Questionnaire (MLQ) will not be published in this thesis. Consequently, only three items from section 4 (i.e. the PCQ) and 5 items from section 5 (i.e. the MLQ) were shown.



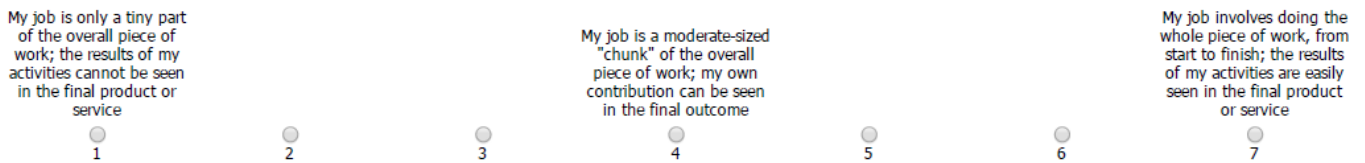
**\* SECTION 2**

This part of the survey asks you to describe your job on a scale from 1 to 7, as objectively as you can. Please do not use this part of the survey to show how much you like or dislike your job. Instead, try to make your descriptions as accurate and objective as you possibly can.

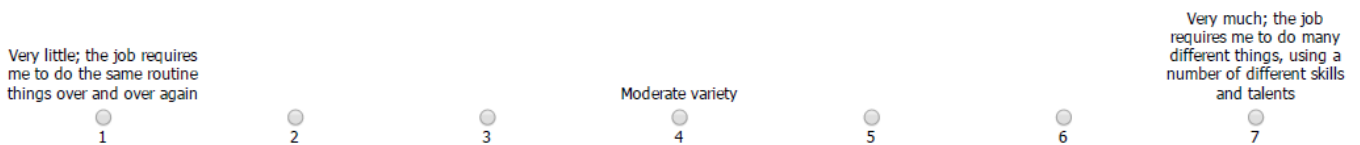
1. How much autonomy is there in your job? That is, to what extent does your job permit you to decide on your own how to go about doing the work?



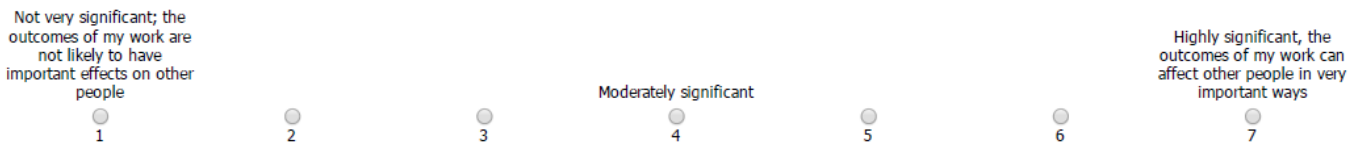
\*2. To what extent does your job involve doing a "whole" and identifiable piece of work? That is, is the job a complete piece of work that has an obvious beginning and end? Or is it only a small part of the overall piece of work, which is finished by other people or by automatic machines?



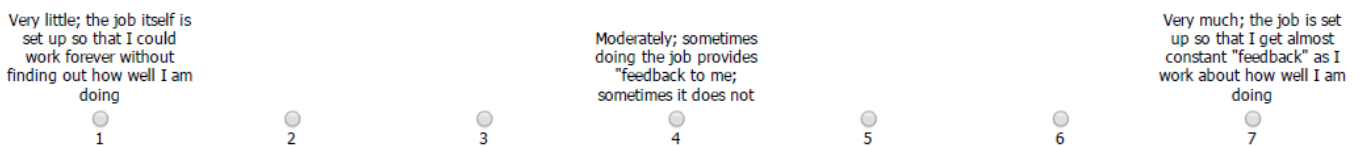
\*3. How much variety is there in your job? That is, to what extent does the job require you to do many different things at work, using a variety of your skills and talents?



\*4. In general, how significant or important is your job? That is, are the results of your work likely to significantly affect the lives or well-being of other people?



\*5. To what extent does doing the job itself provide you with information about your work performance? That is, does the actual work itself provide clues about how well you are doing - aside from any "feedback" co-workers or supervisors may provide?



**\* SECTION 3**

Listed below are 10 statements which could be used to describe a job. Please indicate whether each statement is an accurate or inaccurate description of your job. Once again, please try to be as objective as you can in deciding how accurately each statement describes your job - regardless of whether you like or dislike your job.

	*						
	1	2	3	4	5	6	7
	Very inaccurate	Mostly inaccurate	Slightly inaccurate	Uncertain	Slightly accurate	Mostly accurate	Very accurate
1. The job requires me to use a number of complex or high-level skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. The job is arranged so that I can do an entire piece of work from beginning to end.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Just doing the work required by the job provides many chances for me to figure out how well I am doing.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. The job allows me to use a number of complex or high-level skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. The job is one where a lot of other people can be affected by how well the work gets done.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. The job gives me a chance to use my personal initiative and judgement in carrying out the work.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. The job provides me with the chance to completely finish the pieces of work that I begin.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. After I finish a job, I know whether I performed well.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. The job gives me considerable opportunity for independence and freedom in how I do the work.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. The job itself is very significant and important in the broader scheme of things.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**\* SECTION 4**

Below are statements that describe how you may think about yourself **right now**. Use the scale ranging from "1" (strongly disagree) to "6" (strongly agree) to indicate your level of agreement or disagreement with each of the 24 statements.

	*					
	1	2	3	4	5	6
	Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree
1. I feel confident analyzing a long-term problem to find a solution.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. I feel confident in representing my work area in meetings with management.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. I feel confident contributing to discussions about the organisation's strategy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**\* SECTION 5**

This section is to describe the leadership style of your principal/headmaster as you perceive it. Listed below are 20 descriptive statements. Judge how frequently each statement fits the person you are describing (the leader) using the rating scale ranging from "0" (not at all) to "4" (frequently, if not always).

**THE PERSON I AM DESCRIBING...**

	*				
	0	1	2	3	4
	Not at all	Once in a while	Sometimes	Fairly often	Frequently, if not always
1. Re-examines critical assumptions to question whether they are appropriate.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Talks about their most important values and beliefs.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Seeks differing perspectives when solving problems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Talks optimistically about the future.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Instills pride in me for being associated with him/her.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**\* SECTION 6**

Listed below are 6 value statements. Please rate each statement in terms of "how important this is to you?" on a scale ranging from "1" (not important at all) to "5" (extremely important).

	1 Not important at all	2 Neutral	* 3 Somewhat important	4 Important	5 Extremely important
1. Making the world a better place.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Being of service to society.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Contributing to humanity.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Forming relationships with coworkers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Getting to know your fellow workers quite well.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Developing close ties with coworkers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**\* SECTION 7**

Listed below are 6 value statements. Please rate each statement in terms of "how important this is to your school/organisation?" on a scale ranging from "1" (not important at all) to "5" (extremely important).

	1 Not important at all	2 Neutral	* 3 Somewhat important	4 Important	5 Extremely important
1. Making the world a better place.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Being of service to society.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Contributing to humanity.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Forming relationships with coworkers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Getting to know your fellow workers quite well.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Developing close ties with coworkers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**\* SECTION 8**

Listed below are 6 statements. Please indicate the degree to which you agree/disagree with each statement.

	1 Strongly disagree	2 Disagree	3 Somewhat disagree/ Somewhat agree	4 Agree	5 Strongly agree
1. The work I do on this job is very important to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. My job activities are significant to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. My job activities are personally meaningful to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. The work I do on this job is worthwhile.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. The work I do on my job is valuable.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. The work I do on this job seems useful.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**\* SECTION 9**

Listed below are 9 statements. Please indicate the degree to which you agree/disagree with each statement.

	1 Strongly disagree	2 Disagree	3 Somewhat disagree/ Somewhat agree	4 Agree	5 Strongly agree
1. I feel free to be completely myself at work.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Expressing my true feelings is welcomed at work.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. The feelings I express at work are my true feelings.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Nobody at my work will pick on me if I have different opinions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. I can freely express my thoughts at work.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. My supervisor is supportive of my ideas and ways of getting things done.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. My supervisor displays concern for my needs and feelings.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. I can trust my supervisor to back me up on decisions I make in my job.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. My co-workers offer me support at work.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



## **APPENDIX 4**

### **INFORMED CONSENT FORM**



UNIVERSITEIT • STELLENBOSCH • UNIVERSITY  
jou kennisvennoot • your knowledge partner

**STELLENBOSCH UNIVERSITY  
INFORMATION LEAFLET AND CONSENT TO PARTICIPATE IN RESEARCH**

---

**TITLE OF THE RESEARCH PROJECT: THE DEVELOPMENT AND EMPIRICAL EVALUATION OF  
A WORK ENGAGEMENT STRUCTURAL MODEL**

You are asked to participate in a research study conducted by Megan van Deventer, a Master's student from Department of Industrial Psychology at Stellenbosch University.

**1. PURPOSE OF THE STUDY**

The objective of the research study is to develop and empirically test an explanatory Work Engagement structural model that will provide a valid answer to the research initiating question of why variance in Work Engagement exists amongst different employees working in different organisational contexts.

**2. WHY HAVE I BEEN INVITED TO PARTICIPATE IN THIS PROJECT?**

You were selected as a possible participant in this study because you are a teacher at a public primary/high school in the Western Cape, which therefore satisfies the requirements of my sample.

**3. PROCEDURES**

If you volunteer to participate in this study, you will be asked to follow a link which will redirect you to an electronic questionnaire.

**3.1. Completion of the questionnaire**

You will be required to complete the online questionnaire individually. The questionnaire will take approximately 30 minutes. There is however no time limit placed on the completion of the questionnaire. There are no right and wrong answers.

### **3.2. Questionnaire collection**

Once you have completed the questionnaire, the electronic system used will record the data automatically.

### **4. POTENTIAL RISKS AND DISCOMFORTS**

There exist no foreseeable risks or discomforts. The only inconvenience associated with participation in this study is that it will require your time and energy to complete the questionnaire.

### **5. POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY**

Participation in the research study will not directly benefit you. However, the development of this Work Engagement model will assist in the development of interventions aimed at enhancing Work Engagement levels amongst employees in different organisational contexts, including schools. Furthermore, this research will contribute to the academic field of Industrial Psychology.

### **6. PAYMENT FOR PARTICIPATION**

Neither you, nor your school will receive any payment for participating in this research study.

### **7. CONFIDENTIALITY**

Any information that is obtained in connection with this study and that can be identified with you will remain confidential. Confidentiality will be maintained by restricting access to the data to the researchers (Megan van Deventer and Prof Callie Theron), by storing the data on a password protected computer, and by only reporting aggregate statistics of the sample. Once you have completed the questionnaire, the researchers will receive the results, but the survey system used in this study cleans the source from which the results are sent. The results of your questionnaire can therefore not be traced back to you. The information is therefore collected anonymously.

The results will be distributed in an unrestricted electronic thesis. A summary of the findings will be presented to the teachers of the participating schools. In none of these instances will the identity of any research participant or any participating school be revealed.

### **8. PARTICIPATION AND WITHDRAWAL**

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw your consent at any time without consequences of any kind.

## 9. IDENTIFICATION OF INVESTIGATORS

If you have any questions or concerns about the research, please feel free to contact Megan van Deventer (0842196928 or [15779475@sun.ac.za](mailto:15779475@sun.ac.za)) or Prof Callie Theron (021 8083009 or [ccth@sun.ac.za](mailto:ccth@sun.ac.za) )

## 10. RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research subject, contact Ms Maléne Fouché [[mfouche@sun.ac.za](mailto:mfouche@sun.ac.za); 021 808 4622] at the Division for Research Development OF Stellenbosch University.

### INFORMED CONSENT

Please indicate which statement applies to you, by ticking the appropriate tick box below the statement (You should therefore only select one option):

I have read and understood the information provided above and voluntary consent to participate in the research study under the stipulated condition.

I have read and understood the information provided above and decline the invitation to participate in the research study under the stipulated condition.

## **APPENDIX 5**

### **PERMISSION TO USE THOSE MEASURING INSTRUMENTS NOT AVAILABLE IN THE PUBLIC DOMAIN**

Megan van Deventer



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Authors: *Fred Luthans, Bruce J. Avolio & James B. Avey.*

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Sincerely,

A handwritten signature in black ink, appearing to read "Fred Luthans".

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Sincerely,

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## **APPENDIX 6**

### **ITEM ANALYSIS OUTPUT**

*(See CD)*



## **APPENDIX 7**

### **DIMENSIONALITY ANALYSIS OUTPUT**

*(See CD)*

## **APPENDIX 8**

### **SYNTAX USED TO CALCULATE THE INDICATOR VARIABLES**

*(See CD)*