An Analysis of Tacit Knowledge Sharing Behaviour, within a Social Capital Framework, in a Business Environment of a South African, University of Technology

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DECLARATION

I, Carol Smith, hereby declare that this thesis is the result of my own investigation and research and it has not been submitted in part or in full for any other degree or to any other University.

Aspects of this thesis have been presented at the following local and international conferences. At the:

- Academy of Management, Africa Faculty Development Workshop (10^{th} - 17^{th} December, 2011) in Accra, Ghana.
  Paper presented - "The Development of a Social Capital and Tacit Knowledge Sharing Behaviour Framework".

- Academy of Management, Annual General Meeting in Boston, USA (30^{th} July - 7^{th}August, 2012).
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  Paper presented - "An Analysis of Tacit Knowledge Sharing Behaviour, within a Social Capital Framework, in a Business Environment of a South African, University of Technology".

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Carol Smith

ABSTRACT

This thesis integrates social capital and ‘reasoned action’ theory to construct a theoretical model for investigating the factors which predict an individual’s intention to share tacit knowledge in a University of Technology. It utilizes Nahapiet and Ghoshal (1998: 243) definition and conception of social capital. They define social capital as “the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit”. This study examined tacit knowledge sharing behaviour (i.e., knowledge that is shared between individuals) within the context of social capital. The specific type of tacit knowledge that is being studied relates to work experience ‘know-what’ and ‘know-how’. ‘Know-what’ refers to the basic mastery of a discipline that professionals achieve through education and training. ‘Know-how’ refers to procedural knowledge about a business process and the individual’s capability to perform an action with an understanding of why the action is appropriate in the particular context, (i.e., action skill or applied competence).

Specifically, this study examines the relationship between the structural, relational and cognitive dimensions of social capital and the individual’s attitude towards the sharing of tacit knowledge. It further examines the relationship between the individual’s attitude towards tacit knowledge sharing, their perceived norms and perceived behavioural control over the sharing of tacit knowledge (mediating variables) and their intention to share tacit knowledge.

It is a case study which consists of a mixed methods research design, incorporating nine research interviews and five hundred and fifty four self administered questionnaires.

The theoretical model is examined using structural equation modeling (SEM) and as a result of the findings, the initial model is revised into a set of theoretical models, which are tested using SEM and found to be consistent with the data (i.e., a good fit). The direct, indirect and total effects of the identified predictor (social capital) and mediating variables ('reasoned action') on the individual's intention to share tacit knowledge, in each model, is examined and the results are presented.

Each dimension of social capital is found to be significant for predicting the criterion variable 'attitude towards tacit knowledge sharing'. The individual's attitude towards tacit knowledge sharing is found to be highly significant for predicting the individual's intention to share tacit knowledge but the 'reasoned action' variables are found to be not as significant, particularly perceived behavioural control over the sharing of tacit knowledge.

The results of this study enrich our collective understanding regarding social capital and tacit knowledge sharing behaviour.

Keywords: Social capital, theory of reasoned action, tacit knowledge, network ties, trust, values, social norms, vision, goals, attitude, perceived norms, perceived behavioural control.

DEDICATION

To

JIMMY

who challenged me by saying that

“when I have the same number of letters behind my name as he

does, then I can talk to him”.

Till we meet again.

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Completing this doctoral thesis has been one of the most enriching and challenging activities of my life.

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In addition, I would like to express my love and gratitude to my parents who gave me the opportunity of an education from the best educational institutions and support throughout my life and to my children, Natalie and Shawn, who have made me so proud.

Finally, I would like to honor Prof. James Walsh, past president of the Academy of Management, by concluding with an excerpt from his inaugural speech:

> A university is only incidentally a market. It is more essentially a temple - a temple dedicated to knowledge and a human spirit of inquiry. It is a place where learning and scholarship are revered, not primarily for what they contribute to personal or social well-being but for the vision of humanity that they symbolize, sustain and pass on…in order to sustain the temple of education, we probably need to rescue it from those deans, donors, faculty and students who respond to incentives and calculate consequences, and restore it to those who respond to senses of themselves and their callings, who support and pursue knowledge and learning because they represent a proper life, who read books not because they are relevant to their jobs but because they are not, who do research not in order to secure their reputations or improve the world but in order to honor scholarship, and who are committed to sustaining an institution of learning as an object of beauty and humanity (Walsh 2003: 206).

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ABBREVIATIONS

ATT	Attitude towards Tacit Knowledge Sharing
CDIM	Cognitive Dimension
INT	Intention to Share Tacit Knowledge
NR	Network Resources
NT	Network Ties
PBC	Perceived Behavioural Control over Tacit Knowledge Sharing
PN	Perceived Norms about Tacit Knowledge Sharing
RDIM	Relational Dimension
SC	Social Capital
SDIM	Structural Dimension
SEM	Structural Equation Modeling
SG	Shared Goals
SNV	Shared Norms and Values
SV	Shared Vision
TRST	Trust

CHAPTER 1

OVERVIEW OF STUDY

"In the house of truth, there are many rooms".

(Blackburn 2009: 111)

1.1 Introduction

The aim of this study was to examine and understand the relationship between social capital (the structural, relational and cognitive dimensions of social capital), 'reasoned action' and the individual's intention to share tacit knowledge, in a business environment of a University of Technology.

Universities of Technology use tacit knowledge in their business processes to understand and enact their worlds and to build their knowledge base (Castells 1996: 98; Oppenheim, Stenson and Wilson 2003: 159). They are an important site to study the sharing of tacit knowledge as like business organisations - they encounter the problem of how to effectively create and share tacit knowledge (Lam 2000: 487). Intellectual capital, in a University of Technology, is formed by the accumulation of useful explicit and tacit knowledge. Tacit knowledge is an important influence on the development of intellectual capital where intellectual capital requires embedded forms of knowledge (Nahapiet and Ghoshal 1998: 242; Nonaka 1994:14).

The primary research question that was explored in this study is "how does social capital influence an individual's intention to share tacit knowledge?" This is a crucial question because if social capital influences an individual's intention to share tacit knowledge, Universities of Technology can institute business and managerial practices that promote social capital and the sharing of tacit knowledge within the university. These practices will lead to the development and transfer of intellectual capital which is the core business of a University of Technology.

This study examined tacit knowledge sharing behaviour (i.e., knowledge that is shared between individuals) within the context of social capital. The specific type of tacit knowledge that is being studied relates to work experience, 'know-what' and 'know-how'. 'Know-what' refers to the basic mastery of a discipline that professionals achieve through education and training (Seonghee and Boryung 2008: 284). 'Know-how' in this study, refers to procedural knowledge about a business process and the individual's capability to perform an action with an understanding of why the action is appropriate in the particular context, (i.e., action skill or applied competence), (Baldwin, Pierce, Jones and Farouk 2011: 584; Bigelow 1991:305; Hedlund, Forsythe, Horvath, Williams, Snook and Sternberg 2003: 117). It refers to an understanding of how to actually perform a task, within the business process, not just its principles or concepts. Furthermore, it includes an understanding of how to effectively execute appropriate action and when and under what circumstances it would be appropriate to take such action. Thus, tacit knowledge, in this study, represents both the capability to perform an action and an explicit understanding of why the action is appropriate in a particular context (Bransford, Brown and Cocking 1999: 1). Nonaka and Takeuchi (1995: 28) define 'know-how' as "the ability to apply cognitive knowledge into effective execution in a complex real world.

This study utilizes Nahapiet and Ghoshal (1998: 243) definition and conceptualization of social capital as its point of departure. Nahapiet and Ghoshal (1998: 243) were later scholars of social capital and studied social interaction networks in different communities. They were interested in the personal relationships between people that lead to trust, collaborative action and co-operation. Their work focused on social networks and strong interpersonal relationships within city neighborhoods. They found that these networks form the basis for trust, mutual co-operation and collective action (Jacobs 1965: 60).

According to Nahapiet and Ghoshal (1998: 257) social capital constitutes a form of accumulated history, reflecting investments in social relations and social organisation through time. Time is important for the development of social capital, since all forms of social capital depend on stability and continuity of the social structure. They believe that social relationships generally, though not always, are strengthened through interaction but die out if not maintained (Nahapiet and Ghoshal, 1998: 258). Unlike many other forms of capital, social capital increases rather than decreases with use. In conjunction with Bourdieu (1986b: 241), they believe that interaction, thus, is a precondition for the development and maintenance of dense social capital. They define social capital as “the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit” (Nahapiet and Ghoshal 1998: 243). Their definitional stance was chosen for this study because their early conceptualization of social capital is still relevant and useful, since so many other later approaches to social capital can be traced back to this early work. In this definition, social capital is composed of both the social interaction networks and the benefits/advantages that may be achieved through the individual’s social interaction networks as well as the individual’s relationships and the resources that are embedded within networks of relationships.
This perspective lines up well with Bourdieu and Wacquant’s (1992: 119) approach who define social capital as “the sum of the resources, actual or virtual, that accrue to an individual or group by virtue of possessing a durable network of more or less institutionalized

relationships of mutual acquaintance and recognition". Their definition focuses on the advantages and benefits that individuals derive as a result of individual relationships of mutual acquaintances and on the "deliberate construction of sociability for the purpose of creating this resource". Further definitions of social capital are discussed in section 2:3.

The individual's intention to share tacit knowledge was examined by developing and testing a hypothesized, theoretical model of the antecedent (social capital dimensions) and mediating factors ('reasoned action' dimensions) that influence an individual's intention to share tacit knowledge in a University of Technology. In developing the theoretical model, the social capital dimensions that influence an individual's intention to share tacit knowledge were identified and these dimensions were integrated with the theory of reasoned action dimensions (Fishbein and Ajzen 2010: 22). Research has consistently demonstrated that the theory of reasoned action can effectively model and explain individual human behaviour (Fishbein and Ajzen 1981a: 339; Jaccard and Davidson 1972: 228).

The theoretical approach adopted in this study was multi-disciplinary in that the theory that was used was rooted in social capital theory, 'reasoned action' theory, knowledge management, sociology, social network analysis and social exchange theory.

The following sections outline the context of the study and provide an overview of the study by introducing the research rationale, problem statement, aims, purpose, objectives and research methodology applied in the execution of this study.

1.2 Rationale for study

With regard to the rationale for the study of tacit knowledge sharing behaviour, the concept of tacit knowledge in organisations has become increasingly popular in the literature with it also being recognized as an important asset of organisations (Alvesson and Karreman 2001: 995; Nahapiet and Ghoshal 1998: 242; Spender and Grant 1996: 5). Argote, Ingram, Levine and Moreland (2000: 1) found that “organisations better able to transfer knowledge are likely to be more productive, innovative and adaptable over time”. The sharing of tacit knowledge between colleagues “can create significant short and long-term operational and learning benefits and is a powerful mechanism for improving an organisations’ productivity and increasing its survival” (Argote 1999: pxvii). Many authors have found that in order to compete globally, competitive advantage requires individual staff members to share their tacit knowledge with their colleagues (Chow, Deng and Ho 2000: 65; Davenport and Prusak 1998a: 4; Drucker 1998: 98; Nevis DiBella and Gould 1995: 4). The changing global environment provides the impetus for new business and managerial practices to increase competitiveness. This increased global competition requires universities to manage their academic, financial, human, intellectual and intangible resources more efficiently (Weisbrod 2000: 22).

Furthermore, studies into tacit knowledge sharing behaviour are mainly conducted in business settings. According to Ipe (2003: 354), there is currently no consensus with regard to what constitutes tacit knowledge in universities. As tacit knowledge sharing is context specific and since tacit knowledge is usually difficult to imitate, transfer and replicate, there is a need to develop an understanding of tacit knowledge sharing within the complex University of Technology setting as well (Levin and Cross 2004: 1477).

The social capital rationale for this study was to discover whether the theory of social capital is useful for exploring individual tacit knowledge sharing behaviour within a University of Technology. Vakkari, Savolainen and Dervin (1997: 452) have pointed out that the number of studies on information and tacit knowledge needs, at the individual level, is very limited, as is research applying social capital and social network theory to examine organisational tacit knowledge sharing behaviour. Today, more universities are looking at the development of social capital within the university in order to promote the sharing of tacit knowledge.

The relationship between tacit knowledge sharing behaviour and social capital for successful organisational knowledge creation and intellectual capital has been stressed in several business and organisation contexts (Cohen and Prusak 2001: 1; Tsai and Ghoshal 1998: 464; Widén-Wulff and Ginman 2004: 448). Many research studies have indicated that, like physical, intellectual and human capital, social capital is a productive resource (Baker 1990: 589; Lin and Dumin 1986: 365; Lin, Ensel and Vaughn 1981: 393). Svendsen (2004: 44) suggests that "social capital should be added to the traditional production factors of land, technological knowledge, physical capital, human capital and formal institutions (written rules)". As a productive resource, the presence of social capital facilitates voluntary provision of collective goods, reduces transaction costs and enhances access to social network resources (Burt 1997: 339). In addition, it encourages economic growth and creates wealth for universities (Putnam 1993: 167). Furthermore, it is a powerful mechanism for the creation and transfer of tacit knowledge.

The 'reasoned action' rationale for this study is that integrating social capital and the theory of reasoned action (Fishbein and Ajzen 2010: 1) is a new way of looking at collaborative tacit knowledge sharing behaviour within a University of Technology. Very few studies have applied the theory of reasoned action to tacit knowledge sharing behaviour.

1.2.1 Problem statement

1.2.1.1 Tacit knowledge

A University of Technology's competitive advantage is dependent upon its unique intangible resources and its ability to utilize these resources effectively (Nelson and Winter 1982: 1). Today, "almost eighty percent of economic value creation is based on intangible resources". Research into intellectual capital gives intangibles 'a body' and facilitates the use of intangibles for successful business and knowledge management (Bresman, Birkinshaw and Nobel 1999: 439).

However, most Universities of Technology still do not have appropriate business management practices and management tools to effectively utilize their intangible resources to create future value. The problem of knowledge and intellectual capital management is complex because it can be difficult to measure and manage intangible assets as the degree of tacitness in the transferred knowledge depends on the influence of various intangible factors such as personal beliefs, experience, values and norms (Inkpen and Pien 2006: 779).

Joia (2000: 341) comments that it is difficult for organisations to exactly measure reflect and communicate the impact of the sharing of tacit knowledge and that a long and arduous road still needs to be negotiated before we have reliable measurements for intangible capital. Unless the value created by the sharing of tacit knowledge can be measured (that the intangible asset leads to a tangible result) it is difficult to understand the significance of the sharing of tacit knowledge and its relationship to the development of intellectual capital within a University of Technology. It is said that what is measured in companies is also what is managed.

Furthermore, research into ‘intangibles’ (i.e., for the purpose of this study, the sharing of tacit knowledge) within a University of Technology is unclear with differing opinions being expressed in the literature.

A further problem relates to the focus of strategy formulation. The formulation of strategy is one of the main tasks of university management: i.e., the management of the university’s position relative to its competitors, customers and suppliers (Spender and Grant 1996: 5). The sharing of tacit knowledge is essential to this task. But as we look at managements approach to knowledge, we see that the focus is on content, on what should be known rather than on the manner of knowing it or learning it (i.e., the sharing or transfer of tacit knowledge).

An additional problem with regard to managing the sharing of tacit knowledge in a University of Technology is that much of the university’s knowledge is located within individuals (Jarvenpaa and Staple 2001: 487). Tacit knowledge is utilized by employees during the course of their duties and unless they share their tacit knowledge, this knowledge may be lost when they leave the university (Gupta and Govindarajan 2000: 490). Weiss (1999: 65) found that:

> even if individuals stay with the organisation, the full extent of their tacit knowledge may not be realized and utilized unless there are opportunities for the individual to share that knowledge with others in the organisation.

If the sharing of tacit knowledge is understood at an individual level it will assist universities to understand the sharing of organisational tacit knowledge (Spender and Grant 1996: 5). As Del Favero (2003: 69) has indicated, effective information and knowledge sharing at an individual level in a university faculty is essential for resource exchange and efficient faculty management.

Furthermore, according to Bhatt (1998: 165), the study of tacit knowledge in Universities of Technology is a new research area which still requires the development of a coherent theoretical foundation. He reveals that the link between tacit knowledge sharing behaviour and individual action is problematic and not well understood.

In order to improve business management practices and to facilitate tacit knowledge sharing within a University of Technology, additional empirical work is required to identify what it is that facilitates or inhibits the sharing of individual tacit knowledge in a University of Technology (Grover and Davenport 2001: 13).

1.2.1.2 Social capital

There are few studies of tacit knowledge sharing behaviour looking into the social capital mechanisms behind the sharing of tacit knowledge (Vakkari, Savolainen and Dervin 1997: 452). Besides human resource management, little effort has been put into social capital and tacit knowledge management, i.e., the systematic work with tacit knowledge embedded in social relationships and social networks (Totterman and Widén-Wulf 2007: 7). Although social capital has been shown to assist the transfer of tacit knowledge within organisations, the link between social capital and the individual's intention to share tacit knowledge in terms of the factors which facilitate or inhibit the sharing of tacit knowledge is not well established in the literature (Lauring and Selmer 2011: 348).

We know little about the means or mechanisms that delineate how social capital acts to influence the sharing of tacit knowledge and intellectual capital creation in a University of Technology. It is still unclear how social capital is being leveraged for tacit knowledge exchange (Levin and Cross 2004: 1477).

Although conceptual theories have found that social capital positively affects the sharing of tacit knowledge and the development of intellectual capital, there is inconsistency in theoretical findings (Kim and Lee 2006: 370; Saba and Mc Dowell 2007: 39). Some researchers have found that social capital improves the sharing of tacit knowledge. Other researchers discovered that social capital actually hinders the effective sharing of tacit knowledge. These inconsistent results suggest the existence of mediators between social capital and the sharing of individual tacit knowledge.

Putnam (1995a: 664) has argued that a high research priority is to clarify and understand the effects of the dimensions of social capital. In addition, the individual effects of the structural (network ties and resources), relational (trust, shared values and norms) and the cognitive (shared vision and goals) dimensions of social capital on the individual's intention to share tacit knowledge requires further exploration (Bock, Zmud, Kim and Lee 2006: 87).

Furthermore, the results, in the social capital field with regard to the sharing of tacit knowledge, to date, have consisted of poor operationalization of the concepts; they tend to lack rigor and strong theoretical and operational links to the conceptualization of social capital (Fine 2002: 156; Portes, 1998a: 15; Schuller, Baron and Field 2000: 1). The result is a number of conceptualization approaches (e.g., network analysis, social exchange theory), each attempting to simplify the complex social world of tacit knowledge sharing, while maintaining validity (Woolcock 2001a: 11).

Some researchers, such as Sobel (2002: 139) have questioned whether social capital is measurable. Paxton (1999: 88), for example, noted the wide gap between the concept of social capital and its measurement. This gap has led researchers to question its reliability due to its spread across fields and the discord in its measurement. This is a major problem, not only when conducting research, but also when citing and developing research.

Furthermore, the difficulty in finding meaningful definitions and classifications of tacit knowledge and social capital that apply in all settings is a real challenge (Saba and Mc Dowell 2007: 39; Totterman and Widén-Wulff 2007: 12).

Thus, in order to understand the tacit knowledge sharing process within a University of Technology, additional scholarly and statistical analytical work is required to identify the social capital and 'reasoned action' factors which facilitate or inhibit an individual's intention to share tacit knowledge in a University of Technology.

1.2.1.3 'Reasoned action'

With regard to the 'reasoned action' theoretical approach, although much work has been done in the health field, not much research has been conducted into the 'reasoned action' factors that influence the individual's intention to engage in tacit knowledge sharing behaviour, i.e., the attitudinal factors, perceived norms and perceived behavioural control factors (Bock, Zmud, Kim and Lee 2005: 87).

1.2.1.4 Structural equation modeling

The analytical approaches used in most prior studies on tacit knowledge sharing have contributed to our limited understanding of the factors which influence an individual's tacit knowledge sharing behaviour. Most studies have focused on a single equation model, using regressional analysis and few studies have used structural equation modeling (SEM). Using simple and multiple linear regression techniques, several studies have identified many factors influencing an individual's intention to share tacit knowledge (Lin and Lee 2004: 119; Reychav and Weisberg 2004: 285). The majority of studies published have reported regression or correlation coefficients that gave satisfactory results (Ryu, Ho and Han 2003: 113). For example, Eagly and Chaiken (1993: 176) showed that forty six percent of the variance in intention was explained by the theory of reasoned action. However, Van den Putte and Hoogstraten (1997: 321) checked two hundred articles published between 1991 and 1995 and found that there was a problem when structural equation modeling is applied to the data. They found that the model rarely fits the data.

In addition, published studies have mostly reported the influencing factors based on regressional analysis and have not focused on the interaction among factors which influence an individual's intention to share knowledge. Furthermore, many studies report incomplete results. Van den Putte and Hoogstraten (1997: 321) found "no articles that reported goodness of fit indices on complete models and that only six articles reported complete correlation matrices". These articles included Godin, Valois and LePage (1993: 81), Hounsa et al. (1993: 253), Myeong and Crawley (1993: 253), Theodorakis, Docanis, Bagiatis and Gouthas (1991: 51) and Wilson, Zenda, McMaster and Lavelle (1992: 99). They also used these correlation matrices as input for secondary analyses, and found only one fitting model (Theodorakis et al. 1991: 51).

It should be noted that a single-equation model using regressional analysis represents only the direct effects of multiple determinants on an outcome (Park 2003: 5). In analysis, it may be found that there are mediating variables. One variable may affect another through one or more intervening variables. According to Taylor and Todd (1995: 146) "it is expected that there are relationships amongst the factors identified, in the single equation model approach studies".

Few research studies have been conducted to investigate the relationships among these factors, using SEM analysis, especially with regard to tacit knowledge sharing behaviour. Furthermore, because the majority of researchers report only regression coefficients, they ignore the possibility that another model might give a better description of the data (Weston and Gore 2006: 723

In contrast to multiple regression, structural equation modeling (SEM) allows for the examination of how well individual variables are measured at the same time as the examination of the extent to which variables are related to each other. SEM is particularly useful when one dependent variable becomes an independent variable in subsequent dependence relationships (Hair, Anderson, Tatham and Black 1998: 584).

It provides a straightforward method of dealing with multiple relationships simultaneously while providing statistical efficiency. It has the ability to assess the relationship comprehensively and provides a transition from exploratory to confirmatory analysis (Kelloway 1998: 1).

A further advantage concerns the complexity of the modeling that is possible and finally SEM has the facility to assess the extent to which a proposed model fits a particular dataset (Hankins, French and Horne 1999: 154).

Other statistical techniques such as multiple regression, factor analysis, multivariate analysis of variance all share one common limitation: each technique can examine only a single relationship at a time (Weston and Gore 2006: 723).

1.2.2 Aim of study

The aim of this study was to examine and understand the relationship between social capital (the structural, relational and cognitive dimensions of social capital), ‘reasoned action’ and the individual’s intention to share tacit knowledge, in a business environment of a University of Technology.

In order to do this, a theoretical model of an individual's intention to share tacit knowledge was developed. In developing the model, Nahapiet and Ghoshal (1998: 243) classification of the social capital dimensions (i.e., the structural, relational and cognitive dimensions of social capital) was used to explain the individual's intention to share tacit knowledge. The structural dimension incorporated network ties and resources, the relational dimension incorporated trust, shared values and norms and the cognitive dimension incorporated shared vision and goals.

These social capital dimensions were integrated with the 'reasoned action' dimensions (Fishbein and Ajzen 2010: 1). The 'reasoned action' variables of the individual's attitude towards tacit knowledge sharing, their perceived norms about tacit knowledge sharing and their perceived behavioural control over the sharing of tacit knowledge (i.e., beliefs about the presence of factors that may facilitate or inhibit the performance of tacit knowledge sharing and the perceived power of these factors), (Fishbein and Ajzen 2010: 1), were postulated to be mediating variables between the dimensions of social capital and the individual's intention to share tacit knowledge. These variables are usually found to predict an individual's behavioural intention with a high degree of accuracy. The social capital variables formed the independant variable and the 'reasoned action' variable of an individual's intention to share tacit knowledge formed the dependent variable.

This study focused on the <u>individual</u> sharing of tacit knowledge. It was limited to the social interaction process of the sharing of tacit knowledge and to specific characteristics relevant to the process of the sharing of tacit knowledge (i.e., characteristics of the exchange). It included characteristics such as network ties, network resources, trust, social norms, values, attitudes, perceived norms and perceived behavioural control. It did not examine, for example, individual characteristics of the participants such as absorptive capacity and lack of communication competence (Bennis and O'Toole 2005: 96; Gammie 1995: 34; Mintzberg 2004: 1). For example, individuals might acquire and assimilate tacit knowledge from a source but not all of them have the capacity to transform and utilize it in order to improve their work practices (Zahra and George 2002: 185).

It should be noted that it is difficult to separate the individual characteristics from the characteristics of the exchange, for example, trust is a characteristic of the individual and of the exchange between individuals (Zahra and George 2002: 185).

1.2.3 Purpose of study

This study adopted a model generating approach. The purpose of the study was to develop and test a theoretical model of the individual's intention to share tacit knowledge, within a social capital and 'reasoned action' model.

1.2.4 Objectives of study

The main objective of this research was to develop a set of theoretical arguments and hypotheses, in a model, which explain the dynamic interactions between social capital constructs and 'reasoned action' constructs and the individual's intention to share tacit knowledge, by clarifying the relationships between these constructs.

The sub-objectives were:

- to investigate the relationship between the social capital constructs of:
    - network ties (structural dimension of social capital),
    - trust, shared values and norms (relational dimension of social capital),

    - shared vision and goals (cognitive dimension of social capital)

  and the ‘reasoned action’ construct of the individual’s attitude towards tacit knowledge sharing and

- to investigate the relationship between the ‘reasoned action’ constructs of:
  - attitude towards tacit knowledge sharing,
  - perceived norms about tacit knowledge sharing,
  - perceived behavioural control over tacit knowledge sharing and

  the individual’s intention to share tacit knowledge (Fishbein and Ajzen 2010: 22).

In addition to the above sub-objectives, individual research objectives were set for each measurement construct.

The following research objectives were set for each measurement construct:

Network ties - Ro.1. - To determine the influence of strong network ties on the individual’s attitude towards tacit knowledge sharing.

Network resources - Ro. 2. - To determine the influence of an individual’s access to information, tacit knowledge and resources (through close social relationships within networks) on their attitude towards tacit knowledge sharing.

Structural dimension - Ro. 3. - To determine the influence of an individual’s high level of structural social capital (strong network ties and a high level of network resources) on their attitude towards tacit knowledge sharing.

Trust (affect-based) - Ro. 4. - To determine the influence of affect-based trust on the individual’s attitude towards tacit knowledge sharing with their co-workers.

Trust (cognitive-based) - Ro. 5. - To determine the influence of cognitive-based trust on the individual's attitude towards tacit knowledge sharing with their co-workers.

Trust Ro. 6. - To determine the influence of trust (affect-based and cognitive-based trust) on the individual's attitude towards tacit knowledge sharing with their co-workers.

Shared norms and values - Ro. 7. - To determine the influence that shared norms and values have on the individual's attitude towards tacit knowledge sharing.

Relational dimension - Ro. 8. - To determine the influence that a high level of relational social capital (trust, shared norms and values) has on an individual's positive attitude towards tacit knowledge sharing.

Shared vision - Ro.9. - To determine the influence of shared vision on the individual's attitude towards tacit knowledge sharing.

Shared goals - Ro.10. - To determine the influence of shared goals on the individual's attitude towards tacit knowledge sharing.

Cognitive dimension- Ro. 11. - To determine the influence that a high level of cognitive social capital (shared vision and goals) will have on the individual's attitude towards tacit knowledge sharing.

Social capital - Ro. 12. - To determine the influence of the structural (network ties and network resources), relational (trust, shared norms and values) and cognitive dimension (shared vision and goals) of social capital on the individual's attitude towards tacit knowledge sharing.

Attitude towards tacit knowledge sharing - Ro. 13. - To determine the influence of the 'individual's positive attitude towards tacit knowledge sharing on their intention to share tacit knowledge.

Perceived norms about tacit knowledge sharing - Ro. 14. - To determine the influence of the individual's perceived norms about tacit knowledge sharing on their intention to share tacit knowledge.

Perceived norms about tacit knowledge sharing - Ro. 15. - To determine the influence of the individual's perceived norms about tacit knowledge sharing on their attitude towards tacit knowledge sharing.

Perceived behavioural control - Ro. 16. - To determine the influence of the individual's perceived behavioural control on their intention to share tacit knowledge.

'Reasoned action' - Ro. 17. - To determine the influence of the individual's attitude towards tacit knowledge sharing, their perceived norms about tacit knowledge sharing and their perceived behavioural control over tacit knowledge sharing on their intention to share tacit knowledge.

The hypotheses for the research objectives are outlined in Chapter 2 and 3 and provided in tabular form in Table 4.1.

1.2.5 Research questions

With regard to the hypothesized, theoretical, study model, the primary research question that was explored is "how does social capital predict an individual's intention to share tacit knowledge?"

In order to determine how well the proposed model of the individual's intention to share tacit knowledge, explained the individual's intention to share tacit knowledge, the following questions were investigated:

- Is the study model consistent with the data? Is it a good fit?
- Are the six identified social capital predictor variables (structural dimension of social capital - network ties and resources; relational dimension of social capital - trust, shared values and norms; cognitive dimension of social capital - shared vision and

goals) significant for predicting the criterion variable ‘attitude towards tacit knowledge sharing’?

- What are the direct, indirect and total effects of the identified predictor and mediating variables on the individual’s intention to share tacit knowledge?
- Are the identified three ‘reasoned action’ variables (attitude towards tacit knowledge sharing, perceived norms about tacit knowledge sharing and perceived behavioural control over tacit knowledge sharing) significant for predicting the criterion variable ‘intention to share tacit knowledge’?

1.2.6 Hypotheses

Nenty (2009: 22) believes that “a hypothesis is the most powerful tool man has invented to achieve dependable knowledge”. According to him, they facilitate the creation of knowledge and provide a way to solve problems that occur in humanity. In his opinion, “hypotheses are tentative, intelligent guesses posited for the purpose of directing one’s thinking and action towards the solution of the problem”. In the light of this, a core hypothesis was developed and hypotheses were set for each research objective in the present study.

The core hypothesis was the following:

It is proposed that network ties (structural dimension of social capital), trust, shared norms and values (relational dimension of social capital) and shared vision and goals (cognitive dimension of social capital) act as determinants for the “individual’s attitude towards the sharing of tacit knowledge” and that the “individual’s attitude towards tacit knowledge sharing”, “perceived norms about knowledge sharing” and their “perceived behavioural control over tacit knowledge sharing,” act as determinants for the individual’s “intention to share tacit knowledge”.

Because social capital exists in the structure and content of social networks and relationships and can be conceptualized and operationally defined at many different levels of analysis the focus in conducting this research was on the individual and the dyadic social interactions, between an individual and their co-workers, (i.e., social capital in terms of the relations an individual maintains with other individuals). The individual's self-reported perceptions of their tacit knowledge sharing behaviour with their co-workers have been examined in this study.

Social capital as an individual attribute according to Bourdieu (1986b: 48) refers to "a person's potential to activate and effectively mobilize a network of social connections based on mutual recognition and maintained by symbolic and material exchanges." It is at the individual level that all of the hypotheses were formulated. Each hypothesis for each measurement construct is presented in Chapter 2 (hypotheses for social capital), Chapter 3 (hypotheses for 'reasoned action') and Chapter 4 (for table of all of the studies hypotheses). They are also illustrated in Figure1.1.

1.3 Research model

Few models of the individual's intention to share tacit knowledge exist in the literature. In this thesis, a decision was taken not to use a single-equation approach using multiple regressions because of the previously discussed limitations and instead to use structural equation modeling (SEM). "Finding a statistically significant theoretical model that also has practical and substantive meaning is the primary goal of using structural equation modeling to test theories" (Schumacker and Lomax 2004: 81).Using this technique, measurement indicators for latent variables were drawn up and hypothesized causal pathways were determined.

As a graphical summary of the above explanation, Figure 1.1 depicts the hypothesized study model with the causal pathways that were developed for the present study. The model identifies the latent variables that have a significant influence on the tacit knowledge sharing process and the individual's intention to share tacit knowledge as well as the relationships between these variables.

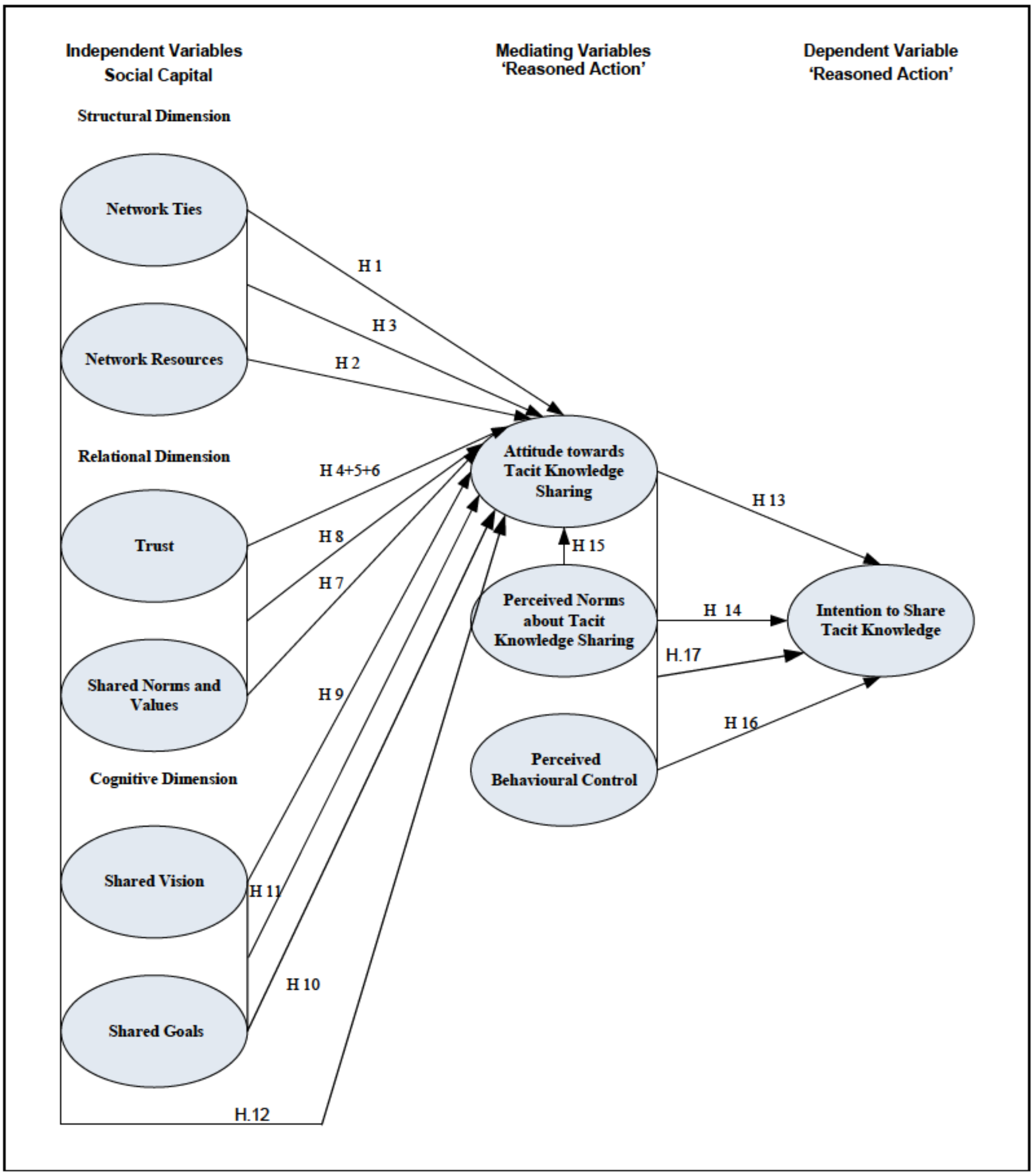

Figure 1.1 Study model

1.4 Research method and design

The research design was a case study of a South African, University of Technology. It consisted of a mixed methods research design incorporating qualitative and quantitative research. This research utilized a positivist paradigm. McKenna (2003: 217) comments that "this paradigm identifies a reality that can be discovered, measured and manipulated....the methods used in this paradigm are empirical and quasi-experimental and great value is placed on objectivity. Knowledge is seen to be value-free and neutral, and is attained by the objective observation of reality, which is out there". A mixed method research design was used in order to obtain a wider and deeper understanding of the issues involved.

The research method consisted of three phases, namely a comprehensive survey of the literature, interpretative qualitative research interviews and a quantitative, empirical survey.

The literature review was conducted to determine how tacit knowledge, social capital and the theory of reasoned action have been conceptualized within the existing body of literature. In this stage relationships between the latent variables were determined and causal paths were drawn up.

The qualitative research consisted of exploratory, in-depth, research interviews with staff of the University of Technology. These interviews facilitated the identification and coding of themes related to the measurement constructs and informed the design of the survey (Yin 1994: 1).

Creswell, Plano Clark and Garrett (2004: 67) comment that "in qualitative research, interviews are preferred for their ability to generate richer and more complicated sources of data".

The quantitative aspect of the study consisted of an empirical study which utilized a survey design. This design "was preferred for its descriptive and predictive functions associated with correlational research". This design allowed the assessment of interrelationships between the measurement constructs and the description of observed phenomena through structural equation modeling.

Definitions adopted by researchers, in this field, are often not uniform, so the studies definitions of variables are listed in Appendix C2.

1.4.1 Research site

The South African, University of Technology, in this study, has an emphasis on career-focused academic programmes that resonate with the needs of a growing and diverse South African economy (Du Pré 2009: 1).

The university offers undergraduate and postgraduate programmes in six faculties: Accounting and Informatics, Applied Sciences, Arts and Design, Engineering and the Built Environment, Health Sciences and Management Sciences. These faculties are spread across five different campuses in different geographical regions.

In total, six faculties and fifty two departments, including all support departments, were targeted, ranging in traditional disciplines such as 'Civil Engineering' and 'Quantity Surveying' to new specializations such as 'Chiropractic and Somatology'.

1.4.2 Study population and sample

The target population was all salaried staff at the University of Technology (i.e., two thousand five hundred and twenty nine salaried staff). The research sample included management, academic and administrative staff as well as technicians and service staff, across all levels of the university, in order to gather sufficient information from different perspectives. The sampling approach for this population was purposive sampling. The rationale for this was that by deliberately targeting a cross section of the university staff, representativeness of the university was achieved. An attempted census was utilized to recruit respondents.

The sample size for the qualitative research consisted of nine respondents from different departments and levels in the organisation.

A self-selected sample was used to obtain the five hundred and ninety (twenty three percent return rate) respondents who completed the research survey.

1.4.3 Qualitative analysis of data

Qualitative data was analysed separately from quantitative data. Themes relating to the variables of social capital, theory of reasoned action and tacit knowledge sharing behaviour were identified and coded in the interview transcripts and the data was then analyzed thematically. The study population and sample is further elaborated on in Section 4.2.4.

1.4.4 Quantitative analysis of data

Descriptive and inferential statistics were performed in the quantitative analysis using the statistical programs SPSS 19 and Amos, Version 16.
Structural equation modeling (SEM) including confirmatory factor analysis was performed in order to test and interpret the hypothesized study model.

In analyzing the results the following stages of structural equation modeling were employed as recommended by Hair, Anderson, Tatham and William (1998: 592):

- a theoretically based model was developed;
- a path diagram of causal relationships was created;

- the path diagram was converted into a structural and measurement model;
- correlation and variance-covariance matrix's were created;
- the model was estimated, identified and 'goodness-of-fit' criteria were evaluated;
- and finally, the model was interpreted, revised and modified to produce a final set of models.

1.4.5 Validity and reliability

In order to test the validity of the empirical qualitative survey, the construct validation of principles of translation validity (face, content) and criterion-related validity (predictive, concurrent, convergent and discriminant validity) was used to test the usefulness of the research model (Trochim 2001: 12940). Validity was also assessed in this study by the magnitude of the factor loadings linking the observed and latent variables in the SEM confirmatory factor analysis. This is discussed further in section 4.3.2 and Section 6.4.

In order to test the consistency of the data, the Cronbach's Alpha Coefficients test, the One Sample t test, the Sign test, the Wilcoxon Signed Ranks test and the Spearman Rank-Order Correlation Coefficient test was applied to the data. In addition, SEM was used to extract the estimated standardized factor loadings and the reliability of each measured variable used in the study. The reliability of the study is discussed further in Section 4.4 and Section 6.4.

1.5 Research constraints

1.5.1 Delimitations

This research focused on the process of individual tacit knowledge sharing behaviour, among co-workers, working in a business environment of an academic institution. It concurred with Portes (1998a:

21), who at the end of his literature review of social capital, asserted that "the greatest theoretical promise of social capital lies at the individual level-exemplified by the analyses of Bourdieu (1986b: 249) and Coleman (1988: S95).

Thus, the process of individual knowledge sharing, i.e., the structural and individual dynamics that cause individuals to share tacit knowledge was examined. The transmission of tacit knowledge between dyads and on issues regarding the exchange flow itself was studied. Accordingly, all of the constructs were developed, measured and tested at the individual level of analysis.

The utilization of knowledge transmitted by the recipients was not examined. This is for a future study.

As this study was confined to a specific site, i.e., a University of Technology, in a specific geographical area in South Africa, the results are, thus relevant to this specific site.

1.5.2 Limitations

The following limitations may apply to this study:

- Self-selected sample

This study used a one site sampling scheme and was conducted in a university of technology in South Africa, and participants were primarily South Africans. As a one site sampling scheme was used the findings may well be vulnerable to the threat of single-source bias. As the research was confined to a University of Technology, the findings (although they are highly plausible) cannot be generalized.

- Limitation of variables selected

"If the developed model is correctly specified, i.e., the model contains all of the actual causal determinants and the actual causal processes leading to the ultimate outcome, the analysis will result in consistent estimates of the true causal effects" (Tate 1998: 60). With regard to the social capital variables, other variables may have been studied, for example, power and communication variables. This study was confined to specific, selected variables which were identified in the theoretical review of the literature. It is acknowledged that there are other relevant variables that may have been tested in the proposed, study model.

- Voluntary participation in study

All participants volunteered anonymously to participate in the survey. This may have led to a sample bias.

1.5.3 Assumptions

This study focused on how social capital affects the "individual's intention to share tacit knowledge" within a University of Technology. Actual tacit knowledge sharing behaviour is not examined. Although actual tacit knowledge sharing behaviour is not examined, research has consistently demonstrated that the theory of reasoned action and an individual's "intention to share tacit knowledge" can effectively model and explain individual tacit knowledge sharing behaviour (Kurland 1995: 297; Millar and Shevlin 2003: 38; Santhanam 2002: 148).

The individual's "intention to share tacit knowledge" is studied rather than actual tacit knowledge sharing behaviour as the individual's intention to share tacit knowledge is considered the single best predictor of actual tacit knowledge sharing behaviour (Ajzen 1991: 179; 2001: 27; Fishbein and Ajzen 1975: 500).

This study assumed that the participants accurately and truthfully responded to the survey questions and that such responses reflected their actual perceptions of their tacit knowledge sharing behaviour.

1.6 Outline of chapters

Chapter 1 consists of the introduction to the research and outlines the broad field of study. It introduces the research problems, aim and purpose of the research. The research questions, objectives and hypotheses are given. A brief introduction to the research methodology is presented which includes the research design, research site, target population and sample. The chapter continues with a discussion of the analysis of the research data. The limitations, delimitations and assumptions are then provided. Finally, the significance of the study in terms of its research and business contributions is outlined.

Chapter 2 presents a review of the social capital literature. It begins with a discussion of social capital and tacit knowledge sharing behaviour. The chapter continues with an exploration of tacit knowledge sharing behaviour in a University of Technology. This is followed by the conceptions and levels of analysis of social capital. The chapter proceeds with the delineation of the different dimensions of social capital. Finally, the research objectives, hypotheses and theoretical background to each social capital measurement construct is presented.

Chapter 3 presents a review of the theory of reasoned action literature and the reasoned action approach. This is followed by a discussion of the behavioural, normative and control beliefs of the 'reasoned action' approach. The chapter proceeds with an overview of the research objectives, hypotheses and theoretical background of each "reasoned action" measurement construct.

Chapter 4 presents the research methodology. The chapter begins by outlining the research design, site and data collection method. This is followed by the population and sample details, development of the research instrument and the pilot study. Then, the validity and reliability of the research is discussed. The chapter proceeds by providing the research model and hypotheses for the study. Finally, the method of data analysis is delineated.

Chapter 5 presents the results of the study. Descriptive and inferential statistics are presented. The chapter starts with the demographic analysis and proceeds with the qualitative analysis (i.e., the thematic analysis of the exploratory interviews). This is followed by the quantitative analysis of the study. The chapter concludes with a presentation of the SEM results for each dimension of social capital.

Chapter 6 presents the discussion of the results. The chapter begins with an overview of the study and its research questions. It continues with a discussion of the research hypotheses and the direct and indirect effects of social capital and the reasoned action variables on the individual's intention to share tacit knowledge. This is followed by the implications of the research results for theory and for practice. The chapter also provides recommendations for further research. This is the final, concluding chapter of the thesis.

1.7 Conclusion

This chapter laid the foundations for this thesis. It introduced the research problem, aim and purpose of the study. The research questions, objectives and hypotheses were given. A brief introduction to the research methodology was presented which included the research design, research site, target population and sample. This introduction was followed by a discussion of the limitations, delimitations and assumptions of the study. Finally, the significance of the study was elaborated and the chapter ended with an outline of the chapters of the thesis and a conclusion to Chapter 1.

The following chapter provides a review of the social capital literature.

CHAPTER 2

SOCIAL CAPITAL

“If you want to run fast do it alone, if you want to run far, do it with other people”

(Bushman Koi saying).

2.1 Introduction

The previous study provided an overview of the research study. This chapter provides a general review of social capital literature. It begins with a brief discussion of social capital and tacit knowledge sharing behaviour. Tacit knowledge and tacit knowledge sharing behaviour is defined and the changing role of universities is explored. The chapter continues with an exploration of tacit knowledge sharing behaviour in a University of Technology. This is followed by a discussion of the roots of social capital followed by the theoretical conceptions of social capital. The definitional stance of this study is then provided. This is followed by a delineation of the levels of social capital. The chapter proceeds by identifying each dimension of social capital (the structural, relational and cognitive dimension of social capital) with a discussion of their respective research objectives, literature review and hypotheses.

2.2 Social capital and tacit knowledge sharing behaviour

As social capital is studied, in this thesis, within the context of tacit knowledge sharing behaviour, a short discussion of tacit knowledge and tacit knowledge sharing behaviour is present in this section, prior to defining social capital. This thesis follows traditional epistemology and adopts a definition of knowledge as “justified true belief”. In line with Nonaka’s (1994: 15) thinking it views knowledge as a dynamic human process of justifying personal beliefs as part of an aspiration for the truth. Knowledge is about beliefs, commitment, and action, which distinguishes it from information. Albert Einstein commented that “knowledge is experience - everything else is just information. Knowledge is anchored on the commitment and beliefs of its holder and these beliefs are deeply rooted in the value systems of individuals. Like information, knowledge is about meaning that is context-specific and relational (Nonaka and Takeuchi 1995: 592).

The most cited and influential conception of knowledge is Polanyi’s (1966a: 16) identification of explicit knowledge and tacit/implicit knowledge. Explicit knowledge refers to knowledge that is transmittable in formal, systematic language and is regarded as knowledge that can be formally and systematically stored, articulated, and disseminated in certain codified forms, such as manual or computer files (Nonaka and Takeuchi 1995: 592).

Because it is explicit and obvious, it can easily be communicated between individuals via visual or verbal form. It is subjective, context specific, and difficult to capture (Nonaka and Takeuchi 1995: 592).

On the other hand, tacit knowledge is difficult to articulate, it has a personal quality, which makes it hard to formalize and communicate. It cannot always be clearly articulated or codified as explicit knowledge (Staycey 2001: 1; Tsoukas 1996: 11). It refers to ‘hidden’ knowledge, embedded in an individual’s experience and coloured by their personal beliefs and values.

Faculty staff can possess both tacit and explicit knowledge as defined by Nonaka and Takeuchi (1995: 40). Tacit knowledge cannot be expressed in any tangible form. Faculty members obtain it either by teaching the course or as a result of professional experience. It includes their cognitive skills, problem-solving ability, and capability to conduct research. Explicit knowledge in a University of Technology can be expressed in a specific, tangible format such as research reports, manuals and documented theories.

Tacit knowledge is often described as residing in the background of our consciousness, enabling us to perform certain tasks and attend to specific problems (Lauring and Selmer 2011: 349).

In Polanyi's (1966: 16) words, it "indwells in a comprehensive cognizance of the human mind and body". As Polanyi (1966: 4) comments, "we can know more than we can tell". That is to say, tacit knowledge is deeply embedded in the mind to the extent that the knowers are not fully aware of the knowledge they possesses (Koskinen, Pihlanto and Vanharanta 2003: 281).

Polanyi (1966: 4) provides an example of face recognition to illustrate this. While the human can recognize a face, we cannot articulate precisely how we do it. Nevertheless, tacit knowledge determines the behaviour of the knower. Common examples of tacit knowledge include the ability to ride a bicycle and the knowledge of an expert baseball player.

Close reading of Polanyi (1966: 4) indicates that he holds the view that some knowledge will always remain tacit. In so doing, he stresses the importance of knowing, as well as knowledge, and, in particular, the active shaping of experience performed in the pursuit of knowledge.

Discussing the practice of science, he observes that "science is operated by the skill of the scientist and it is through the exercise of this skill that he shapes his scientific knowledge" (Polanyi 1962: 49). This suggests both a view of knowledge as object and of 'know-how'. Thus, tacit knowledge differs from explicit knowledge in that tacit knowledge may be considered as the concepts of skill or practical 'know-how' (Koskinen, Pihlanto and Vanharanta 2003: 281).

Knowledge is also defined as professional intellect that embraces 'know-how', 'know-what', 'know-why' and 'care-why' (Kogut and Zander 1992: 383; Quinn, Anderson and Finkelstein 1996a: 7). 'Know-why' according to Quinn et al. (1996a: 7) refers to the "deep knowledge of cause and effect relationships underlying a discipline, expresses as highly trained intuition". 'Care-why' according to Quin et al. (1996a:40) refers to "will, motivation and adaptability for success, enabling renewal of intellect in the face of today's rapid changes.

As mentioned in Chapter 1, the focus on the development of the measurement constructs in this study is on the sharing of individual tacit knowledge in the form of practical work experience and procedural knowledge, i.e., 'know-what' and 'know-how' (previously defined in Chapter 1).

Davenport, De Long, and Beers (1998: 43) viewed knowledge as experience, context, judgment, belief, and information; they stated that it is the most strategically important resource that organisations possess.

There are various classifications of tacit knowledge. According to de Jong and Ferguson-Hessler (1996: 107) conceptual knowledge ('know-that') is "static knowledge of facts" and is often colloquially referred to as "book smarts". In management contexts, conceptual knowledge ('know-that') includes recognition and understanding of management principles, terms, and theories.

Procedural tacit knowledge ('know-how'), "is represented by actions or manipulations that are valid within a domain" (de Jong and Ferguson-Hessler 1996: 107). It is distinct from conceptual knowledge ('know-that') in that it requires demonstration that one can actually do a task-not just know its principles or concepts.

Applied tacit knowledge is distinct from procedural tacit knowledge in that it goes beyond knowing how to effectively execute actions to also include determination of when and under what circumstances it would be appropriate to take such actions (Alexander, Schallert and Hare 1991: 315). It is what learning researchers refer to as situational knowledge: "knowledge about dealing with situations as they typically appear in a particular domain" (de Jong and Ferguson-Hessler 1996: 107). Put another way, applied tacit knowledge determines how well individuals identify and execute proper courses of actions in contextual situations, without directions or response cues, amidst the noise and competing demands that typically characterize different roles in a University of Technology.

The notion of applied tacit knowledge is not new and is conceptually similar to what authors have termed "action skill" (Bigelow 1991: 305; Hedlund, Forsythe, Horvath, Williams, Snook and Sternberg 2003: 117). The definitional stance adopted in this study relates to applied and procedural tacit knowledge.

There is a difference between knowledge and knowledge sharing. In contrast to knowledge, Lauring and Selmer (2011: 349) views knowledge sharing as the provision or receipt of information, 'know-how' and feedback in a particular context. The process of knowledge sharing engagement requires that individuals engage in close interactions that allow them to observe and learn from each other (Baldwin et al. 2010: 586). Knowledge is primarily gained through activity both in attempting to change our environment (through labour or work) and through interaction with other people (Sayer 1992: 13).

Knowledge sharing can be defined as "a social interaction culture involving the exchange of employee knowledge, experience and skills throughout a department or organisation" (Yang 2007: 530). Knowledge sharing between individuals is the process by which knowledge possessed by one individual is converted into a form that can be understood and used by others (Ipe 2003: 337). Gilbert and Krause

(2002: 89) explain the sharing of knowledge as “the willingness of individuals in an organisation to share with others the knowledge they have acquired or created” and it occurs when one party gives some knowledge (explicit or tacit) to another person (Staples and Webster 2008: 617). Dixon (2000a: 1) viewed knowledge sharing as the flow of knowledge from someone who has it to someone wants it.

At the individual level, Ipe (2003: 337) viewed knowledge sharing as effective leverage for making knowledge available to others within the organisation.

Knowledge is one of the few assets that grows most - usually exponentially when shared (Quin et al. 1996a: 7). The effectiveness of knowledge sharing in organisations can be a significant factor to successful organisational management (Earl 2001a: 215; Ipe 2003: 337; Michailova and Husted 2003: 59; Tsoukas and Vladimirou 2001: 973).

2.2.1 Tacit knowledge sharing in a University of Technology

This section highlights the changing role of Universities of Technology in society. It further discusses the sharing of tacit knowledge in a University of Technology setting as opposed to a non-university setting. Universities are primarily in the business of the creation and transfer of knowledge for the betterment of society. In order to cope with a rapidly and increasingly complex environment, the role and functions of Universities of Technology in society is changing. In recent years, Universities of Technology have faced highly complex problems, rapidly changing technologies and a dynamic growth and diversification of knowledge in terms of multidisciplinary and multinational concerns (Kanzler 2010: 31).

The University of Technology system - both internationally and locally is undergoing changes, both educational and financial changes and the effects from social capital, such as innovation, reduced transaction costs and intellectual capital are crucial to handling these changes efficiently.

According to Du Pré (2009: 14) a University of Technology is “a social structure that is organised in a logically disclosed reality with a view to that which qualifies it, namely scientifically-oriented research and teaching/learning”. He offers the following definition of a university: “the university is an academic institution at which research is conducted and teaching and learning are offered within the organised cadre of the contact between lecturer and student, and supported by networking, cooperation and collaboration with external academic partners to create, develop and transmit new knowledge” (Du Pré 2009: 14). At a technological university the focus is on the study of technology from the viewpoint of various fields of study, rather than a particular field of study. The paramount characteristic of the nature of Universities of Technology is technology and technology should be conceptualised in its broadest sense as referring to the effective and efficient application of the accumulated ‘know-how’, knowledge, skills and expertise, that when applied will result in the output of value-added products, processes and services (Du Pré 2009: 15). In essence, it is the ‘know-how’ to fabricate things (this includes creating and developing new technologies). This concept finds its origin in the Greek word, ‘*techne’,* that means 'skill' or 'proficiency' and is also related to the words, ‘*episteme’*, meaning 'understanding and skill', and ‘*poeisis’*, that denotes 'working, creating,' and once again, 'skills' (Du Pré 2009: 15). Prusak (1996: 6) said that “the only thing that gives an organisation a competitive edge… is what it knows, how it uses what it knows, and how fast it can know something new”. Technology, therefore straddles two issues: firstly, the skill to fabricate things and, secondly, the skill to manage the fabricated products. The use of ‘skills’ in a University of Technology refers more to competencies, i.e., the higher-level intellectual challenges of application and knowledge, in addition to the acquisition of knowledge; and not the lower level skills developed through repetition which do not require high level skills.

Unesco (1985: 1) defines technology as "... the 'know-how' and creative processes that may assist people to utilise tools, resources and systems to solve problems and enhance control over the natural and made environment in an endeavour to improve the human condition." The aim of technology then is to improve the lives of human beings.

The emerging knowledge society has profound consequences for the University of Technology. Conceptually three consequences can be identified:

Firstly, Universities of Technology have to accept the fact that they have lost their monopoly on knowledge development. The most innovative research and best laboratories are often found outside universities (for example, Silicon Valley). This new development forces Universities of Technology to reconsider the way in which knowledge is being developed. Secondly, Universities of Technology can sell their knowledge. In doing so, the universities are acting like enterprises competing on the open market. This calls for Universities of Technology to position themselves with regard to knowledge transfer. Higher education institutions worldwide have realised the importance not only of generating new knowledge through research and development programmes, but also actively participating in applying and utilising their knowledge and technology for new products, processes and services. The University of Technology in this study placed a high premium on research and staff members were encouraged to engage in relevant quality research. Entrepreneurial institutions have formulated and implemented strategies to ensure that the 'flow through' of new technology into the market place actually takes place. The emergence of new modes of knowledge production, more geared towards addressing the needs of government, industry and communities, as well as the need for higher education to stimulate economic growth, has led to revised strategies for Universities of Technology.

In particular, a number of Universities of Technology have opted for developing a community of skilled graduates with relevant and specialized knowledge and skills; contributing to a modernizing economy through technological innovation and technology transfer, entrepreneurial development and the application of knowledge and technology. Thirdly, Universities of Technology should deliver programmes contributing towards knowledge-based professions.

The core functions of the University of Technology that is studied in this research are administration, teaching/learning, research and community engagement. The university caters for the needs of employees and has a large complement of previously disadvantaged students. Learning and the transfer of knowledge is critical in each one of the universities core functions. The university strives to ensure that all training is focused on "training for competence. Tacit knowledge is originated in the intelligence of individual staff members and is visible in the tasks, systems, procedures, norms and customs of a University of Technology. Widén-Wulff (2003: 85) states that by studying the different work processes of an organisation, the role of information and knowledge in the organisation can be visualised and business information explained. She believes that social capital theory offers a lens for analysing the transfer of information and knowledge within the business processes in a university. This encourages them to engage in collaborative projects in which dialogue, information transfer and the sharing of tacit knowledge is crucial (Lee and Bozeman 2005: 691).

Much of the tacit knowledge within a University of Technology is located within the social conditions and social organisation of the university. Social organisation refers to "the way in which human conduct becomes socially organised, that is, to the observed regularities in the behaviour of people that are due to the social conditions in which they find themselves rather than to their physiological or psychological characteristics as individuals" (Shafritz and Ott 1996: 214).

According to Shafritz and Ott (1996: 214) the many social conditions that influence the conduct of people can be divided into two basic aspects of social organisations: "(1) the structure of social relations in a group and (2) the shared beliefs and orientations that unite the members of the group and guide their conduct".

The social conditions which exist in a University of Technology facilitate the combination and exchange of intellectual resources which leads to the development of intellectual capital. According to Chakrabarti and Santoro (2004: 23), this combination and exchange process depends on four factors:

- "access to the parties involved
- perceived value of the interaction
- motivation for engaging in activities and
- creative capability of the parties".

Staff in a University of Technology teach undergraduate and graduate courses, interact with students individually or in a group, guide degree-related individual studies, design and conduct research projects, develop and design courses, become involved with various committees on and off campus, and participate in consulting jobs with public and private organisations (Seonghee and Boryung 2008: 284). Staff members' multidimensional role can be difficult to manage effectively. Traditional academic teaching is not typified by flexibility. Faculty members are generally creative and think critically. They tend to maintain an objective distance from the work of their peers. They tend to be relatively conservative, are hesitant to accept rapid changes, and often hesitate to accept the benefits of the maturing technologies. They also tend to be independent, individualistic, and autonomous. Academic staff members tend to focus on individual academic goals and visions rather than working toward common goals. Consequently, their desire to share knowledge is relatively weak. Instead, they locate and acquire information and knowledge through the Internet or through personal human networks. As Sanford (1971: 357) indicated, academic staff members hesitate to follow the teaching and pedagogies of others, preferring to create their own materials.

Although it is possible for faculty members to share their knowledge due to rapidly developing IT and the interdisciplinary characteristics of research and teaching, they hesitate to share such materials due to the lack of systems to protect their intellectual assets. However, efficient scholarly collaboration among faculty members would increase their effectiveness.

According to Austin (1990: 68) Universities of Technology consist of two overlapping subcultures - professional and institutional (which shape the way faculty members teach and interact with their peers and students (Umbach 2007: 263). Regardless of institutional variations, the professional subculture holds the universal values to be the pursuit and dissemination of knowledge (Clark 1987: 41). As mentioned, two major areas of faculty performance in research universities are teaching and research. Traditionally, major universities tend to emphasize research, while Universities of Technology have high teaching loads. However, in recent years, the expectation for productivity in many universities has increased, and high course loads have remained (Perry et al. 1997: 619). Universities produce tremendous amounts of course related resources as the result of these activities. Most of the time, these materials are organized and preserved by individual faculty members; they are not shared efficiently among colleagues who teach the same courses in the same semester or following semesters. Some of these materials have high scholarly value as well as practical merits. However, these materials are not collected and organized due to the absence of a consistent and systematic communication channel for sharing. Throughout the years, the same materials have been recreated frequently. This repetition comes at the expense of time, money, and labor from both the faculty and parent organisation's perspectives. If this valuable information and knowledge could be shared efficiently among colleagues, faculty members could devote more time to research and interaction with students, create a dialogue with colleagues, and provide quality control on courses by providing unified and consistent course materials to students who take a particular course.

Van Westrienen and Lynch (2005: 1) reported on the status of academic institutional repositories in 13 countries. Their report identified uncertainty and fear about intellectual property issues and impact factors regarding scholarly credit as inhibiting factors in institutional repositories. Additionally, they called for the development of a simple, transparent submission process for providing open and easy access to repositories. Beyond this study, little is known about attitudes and behaviors regarding knowledge sharing in an academic environment. Because a faculty community has its own idiosyncratic characteristics, it may have different perceptions and attitudes toward knowledge sharing than members in other types of organisations.

Seonghee and Boryung (2008: 282) also state that "few studies have addressed the perceptions and attitudes of faculty toward knowledge sharing through their institutional repositories on campus". Furthermore they comment that individual members of academic institutions place a higher priority on individual scholarly achievement and teaching than on sharing common visions toward organisational goals and objectives. Consequently, there is a relatively weak willingness to share knowledge for achieving common goals in academia compared to in profit-oriented organisations. In addition, Seonghee and Boryung (2008: 282) found that due to these unique characteristics of exclusiveness and individualism, knowledge sharing and knowledge management in academic organisations are often not systematic and may be inefficient. They found that college and university faculties are embedded within an organisational mixture of disciplinary context and institutional alliances that are made up of numerous subcultures (Seonghee and Boryung 2008: 284). For example, their profession is made of three overlapping subcultures - professional, institutional, and disciplinary - which shape the way faculty members teach and interact with their peer and students.

Regardless of institutional and disciplinary variations, the professional culture (or subculture) holds the universal values to be the pursuit and dissemination of knowledge (Clark 1987: 41). Traditional academic teaching is not typified by flexibility. Faculty members are generally creative and think critically. They tend to maintain an objective distance from the work of their peers. They tend to be relatively conservative, are hesitant to accept rapid changes (Clark and Lewis 1985: 40), and often hesitate to accept the benefits of the maturing technologies (Ayer 2004: 48; Crawford and Crawford 1997: 25). They also tend to be independent, individualistic, and autonomous. Faculty members tend to focus on individual academic goals and visions rather than working toward common goals. Consequently, their desire to share knowledge is relatively weak. Instead, they locate and acquire information and knowledge through the Internet or through personal human networks. As Sanford (1971: 357) indicated, faculty members hesitate to follow the teaching and pedagogies of others, preferring to create their own materials. Although it is possible for faculty members to share their knowledge due to rapidly developing IT and the interdisciplinary characteristics of research and teaching, they hesitate to share such materials due to the lack of systems to protect their intellectual assets. However, efficient scholarly collaboration among faculty members would increase their effectiveness.

Faculty members can possess both tacit and explicit knowledge, as defined by Nonaka and Takeuchi (1995: 40). Tacit knowledge cannot be expressed in any tangible form. Faculty members obtain it either by teaching the course or as a result of professional experience. It includes their cognitive skills, problem-solving ability, and capability to conduct research. Explicit knowledge can be expressed in a specific, tangible format such as research reports, manuals, and documented theories. A faculty member's knowledge is considered a special form of knowledge (Quinn, Anderson and Finkelstein 1996a: 7). Liebowitz (2001: 4) states that educational institutions do not apply much knowledge management. Seonghee and Boryung (2008: 284) concur and comment that that little is known about attitudes and behaviors regarding knowledge sharing in an academic environment. Few researchers have investigated knowledge management in academic institutions. Cronin (2001: 129) state that scholarly activities such as teaching, research, and knowledge sharing could be promoted through appropriate and effective knowledge management or through publicly accessible repositories on campus.

Although tacit knowledge sharing in academia is little studied there are some important works. Cronin (2001: 129) reminds us that the university context is quite different from others concerning information behaviour. Management of information and knowledge does not easily work in the university setting where the faculty members may find their loyalty closer to their discipline than to their university. Del Favero (2003: 69) has pointed out that effective information sharing between different entities (faculty-administrators) at a faculty is important for fruitful faculty management and for organisational favours (e.g. resource exchange).

The findings from Totterman and Widén-Wulffs' (2007: 12) study indicated that information sharing tends to work more efficiently within departments, the local bounded networks and the faculty external networks. According to them, the pre-requisites for social capital appear to exist in these environments. The interviewees in their study stressed some important incentives for a successful information and knowledge sharing climate, such as working in the same building, personal friendship and scholarly closeness. They found that the identification with the discipline both within the university and outside it was of great importance for the faculty professors. Furthermore, most interviewees tended to underline the existence of formal and informal network structures, trust and an open communication climate within one's own department and in some cases with one's closest neighbouring departments. In these environments, the signs of active collaborative information and knowledge sharing were most obvious.

2.3 Conceptions of social capital

The social capital definitions put forward by well-respected theoreticians have been presented here, due to the confusion and disagreement that exists in the literature with regard to defining social capital. Further definitions of social capital have been presented in Appendix C, Table C1.

The term social capital was originally used to describe the relational resources, embedded in personal ties that are useful for the development of individuals in community social organisations (Jacobs 1965: 60). Over the years social capital has been applied to diverse social phenomena. Researchers have applied the concept to the development of human capital (Coleman 1988: 388) to institutional economic performance (Baker 1990: 589) to geographic data and the study of states (Putnam 1993: 167), and national data (Fukuyama 1995a: 1).

Bourdieu (1979: 1) was one of the earliest scholars of social capital. He sought to address the two questions - ‘what is capital, and what forms does it take?’ Building on classical social economic thinkers, such as Durkheim, Mauss, Polanyi and Weber, the result of Bourdieu’s (1979: 1) work was an original reformulation of Marx's concept of capital, where the term 'capital' is expanded to include both material and well as non-material phenomena.

Within classical economics, capital has been broadly defined as a resource available for a person or an organisation and used for maximizing profits. Bourdieu (1986: 241), in line with Marx, defines capital broadly as "accumulated, human labour in either a materialized or incorporated form (that is, within a person), which can potentially produce various forms of profits".

In a more sociological, synchronic perspective, Bourdieu (1986: 241) states that it is a key characteristic of capital that it is inscribed in the world or, in his own formulation, "a force inscribed in the objectivity of things." Therefore, capital implies the existence of media, through which it can be transferred in time and space. These media consist of human-made things (materialized form) and human beings (incorporated form). Bourdieu (1986: 248) goes on to say that consequently, we find physical capital in an objectified material form. Whereas, we find human capital consisting, for example, of education and working experience in an incorporated form, that is, as an invisible part of a person. However, only one form of capital, social capital, exists as relations, that is, as invisible products outside human beings. Therefore, social capital can be transferred through time only in an indirect form, namely as an integral part of a thing or a person (Svendsen 2004: 18). This ties up closely with Polanyi's (1962: 606) view of knowledge as 'indwelling' in his discussion of tacit knowledge.

Bourdieu (1986b: 248) was one of the first researchers to use the term social capital. Focusing on network relations within a group from which the individual group member can profit, social capital in Bourdieu's (1986b: 248) becomes: "the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition”. In his definition, social capital consists of the benefits which accrue to people as a result of their participation in social networks as well as the benefits which occur as a result of the relationships themselves. Bourdieu (1986b: 249) comments that "the volume of social capital possessed by a given agent depends on the size of the network of connections that he/she can effectively mobilize". Social capital, is thus a major aspect of social structure and like other forms of capital, social capital can be put to productive use (Bourdieu 1986b: 249; Coleman 1990b: 302; Putnam 1993: 167).

Bourdieu's (1977: 1) believes that society consists of many social fields. The control of economic, social and cultural capital within these social fields defines the positions and possibilities of individuals. He views economic capital in the same way as Marx but it, in his view, also includes other economic possessions that increase an individual’s access to resources (Bourdieu 1977:1).

In Bourdieu’s (1986b: 241) view the goal of the creation and participation in social networks is improved access to economic capital. Bourdieu (1985: 243) makes the point that “social capital is made up of social obligations (connections) which is convertible, in certain conditions, into economic capital”. Thus, he believes that the individual’s network of relationships is the product of investment strategies aimed at establishing or reproducing social relationships that are directly usable in the short or long term” (Bourdieu 1986b: 248).

Membership in social interaction networks and the social relationships that occur as a result of membership in these networks may be used to increase the social positions of individuals within these networks (Bourdieu 1980: 2).

Another early proponent of social capital is Coleman (1988: S98). The research traditions for social capital can also be traced to his investigations into the New York diamond market, which sought to explain why people co-operate in a communal setting (Coleman 1988: 20-21). Bourdieu's (1986b: 248) human capital theory is concerned with the power of cultural capital, while Coleman (1990: 302) focuses on the role of social capital in the development of human capital.

Coleman (1988: 388) argues that the two words 'social' and 'capital' denote a useful linkage. He points out that in the economist term, 'capital' implies a resource that facilitates production, "but is not consumed or otherwise used up in production". While the sociologists notion of 'social' refers to "aspects of social organisation, ordinarily informal relationship, established for non-economic purposes, yet with economic consequences. Thus, the amount of social capital depends on "the quality of the set of relationships of a social group" (Szreter 2000: 57). Thus, social capital is relational, it is shared by individuals.

Coleman (1990: 302) views social capital in terms of its function rather than in terms of its composition. Coleman (1990: 302) defines social capital in the following way:

> It is not a single entity but a variety of different entities, with two elements in common: they all consist of some aspect of social structures, and they facilitate certain actions of actors-whether persons or corporate actors-within the structure. Like other forms of capital, social capital is productive, making possible the achievement of certain ends that in its absence would not be possible.

His definition highlights the benefits which people obtain as a result of participation in social networks and the deliberate construction of sociability for the purpose of creating this resource. In line with other forms of capital, Coleman (1990: 302) views social capital as “productive of certain ends that could not be achieved in its absence”.

He identifies three dimensions of social capital: “expectations and obligations; trustworthiness of structures and information channels; and norms and effective sanctions”. The first one, expectations and obligations refers to the belief that if you do something for another person they will return the favour at a later date. This, then, results in a “norm and expectation of generalized trust and reciprocity”. People are prepared to take risks in their relationships with one another because they believe that they will return the favour at a later date.

This dimension also relates to the belief that one can then trust the information that you receive from that person and this will inform your future action. The second dimension relates to “trustworthiness of structures and information channels”. The third dimension refers to “effective norms and sanctions which contribute to a generalized environment of trust”. Each of these dimensions lead to collaborative behaviour and collective problem solving.

Coleman (1990: 302) believes that in contrast to human and physical capital “social capital inheres in the structure of relations between actors not with the individual’s”. Just as the creation of physical capital involves changes in materials so as to facilitate production, and human capital involves changes in an individual's skills and capabilities, social capital is created when the relations among persons change in ways that facilitate instrumental action (Coleman 1990: 302).

Furthermore, applied to empirical data, Coleman (1988: 388) sees social capital as a public good, that is, a product that also benefits persons other than the producer, including persons who are unknown to the producer. For example, it can be statistically documented that the production of human capital in schools is facilitated, when pupils possess social capital in the form of strong networks (Putnam 1993a: 167). Networks of family, friends and neighbours, who know one another and meet regularly, ensure shared norms and social control. Coleman (1988: 386) refers to this as 'closure'.

At the same time, he states that if a key person in the local production of social capital (for example, a parent of one of the school children) moves from a community, persons other than this person will feel the loss by the 'severance' of closure-based relations (Coleman 1988: 389). This according to Coleman (1988: 386) confirms the importance of social capital as a collective good.

Coleman (1990: 302) believes that it is not possible for a society to utilize a human capital, if the people who have it, do not communicate. Social capital is thus, the prerequisite for transferring human capital such as knowledge, ideas, learning processes and so on. He further comments that if people are not dependent upon others then their stock of social capital diminishes. This is particularly relevant for the relational dimension of social capital. For example, "expectations and obligations are less significant where people have alternative sources of support" (Coleman 1990: 302).

Other scholars, in line with Coleman's (1990: 302) conceptualization of social capital have also espoused a broader definition of social capital, including not only social relationships, but also the norms and values associated with them (Portes and Sensenbrenner 1993: 1323; Putnam 1995: 667).

Putnam (1995b: 667), the latest exponent of social capital, views social capital in a different way to his predecessors. Whereas Bourdieu (1986b: 248) and Coleman (1990: 302) view social capital as producing resources and benefits for individuals as a result of their participation in social networks and the development of social relationships. Putnam (1993a: 6) was interested in determining the preconditions for the development of strong societal institutions and a prosperous economy. He believes that a successful economic and political system is due to the existence of social capital. The main result of Putnam's (1993a: 6, 7) Italian study was that government reform in Northern Italy succeeded because of 'civic community'. Putnam (1995b: 667) views social capital as residing in neighbourhoods, towns and countries.

Siisiäinen (2000: 10) points out that a further distinction may be seen between Putnam (1995b: 667) and Bourdieu (1968b: 248) in that Putnam's (1993a: 6) idea of social capital deals with collective values and societal integration, whereas Bourdieu's (1986b: 248) approach is made from the point of view of actors engaged in struggle in pursuit of their interests. Putnam (1995b: 667) focuses on action facilitated by social structure in his definition: "social capital refers to features of social organisation, such as trust, norms, and network's that can improve the efficiency of society by facilitating coordinated action". He includes family, friends and organisational networks in his definition.

Putman (1995b: 665) further comments that by social capital, "I mean features of social life-networks, norms and trust - that enable participants to act together more effectively to pursue shared objectives".

Putnam (1995b: 665) divides social capital into three dimensions, "moral obligations and social norms, social values (especially trust) and social networks of citizen's activity (especially among voluntary associations)".

He equates social capital with the level of associational involvement and participation that exists within a community (Putnam 1993a: 167). In his view, voluntary associations are viewed as socially organized groups that are based upon mutual trust. Trust creates and maintains the social relations between its members.

He believes that voluntary association is the most important form of horizontal interaction and reciprocity. According to Putnam (1993a: 173) voluntary associations influence social interaction and co-operation between actors in several ways: firstly they "increase the potential costs to a defector in any individual transaction"; secondly they, "foster robust norms of reciprocity"; and thirdly they, "facilitate communication and improve the flow of information about the trustworthiness of individuals".

Putnam (1993a: 173,174) comments that voluntary associations "allow reputations to be transmitted and refined and they embody past success at collaboration, which can serve as a culturally-defined template for future collaboration".

In comparing Bourdieu (1986b: 241) and Putnam (1993a: 167), it may be seen that Bourdieu (1986b: 241) is more individually orientated while Putnam (1993a:167) focuses more on the group. Putnam's (1993a:167) work is a continuation of the sociology of integration. In his research he is interested in the mechanisms that underlie societal values and which bring about solidarity and togetherness i.e., values that develop consensus and maintain the stable development of society. Trust and voluntary associations create trust in Putnam's (1993a: 167) approach. He is less concerned with social conflict and opposing interests.
In contrast, Bourdieu (1986b: 241) for his part excludes from his theory even the idea of 'genuine' consensus and universal values whose central function is to maintain it in everyday practices. He examines social conflict, forms of power/violence; and forms of domination and deprivation. He focuses more on the sociology of conflict. He focuses on the internal working of voluntary associations and on the structures of power and violence produced or destroyed by individuals. He is less

interested in trust and where he does examine trust/recognition and social exchange, he has the opposite view to Putnam (1993a: 167). Despite the differences between Bourdieu (1986b: 241), Coleman (1990: 302) and Putnam (1993a: 167) definitions, all three definitions indicate that social capital consists of personal connections and interpersonal interaction, together with the shared sets of values and norms that are associated with these contacts.

Putnam (1993a: 179) makes a valid comment when he comments that "different points of departure create a kind of theoretical 'path dependence' - where you can get to depends on where you are coming from, and some destinations you simply cannot get to from here".

In contrast to the above authors, Burt (1992a: 9) focuses on the exchanges that occur between individuals in different types of networks. Burt (1992a: 9) defines social capital as "friends, colleagues, and more general contacts through whom you receive opportunities to use your financial and human capital". For Burt (1997: 355) it includes "the brokerage opportunities in a network". He asserts that individuals who succeed have better social interaction networks and the possibility to develop stronger relationships within these networks. He further explains that "certain people are connected to certain others, dependent on exchange with certain others. Holding a certain position in the structure of these exchanges, can be an asset in its own right, that asset is social capital".

All of the previously discussed definitions of social capital agree that social structure is a kind of capital that can create for certain individuals a competitive advantage in pursuing their ends. Reciprocity and trust form part of all of these definitions. Collaboration and co-operation is fostered by social capital. Better connected people enjoy higher returns in terms of their exchange behavior.

In viewing the different definitions and conceptualizations of social capital, it may be seen that although various researchers agree on the significance social interaction networks and of social relationships as a resource, some researchers locate the source of social capital in the formal structure of the network ties that make up the social network (e.g., features of structure such as closure and structural holes), (Baker 1990: 589) and others focus on the content of those ties (e.g., shared norms, beliefs and abilities), (Adler and Kwon 2002: 23), whereas others, like Bourdieu (1986b: 241), Putnam (1995b: 664) and Nahapiet and Ghosal (1998: 251), also include the actual or potential resources that can be obtained through relationships within these social networks.
The research model developed and utilized in this study, includes all three of the above sources of social capital.

Generally, efforts by researchers have focused on synthesizing these many definitions by combining both the structure and content aspects of social relations in their research.

To conclude this section, it should be noted that defining social capital as a sort of capital is still a controversial issue. Solow (2000: 6) criticized "that social capital is not a capital which stands for a (purposefully reserved) stock of produced or natural factors of production that can be expected to yield productive services for some time".

Arrow (2000: 4) agreed with Solow (2000: 6) and even urged abandonment of the term 'social capital', reasoning that "human networks/organisations are not built up for economic purposes, but building and enjoying existing social relations that have intrinsic values to the participants".

Furthermore, some authors believe that the social phenomena captured by social capital (social networks, social norms, values, vision and goals) are part of the essential and normal dynamics of society and therefore should not be referred to as ‘capital’.

The next section will present the different levels of analysis of social capital.

2.4 Levels of analysis of social capital

As a concept rooted in the structure and content of networks of relationships, social capital can be conceptualized and operationally defined at many different levels of analysis, including micro, meso and macro level as differentiated below:

- Micro-level (i.e., individual and household levels) as found in sociology. At the individual level, social capital refers to “a person’s potential to activate and effectively mobilise a network of social connections based on mutual recognition and maintained by symbolic and material exchanges” (Bayat 2005: 11; Bourdieu 1986: 471).

  Glaeser (2001: 415) provides an alternative definition for individual social capital and defines it as “the set of social attributes possessed by an individual”.

  At this level, social capital may be viewed as the values, norms and networks of interaction between individuals. For example, benefit’s that arise as a result of an increase in status or improved career opportunities, including contacts that increase the individual’s access to resources (Belliveau, O'Reilly and Wade 1996: 1568; Burt 2000: 345; Lin 1999: 42).

- Meso-level (i.e., institutional, regional and community levels) as found in sociology and business studies (Adler and Kwon 2002: 23; Burt 1992: 339; Tsai and Ghoshal 1998: 464). Social capital as an attribute of community is "the quality of the networks and relationships that enable individuals to cooperate and act collectively" (Putnam, Leonardi and Nanetti 1993: 1). It includes "the set of social resources of a community that increases the welfare of that community" (Glaeser 2001: 4). A business example at the meso-level is departmental resource exchange in organisations (Baker 1990: 592).

- Macro-level (i.e., governmental and national levels) as found in sociology and political studies (Grootaert 1999: 2148; Patulny 2004: 32; Putnam 1995b: 664; Putnam 2000: 41).

It should be noted that defining social capital at these three different levels leads to different conceptualizations and measures of social capital (Narayan and Pritchett 2000: 280).

According to Bayat (2005: 1) many researchers incorrectly define the level of social capital at which they are working which leads to inconclusive results. He comments that there tends to be confusion with regard to the development of measurement constructs and the measurement of social capital at the different levels in the literature. Many authors confuse meso-level measurements and discussions with micro-level measurements and discussions. This leads to poorly constructed measurement constructs and invalid deductions.

In addition, problems occur with regard to aggregation. More research is required into the relationship between the macro and meso-levels and the meso and micro-levels (Bayat 2005: 11).

The focus of this study was the knowledge that exists within individuals and the factors that influence the process of knowledge sharing between individuals. Thus, this research concentrated on social capital at the individual level of analysis. The research focus concurs with Portes (1998b: 21) statement, who at the end of his literature review of social capital, asserted that “the greatest theoretical promise of social capital lies at the individual level” - exemplified by the analyses of Bourdieu (1986: 249) and Coleman (1988: 388).

It was limited to the individual, social interaction process of the sharing of tacit knowledge and to specific characteristics relevant to the process of the sharing of tacit knowledge (i.e., characteristics of the exchange). Characteristics such as attitudes, values, social norms, trust, vision, goals, perceived norms and perceived behavioural control.

This study does not examine individual characteristics of the participants such as absorptive capacity and lack of communication competence. For example, individuals might acquire and assimilate tacit knowledge from a source but not all of them have the capacity to transform and utilize it in order to improve their work practices (Zahra and George 2002: 189). It should be noted that it is difficult to separate the individual characteristics from the characteristics of the exchange, for example trust is a characteristic of the individual and of the exchange between individuals.

The individual dimensions of social capital (i.e., the structural, relational and cognitive dimensions) are discussed in more detail in the following sections.

2.5 Dimensions of social capital

Social capital is not a unidimensional concept and different scholars of social capital have studied different dimensions of social capital (Pan, Newell, Huang and Galliers 2007: 405).

It is often described in terms of three dimensions, the structural, relational and cognitive dimensions of social capital. This three-dimensional model of social capital is a valuable approach. Many authors agree that social capital analysed through its dimensions is a way of analysing the sharing of tacit knowledge as a social construct (Nahapiet and Ghoshal 1998: 243; Tsai and Ghoshal 1998: 465; Widén-Wulff and Ginman 2004: 448).

Since Nahapiet and Ghoshal's study (1998: 243) pointed out their possible relationship to the generation of intellectual capital, the study of social capital has been very fruitful in understanding the sharing of tacit knowledge.

In addition, the relationship between tacit knowledge sharing behaviour and the dimensions of social capital for successful organisational knowledge creation and intellectual capital has been stressed in several business and organisation contexts (Cohen and Prusak 2001: 1; Hazleton and Kennan 2000: 81; Nahapiet and Ghoshal 1998: 242). They have been found to be useful in explaining and predicting the sharing of tacit knowledge by influencing the conditions necessary for knowledge and resource exchange and combination to occur (Pan, Newell, Huang and Galliers 2007: 405; Widén-Wulff and Ginman 2004: 448).

This study made use of and adapted Nahapiet and Ghoshal (1998: 243) classification of the social capital dimensions (Figure 2.2). They developed the thesis that social capital facilitates the development of intellectual capital by affecting the conditions necessary for exchange and combination to occur. They also suggested that that it is useful to consider social capital facets in terms of the three dimensions, i.e.: the structural (which facilitates social interaction), the relational, and the cognitive dimensions of social capital (which predisposes people to act in a socially beneficial way).

They examined how each of the three dimensions of social capital influenced the four conditions for resource exchange and combination as diagrammed in Figure 2.2. These three dimensions work interactively, and are mutually reinforcing. For the sake of clarity of exposition, Nahapiet and Ghoshal (1998: 243) consider each dimension of social capital independently. Although they separate the three dimensions of social capital analytically, they recognize that many of the features they describe are, in fact, highly interrelated. Social capital is also divided into a structural, content (cognitive), and a relational dimension by Tsai and Ghoshal (1998: 464) and Hazleton and Kennan (2000: 81).

Although this study considers each dimension of social capital independently from the other dimensions, it is recognized that each dimension of social capital may be interrelated in important and complex ways. For example, particular structural dimensions, such as those displaying strong symmetrical ties, have consistently been shown to be associated with such relational dimensions as interpersonal affect and trust (Bartol and Srivastava 2002: 67; Granovetter 1985: 487; Krackhardt 1992: 216). Similarly, researchers have highlighted the often complex interdependencies between social identification and shared vocabulary and language (Ashforth and Mael 1989: 20).

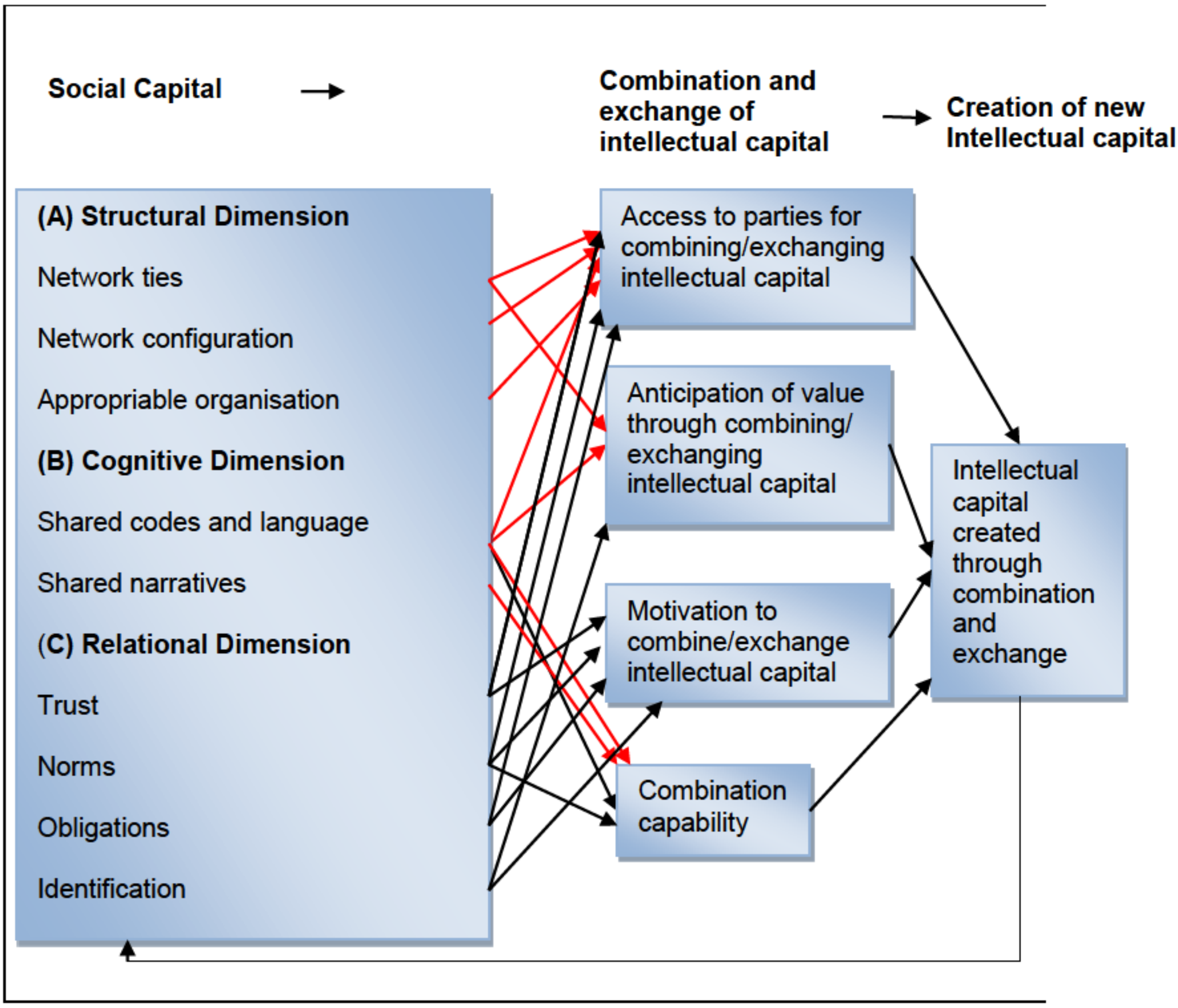

Figure 2.2 Social capital in the creation of intellectual capital (Nahapiet and Ghoshal 1998: 251).

The study model for this research incorporated the structural dimension of social capital (network ties and network resources), the relational dimension of social capital (trust, shared values and norms) and the cognitive dimension of social capital (shared goals and vision).

The structural dimension of social capital is discussed in the next section.

2.5.1 Structural dimension of social capital

In this study, the structural dimension of social capital incorporated strong network ties and network resources

Various authors describe the structural dimension of social capital in different ways depending upon their conceptualization of social capital.
Nahapiet and Ghoshal (1998: 236) believe that the structural dimension of social capital can be conceptualised as "the overall pattern of relationships among social actors - that is, who you reach and how you reach them".

Their work on the structural of social capital was informed by Granovetter's (1992: 3) work on structural embeddedness. The structural dimension, for example, according to Granovetter (1992: 3) concerns "the overall configuration of the social interaction network ties and the pattern of relationships that define an individual's position in a network".

The structural dimension of social capital also occurs in the work of Lindenberg (1996: 311) and Hakansson and Snehota (1995: 1).

Nahapiet and Ghoshal (1998: 236) refer to the concept of embeddedness as "the binding of social relations in contexts of time and space….structural embeddedness concerns the properties of the social system and of the network of relations as a whole". The structural dimension, in their opinion, includes the network structure and the nature of the network ties between the actors. It refers to the networks of configurations between individuals.
According to Nahapiet and Ghoshal (1998: 236):

> it is fundamentally concerned with resources located within structures and processes of social exchange; as such, the

development of social capital is significantly affected by those factors shaping the evolution of social relationships.

For Burt (1992: 61) this dimension includes social interaction. It involves "social and network relations whose connections define who can be reached and how" (Burt 1992: 61). It refers to the "overall pattern of connections between actors" (Burt 1992b: 60). He believes that the location of an actor's contacts in a social structure of interactions provides certain advantages for the actor.

Bolino, Turnley and Bloodgood (2002: 505) agree that the structural dimension refers to "the extent to which actors in a social network are connected".

Hazleton and Kennan (2000: 81) state that this dimension is concerned with access to other actors, individual and corporate resources. They claim that individuals make use of their social networks and relationships to obtain information, knowledge and employment opportunities.

Krishna and Uphoff (1999: 1) are of the opinion that the structural dimension emphasizes the relationships between human behavior and organisations, and includes rules, social networks, associations, institutions, roles, procedures, and precedents. They, thus, have a broader conception of the structural dimension.

Factors that are studied in this dimension include the pattern of the network, open or closed networks, network density, connectivity and hierarchical relationships (Chow and Chan 2008: 459); the presence or absence of social network ties between actors (Scott 2000: 1); social network analysis (Wasserman and Faust 1994: 1); network configuration describing the type of network structure (for example, identity, connectivity and hierarchy), (Tichy, Tushman and Fombrun 1979: 507) and the existence of networks created for one purpose that may be used for another (Coleman 1988: 94).

While actually measuring the various dimensions of social capital, structural social capital is the most observable of them all. The structural dimension is important for the creation and utilization of social capital.

Lin (2005: 11) believes that "equating networks with social capital is incorrect and that equating dense or closed networks with better or greater amount of social capital is conceptually flawed". She contends that "what is needed is to specify conditions under which certain network features such as density or openness lead to the capturing of certain resources that generate certain kinds of returns".

This study adopted Lin's (2005: 11) approach and only one type of network structure, i.e., a strong bonding network structure which is characterized by close individual relationships (i.e., strong network ties) was studied.

This is in line with Inkpen and Tsang's (2005: 161) opinion that the concept of network is one that suffers from being overstretched. They believe that the dynamics of the sharing of tacit knowledge vary across network types and they illustrate that network structures are not uniform in their effects on the sharing of knowledge.

Davidsson and Honig (2003: 308) concur with Inkpen and Tsang (2005: 161) and make the point that:

> network ties that result in social capital may be either direct or indirect, their intensity may vary and the outcomes (in terms of bonding social capital/strong network ties and

bridging social capital/weak network ties) are contingent upon the type of network being analyzed.

In Inkpen and Tsang's (2005: 161) opinion, "network theories that fail to distinguish between network types will be unable to capture the complex variety of factors associated with network knowledge processes". Their research indicated that "network theories need to develop beyond the early, broad theoretical discussions that were based on a generic type of network and to examine in detail the characteristics of different network types" (Inkpen and Tsang 2005: 161).

Thus, this study's structural dimension, measurement constructs concentrate on a strong network tie structure and the resources that are embedded within that structure, i.e.:

- Strong network ties, which incorporate' strength-of-tie' theory (which focuses on the nature of the network ties), (Granovetter 1973: 1360), (Appendix B3 - Three measurement items - question 11, 21 and 12) and
- Network resources, which incorporates social resources theory, which focuses on the resources that are embedded in the individual's social network (Bourdieu 1985: 249; Coleman 1988: 95; Lin 1990: 247), (Appendix B3 - Three measurement items - question 14, 33 and 7).

Strength-of-tie theory focuses on the structure of the network. Social resources theory focuses on the content of the network. According to Seibert, Kraimer and Liden (2001: 7) "a fruitful integration of the two differing conceptualizations of social capital is possible". The key to this integration is to recognize an analytical distinction between the structural properties of the network and the nature of the social resources embedded in the network; essentially a distinction between the form and the content of ego's network. These theories do not only function independently, they may function together but focus on different aspects of social capital.

This study adopts the view that social capital is derived from both the network structure which facilitates or impedes access to social resources and the nature of the social resources embedded in the network. As Seibert et al. (2001: 7) state “the key empirical question then becomes what network structures leads ego to have more (or less) access to important social resources?” In terms of this study which network structure provides more or less access to tacit knowledge?

Lin (2005: 11) has made the point that:

> it must be noted that while social capital is contingent on social networks, they are not equivalent or interchangeable terms. Networks provide the necessary condition for access to and use of embedded resources. Without networks, it would be impossible to capture the embedded resources. Yet networks and network features by themselves are not identical with resources. Rather, variations in networks or network features may increase or decrease the likelihood of having a certain quantity or quality of resources embedded. Thus, network ties should be seen as important and necessary antecedents exogenous to social capital.

This studies ‘network ties’, research objective, literature review and hypothesis for ‘network ties’ is discussed in the next section.

2.5.1.1 Network ties

The research objective for network ties is:

Ro.1. *To determine the influence of strong network ties on the individual’s attitude towards tacit knowledge sharing.*

According to Burt (1992b: 6) social capital may be conceptualized through the identification of network ties and social relationships. For him networks ties are part of the structural dimension of social capital and refer to the configuration of linkages between individuals. The concept of structure implies that there is a relationship between the individual components in the structure. It refers to the structural outcome of social interactions (Burt 1992b: 6).

For example, a busload of passengers does not constitute a group, since no social relations unify individuals in a common structure. But a busload of team soccer players is a group because a network of social relations links the members into a social structure, a structure which is a characteristic of the collectivity that cannot be reduced to the attributes of its individual members (Blau and Scott 1962: 214).

In short, a "network of social relations transforms an aggregate of individuals into a group (or an aggregate of groups into a larger social structure) and the group is more than the sum of the individual's composing it since the structure of social relations is an element that influences the conduct of individuals" (Blau and Scott 1962: 214).

This study examines the social interaction network tie strength at the individual dyadic level (Granovetter 1973: 1478).

Bourdieu (1986b: 249) believes that "social capital resides in relationships between individuals and that the pattern of ties and the relationships built through them are the foundation for social capital". Many researchers believe that social capital may best be seen as a structural asset which occurs in the relationships between individuals (Bourdieu 1985: 248; Davenport, Graham Kennedy and Taylor 2003: 101; Woolcock and Narayan 2000: 230).

The measurement constructs with regard to network ties describe the "pattern of relationships that define an agent's position in a network and the character of the social interaction network tie reflect the intensity of the beliefs and shared values between actors in a network".

Tichy, Tushman and Fombrun (1979: 507) contend that network ties between pairs of individuals represent a wide range of connections, including such activities as friendship, advice seeking, informational communication, material transfers and exchange.

Network ties influence both access to parties for combining and exchanging knowledge and anticipation of value through such exchange (Burt 1992: 339). In addition, arguments have been made that through cycles of knowledge sharing, individuals acquire personal knowledge about each other that develop and strengthen social ties (Levin and Cross 2004: 1477).

This study focuses on the structure that relates to social relations. Rechac and Weisberg (2009: 285) found knowledge sharing engagement to be positively associated with the development of strong social relations. The social relations structure consists of "the pattern of particular ties between actors, where variation in the network in the existence or strength of ties is meaningful and consequential" (Cook and Whitmeyer 1992: 118).

The fact that knowledge sharing within social relations is a dynamic process, shaped by individual factors, situation, and context is well known today. Firstly, social relations involves patterns of social interaction: the number of times people meet, and for how long, the pattern of initiation of the contacts, the direction of influence, status and power between individuals, the degree of cooperation and collaboration, and so forth (Cook and Whitmeyer 1992: 118).

In a University of Technology there is a continual dialogue between explicit and tacit knowledge which draws the creation of new ideas and concepts. According to Nonaka (1994: 18) although ideas are formed in the minds of individuals, social interaction between employees typically play a critical role in developing these ideas. University employees are continuously committed to recreating the world in accordance with their own perceptions (Nonaka 1994: 18).

Networks ties promote a shared understanding among employees, which increases the likelihood of understanding between them because it allows them to formulate their knowledge as a result of knowing what the receiver knows and does not know (Cramton 2001: 346). This understanding involves a kind of ‘parallel processing’ of the complexities of current issues, as the different dimensions of a problem are processed simultaneously. That is to say ‘networks of social interaction’ contribute to the amplification and development of new knowledge (Nonaka 1994: 18). Through social interaction, individuals share and develop knowledge. As a new idea resonates around network of individuals, it is developed and clarified. Networks of social interaction, within universities, provide a forum for nurturing and developing new ideas (Wilson 2000: 53).

They provide a context for creative individuals to create knowledge (Tindale and Kameda 2000: 123). Individuals create and define problems and then actively develop new knowledge to solve them. An innovative idea created by one individual creates a stream of related information and knowledge which may then bring changes in the knowledge base of other individuals. The most valuable employee in a university is the one who is capable of performing at an expert level within networks of social interaction and is able to transfer that expertise to appropriate colleagues (Pettigre, Fidel and Bruce 2001: 43). This transfer facilitates the development of intellectual capital.

The process of tacit knowledge sharing engagement requires that individuals engage in close social interactions that allow them to share ideas and learn from each other (Janowicz-Panjaitan and Krishnan

2009: 245). These social interactions have business consequences in terms of providing valuable information and knowledge flows.

Tacit knowledge resides and is generally shared within the context of a social relationship through social networks. Minbaeva (2007: 579) defines closeness of relationships as “the degree of involvement of source and recipient in communication channels and integrative mechanisms within a firm (Bonache and Zarraga-Oberty 2008: 6).

In the context of social relationships, individuals in networks produce questions, present answers and make decision’s which means that they gather, analyse, process, store, use, and reuse information to construct shared knowledge (Woolcock 1998: 153).

Research has consistently illustrated that “social interaction in the context of relationships has a strong effect on the success of knowledge transfer efforts” (Hansen 1999: 82; Szulanski 1996: 49; Uzzi 1997: 35).

Dahlstrom and Ingram (2003: 768) found that both the pattern and intensity of beliefs in social networks affects the flexibility and ease of knowledge transfer between network members.

Although there is agreement, in the literature, that social network ties provide individuals with access to tacit knowledge, there is lack of consensus on the type of network structure which best facilitates the sharing of tacit knowledge and provides the most access to tacit knowledge and resources.

In order to study the effects of social capital in relation to specific social structures, two types of social capital should be distinguished, i.e., bonding (strong network ties) and bridging (weak network ties) social capital (Putnam 2000: 1). This study examines bonding social capital represented by strong network ties.

Bonding social capital refers to ties between individuals who share similar demographic characteristics, for example, members of the same family, neighbors, close friends and work colleagues and bridging social capital refers to people whose demographic ties are not so strong. It describes more distant connections between people and is characterised by weaker, but more cross-cutting ties, e.g., with business associates, acquaintances, friends from different ethnic groups, friends of friends.

Bonding social capital represents the construction of social networks with those like us (intra-group ties), whereas bridging social capital denotes the construction of such networks with those unlike us (extra-group networks). Because similarity breeds attraction and interaction, subgroups of similar people form. Similarity and increased interaction result in strong network ties forming among subgroup members, which then results in what network researchers refer to as strong cliques: densely connected subgroups of reciprocated ties within the network (Granovetter 1973: 1300).

Levin, Cross and Abram (2002: 4) believe that “people are more likely to have strong network ties, with those who are similar to themselves on a set of socially important attributes such as race, sex, education and age”.

In line with Granovetter’s (1973: 1360) view on strong network ties, the cohesion which exists in an individual’s relational network contributes towards his stock of bonding social capital. He believes that “bonding social capital, shared by all members of the same cohesive group, has effects on the efficiency in coordinating and controlling the collective actions carried out by every actor in the network”. For instance, ties within closely connected groups (cliques) are more likely to be strong between persons with the same characteristics (Granovetter 1973: 1360 Seibert, Kraimers and Liden 2001: 232). Bonding capital may be compared to Granovetter's (1985: 233) 'strong' ties, whereas bridging capital corresponds with his 'weak' ties.

"Weak ties are loose relationships between individuals, as opposed to close ties, that are found in a nuclear family" (Granovetter 1973: 1361). Granovetter (1973: 1370) discusses the importance of an individual having an extended network of weak ties in order to obtain resources (for example, information about future promotion opportunities in their company).

Granovetter (1973: 1361) distinguished four properties of a strong network tie as follows: "the strength of a tie is a (probably linear) combination of the amount of time, the emotional intensity, the intimacy (mutual confiding), and the reciprocal services which characterize the tie". Strong ties, for example, ties that exist within a family ensure a consistent access to various resources.

Strong ties or close interpersonal relationships within social networks relate to aspects such associability, personal compatibility or liking (Granovetter 1985: 490). They may be viewed as those involving mutual interdependence and interconnected activities (Seibert, Kraimer and Liden 2001: 219: Dahstrom and Ingram 2003: 768).

Various studies have suggested that an important factor affecting the transfer of knowledge is the relationship between a source and a recipient (Sveiby and Simons 2002: 424).

Granovetter, (1985: 1370) found that strong ties provide people with the motivation to share information. When a valuable piece of information is received, they assist in knowing who can use it. According to Krackhardt (1992: 218) individuals with whom one is in a relationship are more motivated to assist you and will more readily exchange information and knowledge with you. Close relationships, facilitates exchange which result in increased understanding, changed attitudes, cooperation, collective problem solving and shared interpretations which further bind together individuals into a strong social environment (Hazleton and Kennan 2000: 81; Nahapiet and Ghoshal 1998: 252).

Close relationships build slowly and incrementally over time and strong network ties affect access to knowledge (Coleman 1990: 310; 1988: S104). In the absence of strong ties, business partner relationships and alliances between competitors may not develop the necessary relationships that allow managers to share knowledge willingly (Gulati 1995b: 619). People have a more positive attitude towards sharing knowledge and resources with others with whom they have a close relationship (Chow and Chan 2008: 459). In addition, cooperation, intimacy and empathy develop between the two parties (Granovetter 1973: 1360). Inkpen and Tsang (2005: 155) concur that effective transfer of tacit knowledge between network members requires intimate personal interactions. Minbaeva (2007: 578) argues that only a close relationship between sender and receiver can overcome inherent differences that may exist in experience, values, routines and work practices of individuals. These inherent differences could make the sharing of tacit knowledge sticky and problematic.

Hansen (1999: 82) examined 120 new product development projects within 41 divisions in a large organisation. He found that the transfer of complex knowledge tends to require a strong network tie between the two parties to a transfer.

Inkpen and Dinur (1998: 454) also stipulate that for sharing of tacit knowledge to occur in alliances, strong network ties between the partners are necessary.

In addition, Hansen (1999: 82), Kale, Dingh and Perlmutter (2000: 217) and Reagans and Zuckerman (2001: 502) found that close network ties "provide individuals with considerable opportunity to learn from their network contacts and associates". For example, in business, team members may have different tacit and explicit knowledge. Accountants will have financial 'know-how', engineers will have product knowledge and marketing may have a better understanding of customers. Close network contacts can provide knowledge for inexperienced staff members (Yang, Alejandro and Boles 2011: 157).

The research of Kim and Lee (2006: 370) also demonstrated the positive effects of strong networks ties on knowledge sharing behaviour in industry.

Informal knowledge sharing has also been found to be positively associated with close social relationships (Lauring and Selmer, 2011: 350). He and Wie (2009: 834) found that social relationships affect an individual's attitude toward knowledge sharing. They found the strong ties are particularly conducive to knowledge sharing.

Yang and Farns (2009: 212) study also highlighted the importance of social relationships in tacit knowledge sharing behaviour. Their study highlights the fact that "social capital can reflect strong interpersonal connections and extensive investment in interpersonal relationship". They found that individuals with higher social capital in their social network were likely to behave in ways that benefit other network members in order to maintain their interpersonal relationship. They found that the stronger the social capital, through the reciprocal relationship, with their co-workers, the more willing the individual would be to share his/her tacit knowledge.

This study proposes that strong network ties, (i.e., close relationships) in contrast to weak network ties lead to a more positive attitude towards the sharing of tacit knowledge, due to the benefits that arise as a result of these strong network ties. This is in line with Darvish and Nikbakhsh (2010: 43) finding that strong network ties have a direct effect on attitude and expectations about knowledge sharing.

The above observations lead to the conclusion that strong network ties and close relationships, among similar individuals, fosters intimate personal interactions, cooperation and motivation to share information and knowledge, and this, it is proposed, improves the individual's attitude towards the sharing of tacit knowledge. This leads to the first hypothesis:

Hypothesis 1. Individuals who report strong network ties (i.e., close relationships) will display a positive attitude towards tacit knowledge sharing.

2.5.1.2 Network resources

The research objective for network resources is:

Ro. 2. To determine the influence of an individual's access to information, tacit knowledge and resources (through close social relationships within networks) on their attitude towards tacit knowledge sharing.

According to Gaurav Palmia (nd) "to share an asset, usually it must first be divided. But knowledge is one of the few assets that multiply when shared".

The structural dimension of social capital for this study includes 'network resources'. According to Davidsson and Honig (2003: 307) network resources refer to "the ability of individuals to obtain benefits from their social structures, networks and memberships".

This study views 'network resources' as referring to an individual's access to network resources located within the individual's network ties, for example, information, ideas, knowledge (tacit and explicit) and support that individuals obtain as a result of being in a close relationship with another person.

The previous section discussed the positive attitude created as a result of the individual's strong network ties, (i.e., the structural aspect of social capital). This section discusses the positive attitude created as a result of the individual's access to resources within the individual's strong network ties.

Social capital researchers have examined the nature of the resources embedded within the individual's social interaction network. According to Lin, Ensel and Vaughn (1981: 393):

> "these resources (capital) are social because they are only accessible in and through these social relationships, unlike physical (tools and technology) or human (education and skills) capital, which are essentially the property of individuals".

For example, we choose our friends and these relationships may provide resources.

With regard to the sharing of information and tacit knowledge between colleagues, social capital provides a conduit for the exchange of resources which produces intellectual and human capital in Universities of Technologies. Social interaction networks provide access to information and knowledge by screening the available information and knowledge and by providing a distribution process for individual members of the network (Davidsson and Honig 2003: 301). Access refers to "receiving a valuable piece of information and knowing who can use it".

One of the central themes in the literature is that social interaction network ties are channels for resource flows, for the exchange of resources and that social interaction network ties provide access to resources (Adler and Kwon 2002: 190). With regard to the sharing of tacit knowledge between colleagues, social capital provides a conduit for the exchange of resources which produces intellectual and human capital in universities. Individuals obtain economic and emotional benefits from their social relationships (Portes 1998b: 4; Sandefur and Laumann 1997: 481).

Social capital can be a useful resource both through the utilization of resources available as a result of the bonding of actors as well as by bridging external networks in order to obtain resources (Adler and Kwon 2002: 17; Putnam 2000: 1). Through social interaction networks or strong, close relationships an individual may achieve access to another person's resources, resources such as status, position, wealth or reputation. These resources can then provide various benefits for the individual. For example, social interaction networks can provide access to information regarding work opportunities and consequently to better career outcomes.

Burt (2000: 353) too, is of the opinion that:

> the structure of a given network - who interacts with whom, how frequently, and on what terms - has a major bearing on the flow of resources through that network. He believes that those who occupy key strategic positions in the social interaction network, especially those whose ties span important groups, can be said to have more social capital than their peers, precisely because their network position gives them heightened access to more and better resources.

Wei-ping Wu (2008: 125) also specify that "social capital in an important source for the creation of inimitable value-generating resources that are inherent in a firm's network of relationships because it allows people to benefit from knowledge accumulated by close contacts and associates".

In a University of Technology, academics through networks of social interaction share knowledge and resources. The literature is replete with evidence that university life is characterized by a substantial amount of conversation: in meetings, conferences, and social events that fill the everyday life of workers and managers (Mintzberg 1973: 1; Prescott and Visscher 1980: 446).

It has been argued that individuals exchange and use of each other's knowledge in an academic department results in openness, changed attitudes, collective problem solving and shared interpretations, which bind staff members together (Widén-Wulff, Ek, Ginman, Perttila, Sodergard and Totterman 2008: 346). Academic staff provide and receive knowledge when they are advising younger researchers, commenting on papers by colleagues, working with co-authors and attending meetings (Antal and Richebe 2009: 78). These discussions lead to networks of social relationships and access to resources embedded within, available through, and derived from such networks of relationships.

Alternatively, these meetings and social events provide the unplanned and unstructured opportunities for the accidental coming together of ideas that may lead to the serendipitous development of new intellectual capital (He and Wie 2009: 834).

According to Davenport (2005: 48) high performing knowledge workers get most of their valuable information from other people in their social interaction networks.

Nahapiet and Ghoshal (1998: 243) contend that:

> networks of relationships constitute a valuable resource for the conduct of social affairs, providing their members with collectivity-owned capital, a 'credential' which entitles them to credit, in the various senses of the word.

In their opinion much of this capital is embedded within networks of mutual acquaintance and recognition. According to Coleman (1990:

310) networks, in which everyone is connected so that no one can escape the notice of others, are a source of social capital.

Kraimer, Seibert and Liden (1999: 137) comment that “an alter who possesses characteristics or controls resources useful for the attainment of the ego's goals can be considered a social resource”. According to Burt (1992: 50) close relationships provide “greater bargaining power and thus control over resources and outcomes”. Some individuals have social capital due to their connection with people that have the appropriate information and resources for them to enhance their performance (Lin, Ensel and Vaughn 1981: 395). These resources may be embedded in the individual’s position (Lin 2005: 2). People that you know provide information on available opportunities to you or others in the network, hence influencing the opportunity to combine and exchange tacit knowledge.

One of the main proponents of the view that network ties provide access to resources is Nahapiet and Ghosal (1998: 252). They believe that “social capital developed in one context, such as ties, norms, and trust, can often (but not always) be transferred from one social setting to another, thus influencing patterns of social exchange. Examples include the transfer of trust from family and religious affiliations into work situations (Fukuyama 1995b: 1), the development of personal relationships into business exchanges (Coleman 1990: 310), and the aggregation of the social capital of individuals into that of organisations” (Burt 2000: 347).

Coleman (1988: 98) also found that “social relations, often established for other purposes, constitute information channels that reduce the amount of time and investment required to gather information”.

This finding is corroborated by Huotari and Chatman (2001: 351) who found that the use of social contacts within a university to gain formal information occurred frequently.

Nahapiet and Ghosal, (1998: 252) further argue that “network ties influence both access to parties for combining and exchanging knowledge and anticipation of value through such exchange”.

Granovetter’s (1973: 1361) earlier work also found that “resources are available through the contacts or connections social networks bring”. For example, through ‘weak ties’ (Granovetter 1973: 1362) and ‘friends of friends’ (Boissevain 1974: 392), network members gain privileged access to information and to opportunities.

Granovetter (1985: 491) found that social capital can help individuals obtain resources because it provides individuals with full or partial control over interests or activities that are shared by network members. He calls this “embeddedness” and maintains that actors’ attempts at purposive action are “embedded in concrete, ongoing systems of social relations”. He argues that “patterns of interaction are prevalent among and within business networks and comments that economic analysis neglects past relations of individual actors, but rational individuals know better, relying on their knowledge of these relations”. He believes that past satisfactory dealings with individuals lead to future business relations.

Coleman (1988: 95; 1990: 310) concurs that social capital can be put to productive use. He comments that “as a resource, social capital facilitates actions of individuals who are within the structure, for example, by providing individuals (via network ties) with useful knowledge about opportunities and choices otherwise not available”. For example, inter-unit resource exchange and collaboration within an organisation (Tsai and Ghoshal 1998: 464) and the creation of intellectual capital and transfer of knowledge within an organisation (Nahapiet and Ghoshal 1998: 538).

Seibert, Kraimer and Liden (2001: 219) also confirm that access to tacit knowledge provides access to resources and showed that network structure was directly related to social resources and that 'social resources' was mediated by access to information. They found that information and control over information and tacit knowledge provides social power for an individual which leads to greater access to beneficial resources.

Furthermore, Tsai and Ghoshal (1998: 467) stipulate that "social interaction network ties among members of a virtual community allow a cost-effective way of accessing a wider range of knowledge sources".

Another factor which affects knowledge sharing and access to resources is network hierarchy in universities. Lin (2001: 13) suggests that "the social credentials of an individual reflect his or her social standing in the network, and other members may seek to acquire the resource of such credentials by forming alliances and sharing information with such individuals".

To conclude, in terms of the structural dimension, social capital exists within the context of networks of social relationships and within the resources that are embedded within the social networks and social relationships. Social capital is accessed through the network ties which are channels for the exchange of resources (i.e., beneficial tacit knowledge). These network ties constitute a valuable source of information, tacit knowledge and resources. Thus, it is proposed that access to tacit knowledge located in one's work network as a result of social relationships embedded within those networks will lead to a more positive attitude towards the sharing of tacit knowledge in a University of Technology. This leads to the second hypothesis:

Hypothesis 2. Individuals who report greater access to information, tacit knowledge and resources within their work, social network will display a positive attitude towards tacit knowledge sharing.

The research objective for the structural dimension of social capital was:

Ro. 3. *To determine the influence of an individual's high level of structural social capital (strong network ties and a high level of network resources) on their attitude towards tacit knowledge sharing.*

In order to assess the influence of structural social capital, research objectives 1 and 2 were combined to formulate the following hypothesis:

Hypothesis 3. Individuals who report a high level of structural social capital (strong network ties and a high level of network resources) will display a positive attitude towards tacit knowledge sharing.

2.5.2 Relational dimension of social capital

In this study, the relational dimension incorporated trust (affect and cognitive-based trust), shared norms and values, shared norms of social support and shared norms of reciprocity.

Unlike the impersonal nature of structural social capital, the relational dimension of social capital describes the personal qualities of interpersonal relationships (Bolino, Turnley and Bloodgood 2002: 505). This dimension is concerned with expectations and obligations as central features of social capital.

Nahapiet and Ghoshal (1998: 244) use the concept to refer to "those assets created and leveraged through relationships", and parallel to what Lindenberg (1996: 311) describes as behavioral, as opposed to structural, embeddedness and what Hakansson and Snehota (1995: 1) refer to as actor bonds. It focuses on the role of network ties between individuals and the relational, as opposed to structural, outcomes of interactions (Inkpen and Tsang 2005: 153). This definition has been utilized in this study.

This dimension captures the norms and quality of dyadic relations which is determined by the history of interactions between individuals. It is similar to Adler and Kwon's (2002: 23) concept of 'goodwill' and in Nahapiet and Ghoshal's (1998: 251) opinion, includes trust, norms, obligations and identification.

Hazleton and Kennan (2000: 81) mention three features of the relational dimension as follows: firstly, it is the primary relational feature of social capital, secondly, it includes identification, which refers to the extent to which actors view themselves as connected to other actors and finally the third feature is the degree of social system closure. The effect of system closure is the emergence of observable norms.

Granovetter (1992a: 3) in discussing the relational dimension refers to the term 'relational embeddedness' which he says describes the kind of personal relationships people have developed with each other through a history of interactions. In his opinion, it represents the motivational characteristic of interpersonal social exchange.

According to Chow and Chan (2008: 459) the relational dimension focuses on the particular relations people have, such as respect and friendship, that influence their behavior. It is through these ongoing personal relationships that people fulfill such social motives as sociability, approval, and prestige. For example, two individuals may occupy equivalent positions in similar network configurations, but if their personal and emotional attachments to other network members differ, their actions also are likely to differ in important respects. For instance, although one person may choose to stay in a firm because of an attachment to fellow workers, despite economic advantages available elsewhere, another without such personal bonds may discount working relationships in making career moves.

Among the key facets in the relational dimension are trust and trustworthiness (Cohen and Prusak 2001b: 1; Fukuyama 1995b: 92; Putnam 1993: 35), shared values, norms and sanctions (Coleman 1990b: 302; Putnam 1995a: 67), obligations and expectations (Burt 1992: 9; Coleman 1990b: 302; Granovetter 1985: 481; Mauss 1954: 1), identity and identification (Hakansson and Snehota 1995: 1; Merton 1968: 1) and reciprocity, solidarity attitudes and beliefs.

The social capital research objectives, literature review and hypotheses for the relational dimension are provided in the next section.

2.5.2.1 Trust

The research objectives for trust are:

Ro. 4. To determine the influence of affect-based trust on the individual's attitude towards tacit knowledge sharing with their co-workers.

Ro. 5. To determine the influence of cognitive-based trust on the individual's attitude towards tacit knowledge sharing with their co-workers.

Ro. 6. To determine the influence of trust (affect-based and cognitive-based trust) on the individual's attitude towards tacit knowledge sharing with their co-workers.

Wei-ping Wu (2007: 130) states that trust is one of the most frequently used variables to manifest the relational dimension of social capital. In his opinion trust has four facets: "belief in the good intent and concern of exchange partners, belief in their competence and capabilities, belief in their reliability, and belief in their perceived openness."

Tsai and Ghoshal (1998: 467) also believe that trust is one of the main components of the relational dimension and that trust is an important part of the development of intellectual capital in organisations.

It should be noted that a variety of definitions of trust exist in the literature depending upon the researchers perspective. Chow and Chan (2008: 464) define social trust as "the degree of one's willingness to be vulnerable to the actions of other people".

In their overview of the most quoted definitions of trust, Dietz and Den Hartog (2005: 557) show that trust may be perceived as a belief, as a decision and as an action.

According to Darvish and Nikbakhsh (2010: 36) "trust is a relationship of reliance". In their view "a trusted party is presumed to seek to fulfill policies, ethical codes, law and their previous promises. It does not need to involve belief in the good character, vices, or morals of the other party. It is viewed as a set of specific beliefs dealing primarily with the integrity, benevolence, and ability of another party".

Mishra (1996: 261) argues that "trust is multidimensional and indicates a willingness to be vulnerable to another party - a willingness arising from confidence in four aspects, belief in their:

- good intent and concern of exchange partners,
- competence and capability,
- reliability and
- perceived openness".

Some researchers exclude trust as an element in their definition of social capital (since they consider it as an outcome of social capital), for example, Woolcock (1998: 155) defines social capital as "the norms and networks (within society) that facilitate collective action". Others believe that trust is an important component of social capital (Uslaner 1999: 121). For them, social capital primarily reflects a system of values, particularly social trust. Most definitions view social capital as both a belief and a value held (i.e. trust) and a social network. Further definitions of trust are provided in Appendix C - Table C2.

With regard to tacit knowledge sharing, McEvily, Perrone and Zaneer (2003b: 91) argue that "trust encourages knowledge sharing by increasing the disclosure of knowledge to others and by granting others access to one's own knowledge".

Grannovetters (1985: 490) embeddedness argument stresses the role of personal relations and networks of such relations in generating trust. He contends that people trust information from a trusted informant, one that one has dealt with in the past and found to be reliable. He believes that this information is better for four reasons:

- it is cheap;
- one trusts one's own information best - it is richer, more detailed and known to be accurate;
- individuals with whom one has a continuing relationship have an economic motivation to be trustworthy, so as not to discourage future transactions; and
- apart from pure economic motives, continuing economic relations often become overlaid with social content that carries strong expectations of trust and abstention from opportunism (Grannovetters 1985: 490).

Trust is important for the exchange of information and tacit knowledge. A number of researchers have found that where relationships are high in trust, people will co-operate and engage in social exchange (Ghoshal and Bartlett 1994: 94; Putnam 1993: 1; Ring and Van de Ven 1992: 483).

Misztal (1996: 10) observes that "trust, by keeping our mind open to all evidence, secures communication and dialogue" suggesting thereby that trust may both improve access to people for the exchange of intellectual capital and increase the anticipation of value through exchanges".

Zaheer, Mc Evily and Perrone's (1998a: 141) study indicated that "inter-organisational trust mitigates the information asymmetries that are inherent in inter-firm exchange by allowing the more open and honest sharing of information".

A lack of trust significantly increases the costs of exchange and at the same time decreases the willingness of the individual to share tacit knowledge. If receivers do not trust the individual or the information or knowledge received from senders, they likely will not make full use of it (Inkpen and Tsang 2005: 146).

Ring and Van de Ven (1992: 245) comment that "if there are high levels of trust, people are more willing to take risks in exchange." This may represent an increased willingness to experiment with combining different sorts of information. For example, Luhmann, Davis, Raffan and Rooney (1979: 27) have shown "trust to increase the potential of individuals for coping with complexity and diversity". This is also important for the creation of intellectual capital.

Siisiäinen (2000: 33) talks about 'generalized trust' that reflects individuals doing something good because they know that they will be rewarded as positive relations develop. He comments that trust is needed when role expectations and familiar relationships no longer help individuals to anticipate the reactions of others. In these situations, individuals rely on the experiences of past interactions. Choices in individual interaction produce mutual reciprocity and trust and thereafter values and norms. This, according to Putnam (1993: 163) is the basis of social consensus - in his opinion "trust creates reciprocity and voluntary associations, reciprocity and associations strengthen and produce trust".

Trust is based on social judgments (e.g., assessment of the other party's integrity, benevolence, competence, etc.) together with assessment of the costs (i.e., risk) if the other party turns out to be untrustworthy (Rousseau, Sitkin and Burt and Camerer 1998: 393). In business, under a risky condition, a party's trust is signified by a decision to take action that puts its fate in the hands of the other party. When trust is low or absent, the risk of sharing knowledge is considered high. Given that by exchanging knowledge, one party puts its fate in the hands of the other (Inkpen and Tsang 2005: 154). Thus, trust in transfer relationships is based on the social judgment of the other party's trustworthiness, aligned with the costs of the transfer.

With regard to the effects of trust in organisations, Andrews and Delahaye (2000: 797) found that trust was important for the way that knowledge is shared by employees in organisations. Their study established that "in the absence of trust, formal knowledge sharing practices were insufficient to encourage individuals to share knowledge with others within the same work environment".

Many studies have suggested that trusting relationships evolve from social interactions (Carley 1991: 331; Davenport 1998: 1; Kim and Lee 2006: 370) and are critical for the transfer of knowledge because it increases information exchange (Kramer 1999: 569; Kramer and Tyler, 1996: 1; Mayer, Davis and Schoorman 1995: 712; McEvily, Perrone and Zaheer 2003: 91; Nelson and Cooprider 1996: 409; Penley and Hawkins 1985: 309; Roberts 2000: 429).

In this study, trust includes:

- Affect-based trust, which includes perceptions of reciprocal concerns and interpersonal caring (Appendix B3 - Three measurement items - Question 6, 17 and 11) and
- Cognitive-based trust, which includes judgment of the other person's competence, reliability, dependability and knowledge

ability in the work setting (Appendix B3 - Three measurement items - Question 30, 8 and 32).

Affect-based trust is based upon the individual's view of the other person's values and norms. Cognitive-based trust is based upon the individual's view of the other person's competence and reliability in terms of their work function (Rousseau, Sitkin, Burt and Camerer 1998: 393).

Trust in the form of affect-based trust and cognitive-based trust affects the individual's attitude towards tacit knowledge sharing. It influences the individual's decision to transfer tacit knowledge.

Affect-based trust and cognitive-based trust are discussed in more detail in the following sections.

(a) Affect-based trust

Lewis and Weigert (1985: 970) refer to affect-based trust as "emotional ties linking individuals, such as friendship, love, or care".

Yang and Farns (2009: 212) study highlighted the fact that social capital can reflect strong interpersonal connections and extensive investment in interpersonal relationship. Their results showed that "affect-based trust within an organisation is an important prerequisite for effective interpersonal tacit knowledge sharing and that managers need to foster the formation of an intensive social network among employees, in order to promote tacit knowledge sharing among staff members" (Yang and Farn 2009: 212).

Leana and Van Buren (1999: 212) also found that social capital and affect-based trust are related. They comment that universities that are high in social capital will also be high in affect-based trust. They further elaborate that where the university's culture promotes trust and cooperation between individuals, the degree of interactions will rise significantly. In such environments, the tendency to share and exchange knowledge will be high and individuals will eagerly exchange their knowledge.

(b) Cognitive-based trust

Cognitive-based trust is based upon the individual's assessment of the other person's competence. The ability to perform work tasks, (i.e., competence), engenders trust with co-workers within the university. Blau (1964: 1) and Schurr and Ozanne (1985: 939) propagate that this is based on the assumption that ability engenders trust that the individual's co-workers will successfully complete a work task. In terms of tacit knowledge sharing, it implies an ability to relay trustworthy information to other staff members. Individuals who report that they trust their co-workers will perceive their co-workers as competent and reliable and will display a more positive attitude toward tacit knowledge sharing.

Lewis and Weigert (1985: 970) stipulate that trust is 'cognitive-based' because "we cognitively choose whom we will trust under which circumstances, and we base the choice on what we take to be good reasons, constituting evidence of trustworthiness".

A review of the literature indicates that there is some debate with regard to the effect of trust and tacit knowledge sharing behaviour. Some studies highlight the positive effects of trust on knowledge sharing behavior and other studies highlight the negative effects of trust. These effects are elaborated in the following sections.

(c) Positive effects of trust

Research has shown that interpersonal trust has the following positive effects on the sharing of knowledge: it leads to increased overall tacit knowledge exchange (Butler 1999: 217); it increases the willingness of staff members to share their knowledge (Sveiby 2001a: 344); it makes knowledge exchanges less costly; it increases the likelihood that newly acquired knowledge is sufficiently absorbed so as to be useful to the recipient (Tsai and Ghoshal 1998: 467); it can exhibit greater openness to the potential for value creation through knowledge exchange and combination (Nahapiet and Ghoshal 1998: 254); it enhances team cohesiveness and increases inter-functional co-operation.

Furthermore, researchers have found that trust encourages co-operative and collaborative behavior (Collins and Smith 2006: 552), thereby facilitating the sharing of tacit knowledge which gives rise to the development of new forms of association, exchange and innovative organisation (Fukuyama 1995a: 1; Ghoshal and Bartlett 1994: 91). Co-operation leads to the exchange and or combination of knowledge and resources within the work processes (Bradach and Eccles 1989: 104). Nahapiet and Ghoshal (1998: 255) state "that there is a two-way interaction between trust and cooperation: trust promotes co-operation, and co-operation itself leads to trust. This two-way interaction between trust and co-operation may lead to the development, over time, of generalized norms of co-operation, which increase yet further the willingness of the individual to engage in social exchange and the sharing of tacit knowledge".

Trust and reciprocity are related. Putnam (1993: 3) comments that a society that relies on generalised reciprocity is more efficient than a distrustful society, for the same reason that money is more efficient than barter. Trust lubricates social life.

Sveiby and Simons (2002: 421) found that a culture of trust, co-operative interaction and collaboration improves knowledge sharing and organisational effectiveness.

According to Nahapiet and Ghoshal (1998: 255) “collective trust may become an important form of expectational asset that group members can rely on to help solve problems of co-operation and co-ordination”.

A further benefit of trust is the reduction of transaction costs with regard to the sharing of tacit knowledge (Putnam 1993: 1). Several researchers have suggested that social capital in the form of high levels of inter-personal trust diminishes the probability of opportunism and reduces the need for costly monitoring processes.

Bradach and Eccles (1989: 104) claim that "trust is a type of expectation that alleviates the fear that one's exchange partner will act opportunistically. When two parties begin to trust each other, they become more willing to share their resources without worrying that they will be taken advantage of by the other party”.

Svendson (2004: 29) argues that the “building of trust in smaller groups facilitates the removal of opportunism due to the possibility of social sanctioning, thus leading to a higher level of economic growth”.

This idea is derived from the work of Ostrom (1990: 35) who writes: “norms of behavior reflect valuations that individuals place on actions or strategies in and of themselves, not as they are connected to immediate consequences. When an individual has strongly internalised a norm related to keeping promises, for example, the individual suffers shame and guilt when the promise is broken. If the norm is shared with others, the individual is also subject to considerable social censure for taking an action considered to be wrong by others”.

The implication in Svendsens (2004: 30) approach is that if group members trust one another and can sanction defectors, this group may achieve more economic growth compared to another group without such internal trust because more transactions may take place at lower cost and the predictability of behavior increases; it is therefore no longer necessary to monitor and enforce most transactions formally. "Social sanctioning and the building of trust lubricate's society while reducing opportunistic behavior" (Putnam 1993: 1). Therefore, Svendsen (2004: 30) believes that one may therefore suggest that social capital is a new production factor by saving transaction costs in society, thus allowing more voluntary transactions to take place. More transactions can take place at a lower cost and trust will increase predictability and production in society because it is no longer necessary to have a formal third party for monitoring and enforcing all transactions.

Coase (1937: 386) argues that "firms reduce transaction costs by having numerous informal transactions taking place, which are not formally sanctioned".

In the absence of trust and networks ensuring compliance, individuals tend not to co-operate because others cannot be relied on to act in a similar way. Researchers refer to this as "the prisoner's dilemma" or the '"free-rider problem" (Côté 2001: 29).

(d) Negative effects of trust

As mentioned previously, not all researchers are convinced about the role of trust in the sharing of tacit knowledge. The following studies question the positive effect of trust on information and tacit knowledge sharing.

Bakker, Leender, Gabbay Kratzer and Van Engelen (2006: 600) found that trust did not have a statistically significant effect on the sharing of 'know-how' (i.e., tacit knowledge). They examined new product development and found that trust did not play a part in whether or not new product development professionals share their 'know-how'. They found that "trust by itself does not explain the extent to which members of new product development teams share knowledge". They further believe that "trust is likely to have the most effect on knowledge sharing as a result of its absence rather than due to its presence". They contend that trust may be a condition to knowledge sharing, but believe that it does not have a positive effect on the sharing of knowledge per se. They postulate that "although the absence of trust may impede people's motivation to share knowledge with others, it is unlikely that that those who have high levels of trust in others are more likely to share knowledge than those with moderate trust levels," at least in the new product development setting which they studied. They believe that trust "hardly ever explains variations in knowledge sharing" and make the point that "trust can sometimes be a means-to-an-end, but is generally not the end itself". Their conclusion is that with regard to knowledge sharing behaviour, trust should not be viewed as social capital.

Seonghee and Boryung (2008: 287) concur with the findings of Bakker et al., (2006: 600) and also found that trust was not significantly associated with knowledge sharing behaviour. Their conclusion was that individuals at universities are individually orientated and display autonomous behaviour. As a result they are not willing to share or exchange their teaching and research materials with each other.

Levin, Cross, Abrams and Lesser (2002: 23) also suggest that "there has been little evidence with regard to the predictors of interpersonal trust".

The findings above contrast with previous studies on various types of organisations, which identified interpersonal trust as a crucial factor affecting the sharing of knowledge (Kramer 1999: 569; Nelson and Cooprider 1996: 409; O'Dell and Grayson 1998: 154; Zand 1972: 229).

To conclude, although there is some debate in the literature with regard to the effects of trust on tacit knowledge sharing behaviour, the majority of researchers, find that trust provides social capital, in the form of greater network interaction, co-operation, collaboration, increased access to the exchange of resources and reduction of transaction costs and opportunistic behaviour. All these factors, lead to a more positive individual attitude towards the sharing of tacit knowledge. Therefore, it is proposed that:

Hypothesis 4. Individuals who report affect-based trust towards their co-workers will display a positive attitude towards tacit knowledge sharing.

Hypothesis 5. Individuals who report cognitive-based trust towards their co-workers will display a positive attitude towards tacit knowledge sharing.

Hypothesis 6. Individuals who report trust (affect-based trust and cognitive-based trust) towards their co-workers will display a positive attitude towards tacit knowledge sharing.

2.5.2.2 Shared norms and values

The research objective for shared norms and values is:

Ro. 7. To determine the influence that shared norms and values have on the individual's attitude towards tacit knowledge sharing.

A specific organisational culture is evident in the social capital, norms, values and practices of a University of Technology. An organisational culture is a "collection of practices, symbols, values and assumptions the members of an organisation share with regard to appropriate behaviour" (Ajmal and Koskinen 2008: 10). Schein (1985: 9) defined culture as a "pattern of basic assumptions" that is developed by a group as they grapple with and develop solutions to everyday problems. When these assumptions work well enough to be considered valid, they are taught to new members as the appropriate way to approach these problems". Culture has also been defined as the "underlying beliefs and assumptions of the organisation" (Sun and Scott 2005: 75).

Schein (1985: 89) further added that “a key part of every culture is a set of assumptions about how to determine or discover what is real and how members of a group take an action, how they determine what is relevant information, and when they have enough of it, to determine whether to act and what to do”. Culture, shared norms and values are inter-related. Culture shapes the norms and values of a University of Technology by establishing the context for social interactions within the organisation (David and Fahey 2000: 114; Trice and Beyer 1993: 1).

Values form the basis of norms, which, in turn, shape specific university business practices. Svendson (2005: 28) postulates that ‘face-to-face’ interaction generates common social norms (or ‘social glue’) that creates predictable business behavioural patterns. In this way, culture and business behavioural rules are built through repetition, tradition and example.

David and Fahey (2000: 114) identified certain aspects of organisational culture that influence knowledge sharing: “culture shapes assumptions about which knowledge is important; it controls the relationships between the different levels of knowledge (organisational, group, and individual); it creates the context for social interaction and it determines the norms regarding the distribution of knowledge between an organisation and the individuals in it….culture suggests what to do and what not to do regarding knowledge processing and communication in organisations”. Thus, an organisation’s culture shapes the perceptions and behaviors of its employee.

Hall and Goody (2007: 182) comment that “if a culture promotes social interaction, dialogue and frequent contacts, it facilitates creating and sharing new ideas, transmitting tacit knowledge and finding solutions to novel or existing problems”. The literature on organisational socialisation has highlighted the importance of informal social interaction in helping individuals to learn organisational norms and values.

Social interaction increases when a university culture encourages co-operation between individuals. If the culture is one of co-operation knowledge sharing and exchange will be high.

The culture of an organisation may also be a barrier to the development and sharing of tacit knowledge (David and Fahey 2000: 114; Leonard-Barton 1995: 1; Pan and Scarbrough 1999: 359). “Norms and practices that advocate individual ownership of knowledge severely impede the process of knowledge sharing within the organisation, as the organisational culture orients the mindset and actions of every employee” (Nonaka and Takeuchi 1995: 167).

Furthermore, David and Fahey (2000: 114) highlight that culture may be different among subgroups within the organisation. These subgroups may have their own set of values, norms and practices that result in different knowledge sharing behaviours (McDermott and O’Dell 2001: 76; Pentland 1995: 1). These subgroups and their specific knowledge sharing behaviours are difficult to assess and make it harder to determine what culture needs to be developed in order to encourage the sharing of tacit knowledge within the university (Ajmal and Koskinen 2008: 7).

In this study, ‘shared norms’ have been defined as including:

- Social norms - (i.e., acceptable social behavior with regard to the sharing of tacit knowledge), (Appendix B3 - One measurement item - question 10).
- Norms of social support - (i.e., benevolence and altruistic behaviour that relates to the sharing of tacit knowledge), (Appendix B3 - Two measurement items - question 23 and question 4) and
- Norms of reciprocity - (i.e., sharing relationships with others in terms of the sharing of tacit knowledge), (Appendix B3 - One measurement item - question 35).

Each of these is discussed in more detail in the following sections.

(a) Social norms and values

Social norms and values refer to "what is acceptable or permissible behaviour in a group or society". They include mutual 'credits', expectations and obligations as well as sanctions against opportunistic or anti-social behaviour" (Fishbein and Ajzen 2010: 129). They are shared strategic visions, systems of meanings, and normative value orientations (Nahapiet and Ghoshal 1998: 244).

Social norms are also understood as the formal or informal social rules that guide how network members behave towards each other. These norms relate to individual shared attitudes amongst people that are accepted by most people as the right thing to do and are understood by most members of society, behaviours such as being polite to others, giving seating preference to pregnant women in public buses, etc.

Nonaka (1994: 154) states that if knowledge is defined as justified true belief, it is deeply rooted in the value systems of individuals and hence in their norms.

How do social norms and values develop? According to Janowicz-Panjaitan and Krishan (2009: 245) in the course of social interaction common notions arise as to how people should act and interact and what objectives are worthy of attainment. First, common values crystallize, values that govern the goals for which men and women strive, their ideals and their ideas of what is desirable, such as the importance financial success assumes in our thinking. Second, social norms develop - that is, common expectations concerning how people ought to behave - and social sanctions are used to discourage violations of these norms. If values define the ends of human conduct, norms distinguish behaviour that is a legitimate means for achieving these ends from behaviour that is illegitimate. People have different shared meanings, values and social norms. In Coleman's (1990: 104) opinion, a norm exists when the socially defined right to control an action is held not by the actor but by others. Thus, it represents a degree of consensus in the social system. Through the process of informal social interaction, individuals realize and adopt their university's languages, codes, norms, values, and practices. In this way values, norms and different role expectation emerge within the social structure. Social norms and values provide for social control in an organisation. A system of shared beliefs and orientations also develop.

At the same time, according to Tsai and Ghoshal (1998: 467), these socialized individuals may also create new sets of values and norms or new visions based on their common interests and mutual understandings.

Social norms and values that influence tacit knowledge sharing include "the creation of a sense of involvement and contribution among employees" (O'Dell and Grayson 1998: 154), the "types of knowledge that are valued" (Leonard-Barton 1995: 1), and "knowledge-related values such as trust and openness" (von Krogh 1998: 133).

There is much evidence showing that the existence of organisational cultural norms and values within an organisation fosters knowledge transfer by increasing intimacy and closeness between source and receiver. Norms of cooperation can establish a strong foundation for the creation of intellectual capital becoming, in effect, "expectations that bind" (Kramer and Goldman 1995: 50). Such norms according to Nahapiet and Ghoshal (1998: 255) "may be a significant influence on exchange processes, opening up access to parties for the exchange of knowledge and ensuring the motivation to engage in such exchange".

Cabrera (2003: 1) reviewed the main sociological and psychological theories to identify factors related to knowledge sharing behaviour and found that social norms that encourage open exchanges of knowledge among organisation members led to a greater degree of knowledge sharing.

Blau (1964: 255) argues that social norms substitute indirect exchange for direct exchange. One member conforms to the group norm and receives approval for the conformity and implicit approval for the fact that conformity contributes to the group's maintenance and stability. In other words, the group engages in an exchange relationship with the individual.

An individual's value system also plays a large role in the sharing of tacit knowledge. It leads to shared understanding between colleagues.

Morgan and Hunt (1994: 25) define shared values as "the extent to which partners have beliefs in common about what behaviours, goals and polices are important or unimportant, appropriate or inappropriate and right or wrong". In their view, commonly agreed upon values, serve as mediating links for social transactions. Sitkin and Roth (1993: 368) also maintain that trusting relationships are rooted in value congruence, i.e., the compatibility of individual values with an organisation's values. A trusting relationship based upon exchange between two parties implies that common norms and values have brought and kept them together (Barber 1983: 21).

Shared values make indirect social exchange possible. The presence of a supporting university culture that embeds social values of the sharing of tacit knowledge is necessary to motivate individuals to share tacit knowledge easily and frequently.

Shared understanding represents the extent to which the work values, norms, philosophy, problem-solving approaches, and prior work experience of a dyad are similar (Gerwin and Moffat 1997: 1275; Nelson and Cooprider 1996: 409). Research suggests that similar heuristics and shared understanding and experiences between a source and a recipient are important antecedents of the sharing of tacit knowledge (Hansen 1999: 83). They remove barriers to understanding and acceptance between a source and a recipient (Krauss and Fussell 1990: 1). Both participants thereby enhance their ability to work toward a common goal (Nelson and Cooprider 1996: 409). Without shared understanding, there is a tendency for the parties to disagree about what they should be doing and why, which leads to poor outcomes (Gerwin and Moffat 1997: 1275).

In addition, norms and values prompt individuals to behave in ways other than naked greed (Portes and Sensenbrenner 1993: 368). As Ouchi (1980: 1320) noted "common values and beliefs provide the harmony of interests that erase the possibility of opportunistic behavior". With collective norms and values, members of a university are inclined to trust one another, as they expect that they all work for collective goals and will not be hurt by any other member's pursuit of self-interest (Tsai and Ghoshal 1998: 466). Also sanctions underpin norms and values, the fear of disapproval might compel individuals to comply with the shared norms and values and behave in an accepted way.

Ostrom (1990: 36) also believes that an individual's norms and values have an influence upon the opportunistic behaviour individuals can expect from other individuals. Ostrom (1990: 36) uses Williamson's (1975: 29) definition of opportunism, namely 'self-interest with guile', and comments that "in a setting in which few individuals share norms about the impropriety of breaking promises, refusing to do one's share, shirking, or taking other opportunistic actions, each appropriator must expect all other appropriators to act opportunistically whenever they have the chance. In such a setting it is difficult to develop stable, long-term commitments, expensive monitoring and sanctioning mechanisms may be needed".

Svendsen (2004: 30) concurs with Ostrom (1990: 36) and comments that “acceptable behaviour is reinforced by shared norms and values which lead to an informal agreement where the only sanction is that of social ostracism”. Social ostracism helps to enforce the informal agreement. If someone does not follow the informal agreement, that person will simply be ostracized by the group and, as such, confront extra costs from not co-operating.

Thus, norms of reciprocity, social networks and social ostracism help ensure an individual’s compliance with cooperative behaviour and collectively desirable business behaviour (Iqbal, Rasli, Heng, Ali, Hassan and Jolaee 2011: 11053).

(b) Norms of social support

Shared norms of social support positively impact upon the sharing of tacit knowledge. Shared norms of social support may be manifested as benevolence or altruistic behaviour. Benevolence, according to Gabbay and Leenders (2003: 509) is “the extent to which a trustee is believed to want to do good to the trustor, aside from an egocentric profit motive”.

When individuals in a network work toward a work related goal they often display altruistic behaviour, i.e., helping others without expecting anything in return. Benevolent and altruistic behaviour is beneficial for the sharing of tacit knowledge. Wasko and Faraj (2005: 35) showed that individuals who contribute to the group and share knowledge feel satisfied by displaying altruistic behaviour.

(c) Norms of reciprocity

Molm, Takahashi and Peterson (2000: 1396) define reciprocal acts as “those in which individuals help others and share information without negotiation of terms and without knowledge of whether or when the other will reciprocate”. Chiu, Hsu and Wang (2006: 1876) define norms of reciprocity as “knowledge exchanges that are mutual and perceived by the actors as fair". He and Wei (2009: 828) define reciprocity as "the benefit expectancy of a future request for knowledge being met as a result of the current contribution". They believe that reciprocity exerts influence on information and knowledge sharing by means of a "return-in-kind" attitude.

Blau (1964: 6) concurs and comments that reciprocity implies "actions that are contingent on rewarding reactions from others and that cease when these expected reactions are not forthcoming". Where strong norms of reciprocity exist, social exchanges are regulated by the custom of returning favours. If someone gives another person a gift, the recipient returns the favour at a later date.

Mause (1990: 70) was one of the first researchers to show that reciprocity is observed empirically by the perpetual exchanges of goods between individuals and groups in every single community. Mauss (1990: 70) points out that it is precisely the reciprocity observed in the innumerable exchanges of goods in a society that at an overall level knits this society together in every aspect, producing common norms, common identity, trust and solidarity on the one hand, and strong economic ties on the other. By extending Mauss's (1990: 70) argument further, the conclusion is reached that it is the demarcated, small-scale nature of the local communities that stimulate the face-to-face exchanges, which according to Mauss (1990: 70) strengthens the social economic ties of the entire society. Reciprocal relations are being accumulated in bundles of local, social networks. They state that in this way local social networks create bottom-up social control: the order and social cohesion of the entire society is guaranteed in the sense that everybody is committed to everybody else. As Mauss (1990: 70) puts it "although the prestations and counter-prestations take place under a voluntary guise they are in essence strictly obligatory, and their sanction is private or open warfare".

Bourdieu and Passeron (1997: 64) continue this argument and maintain that in a system of symbolic power, gift exchange is covered by universalizing strategies denying the interestedness of the parties to the exchange. The total structure of exchange gains autonomy from conscious individual choices. Gift givers and receivers "collaborate, without knowing it, in a work of dissimulation tending to deny the truth of exchange, the exchange of exact equivalent, which represents the destruction of the exchange of gifts".

There is a great deal of empirical evidence for the relationship between reciprocity and knowledge sharing (Bartol and Srivastava 2002: 64; Orr 1990: 189).

Reciprocity as a motivator of knowledge sharing implies that individuals must be able to anticipate that sharing knowledge will prove worthwhile (even if they are uncertain about exactly what the outcome will be (Nahapiet and Ghoshal 1998: 244). It is the expectation that those involved in sharing knowledge will be able to acquire or benefit from some of the value created by their involvement.

Ipe (2003: 339) comments that “reciprocity, or the mutual give-and-take of knowledge can facilitate knowledge sharing if individuals see that the value-add to them depends on the extent to which they share their own knowledge with others”.

Schulz (1970: 661) believes that receiving knowledge from others stimulates a reciprocal flow of knowledge in the direction of the sender both horizontally and vertically in organisations.

Support for the relationship between reciprocity and knowledge sharing was also found by Hall (2001: 166) and Dyer and Nobeoka (2002: 1).

Reciprocity is also thought to be a motivator of knowledge sharing in communities of practice where knowledge sharing results in enhancing participants' expertise and providing opportunities for recognition (Bartol and Srivastava 2002: 64; Orr 1990: 189).

There is also a great deal of evidence for the relationship between reciprocity and the individual's attitude towards tacit knowledge sharing as discussed below. Bock et al. (2005: 93) confirms that an individual's attitude toward knowledge sharing is driven by anticipated reciprocal relationships regarding knowledge sharing. They contend that "anticipated reciprocal relationships capture employees' desires to maintain ongoing relationships with others, specifically with regard to knowledge provision and reception" (Bock et al. 2005: 93). They argue that "when two individuals are influenced by their social and organisational contexts, especially where knowledge is exchanged, the social exchange relationship is a major determinant of their attitudes" (Bock et al. 2005: 93). Social exchange creates friendships with unspecified obligations. According to them "employees who believe their mutual relationships with others can improve through their tacit knowledge sharing, and who are operating on the basis of their desire for fairness and reciprocity, are likely to have positive attitudes toward knowledge sharing" (Bock et al. 2005: 93).

Nahapiet and Ghoshal's (1998: 255) study also indicated that an individual's anticipated reciprocal relationship has a significant effect on his/her attitudes toward explicit knowledge sharing.

To conclude, shared norms and values create expectations that bind, encourage social exchange and the exchange of information and tacit knowledge, promote trust, reduce opportunistic behavior, facilitate reciprocity and ensure co-operative and desirable collective behavior. All these factors positively affect the individual's attitude towards tacit knowledge sharing. This leads to the seventh hypothesis:

Hypothesis 7. Individuals who report a perception of shared norms and values between themselves and their co-workers will *display a positive attitude towards tacit knowledge sharing.*

In order to assess the influence of relational social capital on the individual's attitude towards tacit knowledge sharing, research objectives 4, 5, 6 and 7 were combined to formulate the following research objective and research hypothesis:

Ro. 8. To determine the influence that a high level of relational social capital (trust, shared norms and values) have on an individual's positive attitude towards tacit knowledge sharing.

Hypothesis 8. Individuals who report a high level of relational social capital (trust, shared norms and values) will display a positive attitude towards tacit knowledge sharing.

The cognitive dimension of social capital is described in the next section.

2.5.3 Cognitive dimension of social capital

The cognitive dimension is this study referred to shared vision and goals (Appendix B3 - Shared vision - Measurement items - question 31, 5 and 34 / Shared goals - Measurement items - question 13, 16 and 22).

According to Nahapiet and Ghoshal (1998: 243) it refers to "those resources providing shared representations, interpretations, and systems of meaning among parties". It includes attributes like shared vision, goals, values, languages, codes and shared narratives (Levin et al. 2002: 25). Krishna and Uphoff (1999: 1) believe that this dimension includes norms, shared values, reciprocity, solidarity, attitudes, trusts, and beliefs. These attributes represent facets of particular importance in the context of their consideration in the development of intellectual capital (Cicourel 1973: 1).

This dimension facilitates shared understanding between individuals, collective goals and agreed upon actions between individuals (Chow and Chan 2008: 259; Hazleton and Kennan 2000: 81).

Krishna and Uphoff (1999: 1) espouse the view that the cognitive dimension focuses more on the psychological side of the individual. They state that in terms of employee behavior, there is a need to recognize that individuals as cognitive and emotional beings possess free will. Free will enables people to make decisions regarding the behaviours in which they will engage. Boland and Tenkasi (1995: 351) suggest that higher cognitive social capital gives partners a common perspective that enables them to develop similar perception and interpretation toward events.

Furthermore, this dimension captures the essence of what Coleman (1990: 315) describes as "the public good aspect of social capital". In his view within an organisation (especially a large, complex organisation), a shared vision helps to develop the cognitive dimension, which in turn facilitates individual and group actions that can benefit the whole organisation.

Shared vision and shared goals are discussed individually in the following sections.

2.5.3.1 Shared vision

The research objective for shared vision is:

Ro.9. To determine the influence of shared vision on the individual's attitude towards tacit knowledge sharing.

Hoe and Mc Shane (2010: 370) comment that a shared vision refers to "a clear and common picture of a desired future state that members of a group or organisation identify with themselves”. They found that shared vision has a profound effect on knowledge acquisition. They believe that “shared vision implies strong team cohesiveness and organisational commitment, which motivates employees, to more actively share, organisationally beneficial knowledge”.

Krackhardt (1990: 342) found that “the structure of organisation members' social interactions influences the formation of a shared vision and this in turn influences the members’ information and knowledge sharing behaviour”.

Tsai and Ghoshal (1998: 467) concur and make the point that organisation members who share a vision will be more likely to become partners sharing or exchanging their productive resources, i.e., tacit knowledge. They comment that “when a shared vision is present in the network, members have similar perceptions as to how they should interact with one another, can avoid possible misunderstandings in their communications and have more opportunities to exchange their ideas or resources freely” (Tsai and Ghoshal 1998: 467).

Many authors have indicated that a shared vision facilitates the sharing of tacit knowledge. For example, Orton and Weick (1990: 203) propogate the view that an “individual’s perceived understanding and commitment to the organisation’s vision potentially motivates employees to engage more fully in informal knowledge acquisition and dissemination”. They found that shared vision was a “significant predictor of informal knowledge dissemination”.

According to Hoe and Mc Shane (2010: 380) a “shared vision implies strong team cohesiveness and/or organisational commitment, which motivates employees, to more actively share, organisationally beneficial knowledge”.

Furthermore, research undertaken by Darvish and Nikbakhsh (2010: 43) indicated that shared vision has a strong effect on an individual's attitude towards knowledge sharing. They found that shared vision facilitates shared goals in a university setting and is critical for departmental success. In their view a shared vision reflects professional context compatibility and facilitates the acquisition and dissemination of organisational beneficial tacit knowledge in a University of Technology.

Inkpen and Tsang (2005: 157) contend that "shared vision embodies the collective goals and aspirations of the members of an intra-corporate network".

Gold, Malhotra and Segars (2001: 185) pointed to the fact that a shared vision not only provides a sense of purpose to the organisation but also helps to create a system of organisational values.

Tsai and Ghoshal (1998: 467) found that you can view a shared vision as a bonding mechanism that helps different parts of an organisation to integrate or to combine resources.

To conclude, shared vision may be viewed as a productive bonding mechanism which promotes mutual understanding and shared goals, the exchange of resource and the avoidance of misunderstanding amongst individuals. It encourages individuals to engage in the sharing of tacit knowledge. This, it is proposed, leads to a positive attitude towards the sharing of tacit knowledge. Hence:

Hypothesis 9. Individuals who report a perception of shared vision between themselves and their co-workers will display a positive attitude towards tacit knowledge sharing.

2.5.3.2 Shared goals

The research objective for shared goals is:

Ro.10. To determine the influence of shared goals on the individual's attitude towards tacit knowledge sharing.

Coleman (1988: 95) was the first to define social capital as "people's ability to co-operate in achieving a common goal" (Inkpen and Tsang 2005: 153). According to Inkpen and Tsang (2005: 153) "shared goals represent the degree to which network members share a common understanding and approach to the achievement of network tasks and outcomes". Chow and Chan (2008: 464) define a shared goal as "the degree to which one has collective goals, missions and visions with other people".

Svendsen (2004: 27) postulates that "shared goals may be viewed as voluntary co-operation which is self-enforcing and established in an informal institution without any written rules, in contrast to forced co-operation, which is enforced by a third party, following the written-down rules of a formal institution".

Within an organisation, shared goals can be achieved through co-operation and knowledge sharing. The aim of tacit knowledge sharing in a University of Technology is usually to bring individual knowledge to common attention and to work towards common goals (Widén-Wulff and Ginman 2004: 498). The degree to which individuals are committed to defined and accepted goals help them to see the potential value of their resource exchange (i.e., tacit knowledge exchange) and combination. As a result, organisation members who share goals are more likely to become partners sharing or exchanging their tacit knowledge resources. Shared goals are thus critical for knowledge transfer.

Pinto, Pinto and Prescott (1993: 1281) demonstrated that "shared goals can enhance knowledge transfer within cross-functional teams and impact project outcomes".

In their study, Chow and Chan (2008: 460) found that “with collective goals, organisational members tend to believe that other employee's self-interest will not affect them adversely and they thus contribute their knowledge to help achieve their mutual goals”.

Furthermore, Wasko and Faraj (2005: 35) found that knowledge sharing requires shared understanding and that goals were important factors in facilitating mutual understanding.

Wagner (1995: 90) states that “shared goals can be considered as the force that holds people together and lets them share what they know”.

Homburg, Hoyer and Fassnaucht (2002: 86) also found that having common goals and shared obligations between staff members is important for effective work performance and the transfer of knowledge.

It should be noted that the lack of shared goals or conflicting goals will have a negative effect of the sharing of tacit knowledge.

Seonghee and Boryung (2008: 282) found that “individual members of academic institution place a higher priority on individual scholarly achievement and teaching than on sharing common visions toward organisational goals and objectives”. Consequently, individuals in universities are less likely to share knowledge in pursuit of common goals as compared to business organisations. Due to exclusiveness and individualism and competition for scarce resources knowledge sharing in universities may be poor. This can undermine the transfer of tacit knowledge within the university.

Holland, Gaston and Gumes (2000: 233) point out conflicting goals as one of the biggest obstacles for cross functional teams. They comment that:

> because of conflicting goals, cross functional team members often lack the time and resources to fulfil team responsibilities and often do not know how to reconcile team and functional priorities. Due to conflicting goals, team members are reluctant to co-operate. When there is agreement on team goals, team members are motivated to co-operate and share knowledge with each other, since they understand that by sharing knowledge they can more easily and quickly complete tasks.

Weldon and Weingart (1993: 1) concur with Holland, Gaston and Gumes (2000: 233) and comment that teams working towards specific, shared goals consistently perform better than those working without shared goals.

Thus, to conclude, shared goals promote a common understanding, the mutual exchange of ideas, the sharing of knowledge and the motivation to cooperate with a common vision. This, it is proposed, will lead to a more positive attitude towards the sharing of tacit knowledge. This leads to the tenth hypothesis:

Hypothesis 10. Individuals who report a perception of shared goals between themselves and their co-workers, will display a positive attitude towards tacit knowledge sharing.

In order to assess the influence of cognitive social capital, research objective 9 and 10 were combined to formulate the following research objective and research hypothesis:

Ro. 11. To determine the influence that a high level of cognitive social capital (shared vision and goals) will have on the individual's attitude towards tacit knowledge sharing.

Hypothesis 11. Individuals who report a high level of cognitive social capital (shared vision and goals) will display a positive attitude towards tacit knowledge sharing.

2.6 Social capital hypothesis

The research objective for social capital is:

Ro. 12. To determine the influence of the structural (network ties and network resources), relational (trust, shared norms and values) and cognitive dimension (shared vision and goals) of social capital on the individual's attitude towards tacit knowledge sharing.

Very little research has investigated the combined effect of all three dimensions of social capital (i.e., structural, relational and cognitive dimension) on the individual's attitude towards the sharing of tacit knowledge.

Prior research has suggested that the three dimensions of social capital influence the individual's intention to share tacit knowledge (Ajzen and Madden 1986: 453; Doll and Ajzen 1990: 1; Parker, Manstead, Stradling, Reason and Baxter 1992: 94; Schifter and Ajzen 1985: 843). Hence:

Hypothesis 12. Individuals who report a high level of structural social capital (network ties and network resources), relational social capital (trust, shared values and norms) and cognitive social capital (shared vision and goals) will display a positive attitude towards tacit knowledge sharing.

The three dimensions of social capital (i.e., the structural, relational and cognitive dimensions of social capital) have been incorporated into the studies model and serve as the independent variable for the individual's attitude towards the sharing of tacit knowledge.

The social capital aspect of the studies model is diagrammatically illustrated in Figure 2.3 on the following page. The theory of reasoned action and the individual's attitude towards the sharing of tacit knowledge is discussed further, in the next chapter.

2.7 Conclusion

This chapter provided a general review of social capital literature. It began with a brief discussion of tacit knowledge and tacit knowledge sharing. This was followed by a discussion of the roots of social capital followed by the theoretical conception of social capital. This studies definitional stance was then provided.

This chapter showed that the term social capital is currently categorized into the following types: (1) micro, (household or individual), meso (regional and community), macro (national) levels, which are categorized based on the level of economic structure that social capital affects and (2) three dimensions, i.e., the structural, relational and cognitive dimensions of social capital. The three dimensions of social capital were outlined and differentiated. The chapter then proceeded to present the studies research objectives, hypotheses and literature relating to each social capital measurement construct.

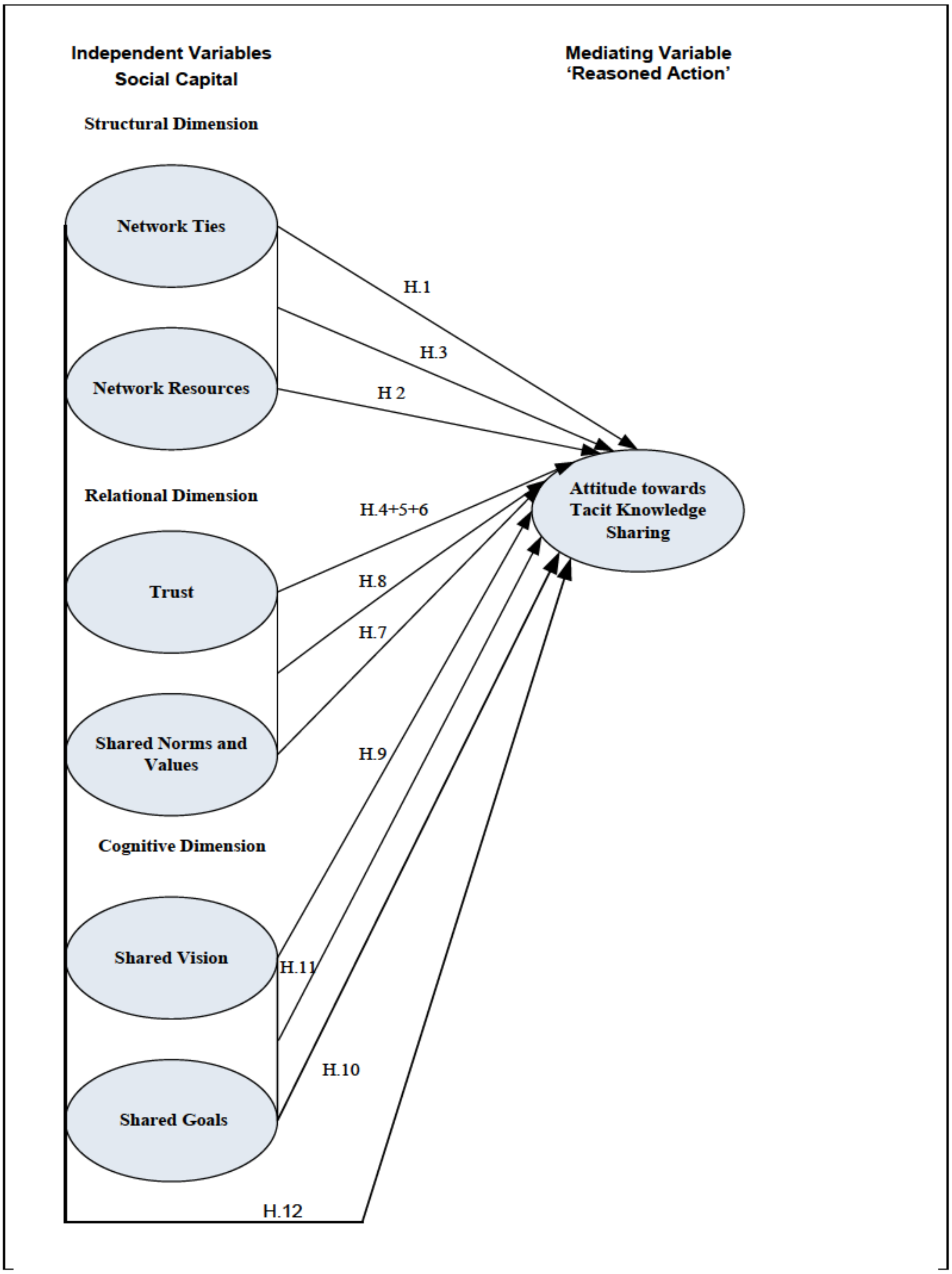

Figure 2.3 Social capital hypotheses

The measurement constructs discussed included network ties, network resources (structural dimension), trust, shared norms and values (relational dimension) and vision and goals (cognitive dimension).

This study proposes that network ties (structural dimension of social capital), trust, shared norms and values (relational dimension of social capital) and shared vision and goals (cognitive dimension of social capital) act as determinants for the “individual’s attitude towards the sharing of tacit knowledge” and that the “individual’s attitude towards tacit knowledge sharing”, “perceived norms about knowledge sharing” and their “perceived behavioural control over tacit knowledge sharing,” act as determinants for the individual’s “intention to share tacit knowledge”.

The “individual’s attitude towards the sharing of tacit knowledge”, their “perceived norms about knowledge sharing” and their “perceived behavioural control over tacit knowledge sharing” are attributes which are included in Fishbein and Ajzens (1010: 1) ‘reasoned action’ model.

The following chapter presents the literature related to the theory of reasoned action and the individual’s intention to share tacit knowledge.

CHAPTER 3

THEORY OF REASONED ACTION

"I have yet to see any problem, however complicated, which, when you looked at it in the right way, did not become still more complicated".

(Poul Anderson 1999: 625)

3.1 Introduction

The previous chapter provided a review of the theory of social capital. This chapter provides a general review of the theory of reasoned action (Fishbein and Ajzen 2010: 1) literature and an in depth review of literature related to each 'reasoned action' measurement construct used in this study. It begins with the history of the theory of reasoned action and the 'reasoned action' approach. This is followed by the behavioural, normative and control beliefs which underlie the theory of reasoned action. The chapter proceeds by examining the research, objective, hypotheses and reviews of the literature with regard to each 'reasoned action' measurement construct used in the study model.

3.2 Background of the theory of reasoned action

The theory of reasoned action was proposed by Martin Fishbein and Icek Ajzen in 1975. It was grounded in various theories of attitude such as learning theories, expectancy-value theories (Ajzen 2001: 27), consistency theories (Heider's balance theory, Osgood and Tannebaum's congruity theory and Festinger's dissonance theory) and attribution theory. Their theory was "born largely out of frustration with traditional attitude-behavior research, much of which found weak correlations between attitude measures and performance of volitional behaviors" (Hale, Householder and Greene 2003: 259).

The key application of the initial theory of reasoned action (Fishbein and Ajzen 1975: 1) was the prediction of behavioural intention. The theory assumed that behaviour was determined by the individual's intention to perform, or not to perform a given behaviour. According to this theory, if people evaluated the suggested behaviour as positive (attitude towards the behaviour), and if they thought their significant others wanted them to perform the behaviour (subjective norm), this resulted in a higher intention (motivation) to perform the behaviour and thus they were more likely to perform the behaviour.

In this theory, attitudes did not directly predict behaviour, they predicted intention. Subjective norms did not directly predict behaviour, they predicted intention. Intention predicted behaviours. A high correlation of attitudes and subjective norms to behavioural intention, and subsequently to behaviour has been confirmed in many studies (Sheppard, Hartwick and Warshaw 1988: 325). Figure 3.4 provides a schematic presentation of Fishbein and Ajzen's (1975: 1) initial 'reasoned action' model.

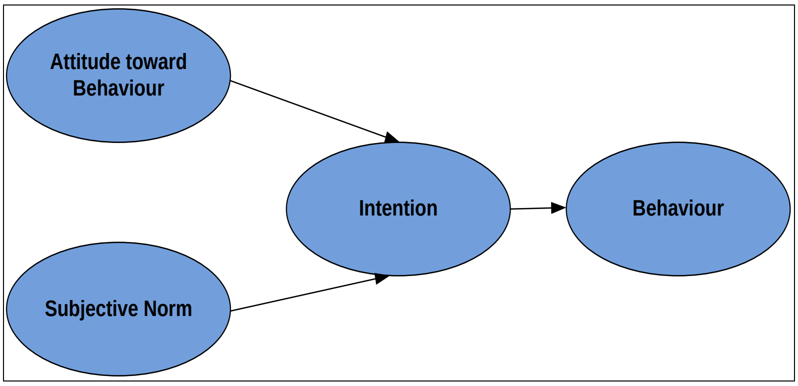

Figure 3.4 Fishbein and Ajzen's (1975: 1) initial 'reasoned action' model.

In 1985, Ajzen proposed an extension to Fishbein and Ajzen's (1975: 1) initial theory of reasoned action model through his article "From intentions to actions: A theory of planned behavior". In this new model, Ajzen included a construct called 'perceived behavioral control' and generated a new model named the 'theory of planned behaviour'.

Perceived behavioural control reflects a person's ability to actually perform a behavior.

Ajzen (1991: 180) included 'perceived behavioural control' because some studies did not show that behavioural intention always led to actual behaviour because of circumstantial limitations. He believed that if people are given a sufficient degree of actual control over the behaviour, people will carry out their intentions when the opportunity arises. Also, he found that behavioural intention could not be the exclusive determinant of behaviour where an individual's control over the behavior is incomplete. He, thus, extended the theory of reasoned action to cover non-volitional behaviours for predicting behavioural intention and actual behaviour. To the extent that perceived behavioural control is veridical, it can serve as a proxy for actual control and contribute to the prediction of the behaviour in question.

The theory of planned behaviour (Ajzen 1991: 189) deals with the antecedents of attitudes, subjective norms, and perceived behavioural control, antecedents which in the final analysis determine intentions and behaviour. Individuals form beliefs about an object by associating object with various characteristics, qualities and attributes (Fishbein and Ajzen 2010: 96).

The way beliefs influence attitudes is described by the popular model of attitude formation and structure, the expectancy-value model (Feather 1988: 105).

At the most basic level of explanation, the theory postulates that behaviour is a function of salient information, or beliefs, relevant to the behaviour. According to Fishbein and Ajzen (1975: 1), people's evaluations of, or attitudes toward behaviour are determined by their accessible beliefs about the behaviour, where a belief is defined as "the subjective probability that the behavior will produce a certain outcome" (i.e., outcome expectancy). Specifically, the evaluation of each outcome contributes to the attitude in direct proportion to the person's subjective possibility that the behaviour produces the outcome in question (i.e., outcome expectancy). People can hold a great many beliefs about any given behaviour, but they can attend to only a relatively small number (five to nine items of information at a time) at any given moment (Miller 1956: 81). “It can therefore be argued that a person’s attitude toward and object is, at any given moment, primarily determined by no more than five to nine readily accessible salient beliefs about the object” (Fishbein and Ajzen 2010: 99).

Three kinds of salient beliefs may be distinguished: behavioural beliefs (beliefs about the likely outcomes of the behavior and the evaluations of these outcomes) which are assumed to influence attitudes toward the behaviour, normative beliefs (beliefs about the normative expectations of others and motivation to comply with these expectations) which constitute the underlying determinants of subjective norms, and control beliefs (beliefs about the presence of factors that may facilitate or impede performance of the behaviour) and the perceived power of these factors which provide the basis for perceptions of behavioural control. It is these salient beliefs that are considered to be the prevailing determinants of a person’s intentions and actions.

In their respective aggregates, behavioral beliefs produce a favorable or unfavorable attitude toward the behaviour; normative beliefs result in perceived social pressure or subjective norm; and control beliefs give rise to perceived behavioural control. In combination, attitude toward the behaviour, subjective norm, and perception of behavioural control lead to the formation of a behavioural intention.

The only difference between the ‘theory of reasoned action’ and the ‘theory of planned behaviour’ is the inclusion of perceived behavioural control.

As a general rule, the more favorable the attitude and subjective norm, and the greater the perceived control, the stronger should be the person's intention to perform the behaviour in question. This is schematically presented in Figure 3.5.

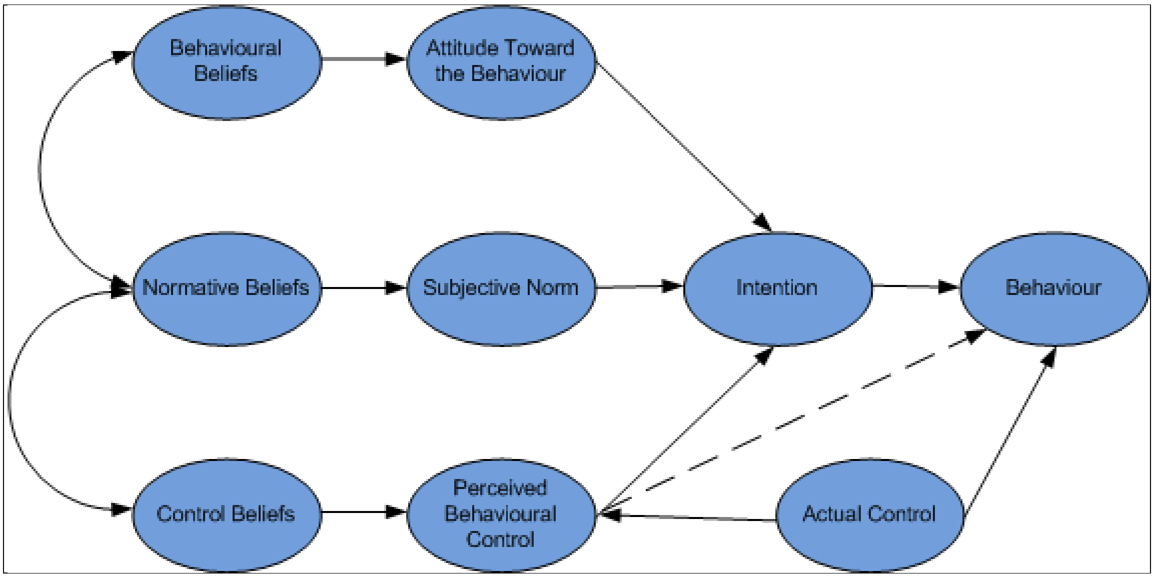

Figure 3.5 Ajzen's (1991: 179) theory of planned behaviour

The theory of reasoned action proposed by Ajzen and Fishbein (1980: 1) and the extended theory of planned behaviour (Ajzen 1991: 179) have been used over the past two decades to examine various behavioural intentions and behaviours (Fishbein and Ajzen 1981: 339). A great number of studies have, over the years, tested the general expectancy-value model of attitude as well as its application to behavior. In a typical study, a standard, global measure of attitude is obtained, usually by means of an evaluative semantic differential, and this standard measure is then correlated with an estimate of the same attitude based on salient beliefs (Godin, Valois, Shephard and Desharnais 1987: 145; Jaccard and Davidson 1972: 228: Rosenberg 1956: 367). The results have generally supported the hypothesized relation between salient beliefs and attitudes, although the magnitude of this relation has sometimes been disappointing (Insko, Blake, Cialdini and Mulaik 1970: 228). Various factors according to Ajzen (1991: 192) may be responsible for relatively low correlations between salient beliefs and attitudes. First, there is the possibility that the expectancy-value model is an inadequate description of the way attitudes are formed and structured. For example, some investigators (Valiquette, Valois, Desharnais, and Godin 1988: 723) have questioned the multiplicative combination of beliefs and evaluations in the expectancy value model of attitude. Most discussions of the model, however, have focused on methodological issues.

3.3 The 'reasoned action' approach

The following section presents Fishbein and Ajzen's (2010: 20) theory of behavioural prediction, in its most current form, as it applies to the sharing of tacit knowledge. It should be noted that Fishbein and Ajzen (2010: 20) refer to their latest theory as the 'theory of reasoned action', reverting back to their older, 1975 title. Their 'reasoned action' (2010: 22) model is schematically represented in Figure 3.6.

In this model, human social behaviour occurs as a result of the beliefs which people have about performing the behaviour (Fishbein and Ajzen 2010: 20). It occurs spontaneously from these beliefs, i.e., for the purposes of this study, tacit knowledge sharing beliefs. These beliefs serve to guide the individual's decision to share or not share their tacit knowledge. Fishbein and Ajzen (2010: 20) identify three types of beliefs: behavioural, normative and control beliefs. These are discussed in the following section.

3.3.1 Behavioural beliefs

Analysis of behavioural beliefs offers insight into "the ways people think about the behaviour, about its likely consequences, the demands placed on them by others, as well as the required resources, possible barriers and other issues of control" (Fishbein and Ajzen 2010: 23).

According to Ajzen (1991: 191) “we form beliefs about an object by associating it with certain attributes, i.e., with other objects, characteristics, or events”. These beliefs originate in a variety of sources such as personal experiences, education, television and interaction with family and friends. Consequently individuals from different social backgrounds or with different personality traits are likely to differ in the behavioural beliefs they hold.

Behavioural beliefs describe “the person’s beliefs that the behaviour leads to certain outcomes and his or her evaluations of these outcomes” (Ajzen 1991: 191). Thus, an individual’s behavioural beliefs include evaluations or outcome expectations which describe the implicit valuation or payoff that an individual associates with the outcome.

Outcome expectations refer to “an individual’s belief that task accomplishment leads to a possible outcome” (Ajzen 1991: 191) or as Chiu, Hsu and Wang (2006: 1872) contend in relation to knowledge sharing behaviour, that they refer to “the knowledge contributor’s judgment of likely consequences that his or her knowledge sharing behaviour will produce to him or herself”. These beliefs or outcome expectations guide the individual’s decision to perform or not perform the behaviour in question. To explain this further, outcome expectation was originated from the expectancy-value model (Ajzen 2001: 30). It is a variable linking belief, attitude and expectation.

With regard to the individual’s outcome expectation, individuals hold beliefs about the positive or negative consequences they might experience if they shared their beliefs about sharing their tacit knowledge. Their outcome expectations (i.e., their positive or negative evaluations about the sharing of their tacit knowledge) about sharing their tacit knowledge determine their attitude towards sharing their tacit knowledge (Fishbein and Ajzen 2010: 20). According to Ajzen (1991: 191) “the outcome’s subjective value contributes to the attitude, in direct proportion to the strength of the belief, i.e., the subjective probability that the behaviour will produce the outcome in question".

Ajzen (1991: 191) comments that "since the attributes that come to be linked to tacit knowledge sharing behaviour are already valued positively or negatively, we automatically and simultaneously acquire an attitude towards the tacit knowledge sharing behaviour". In this way, individuals develop positive attitudes towards tacit knowledge sharing behaviour that they believe will have desirable or beneficial outcomes and form unfavourable attitudes towards tacit knowledge sharing behaviour which they believe will have negative outcomes. These outcome expectancies are assumed to determine people's attitude toward personally sharing their tacit knowledge - that is, their positive or negative evaluation of their sharing of tacit knowledge.

For example, for any given behaviour at a given time, we will have a set of salient beliefs, for example, a woman's beliefs about using birth control pills may be that they cause her to gain weight.

For each belief, she will have an outcome evaluation, for example, "birth control pills' causing me to gain weight is a bad thing".

For each belief, she will also have a belief strength, for example "I am very certain that using birth control pills will cause me to gain weight".

An attitude toward a behaviour can be predicted by assessing for each belief, the outcome evaluation and belief strength. The positivity and negativity of the attitude may also be assessed.

The implications of this approach is that two people may have the same set of beliefs about a behaviour but a totally different attitude because of different outcome evaluations or belief strengths.

A person's attitude can be changed in several ways by:

- Changing the salient beliefs in a situation,

- Changing evaluations of the beliefs,
- Changing the strength of the belief.

The individual's attitude toward the sharing of tacit knowledge is discussed further in Section 3.4.

3.3.2 Normative beliefs

Normative beliefs are concerned with the likelihood that important referent individuals or groups approve or disapprove of the sharing of tacit knowledge. People form normative beliefs (injunctive and descriptive beliefs) that important individuals or groups in their lives would approve or disapprove of their sharing their tacit knowledge as well as beliefs that these referents themselves do or don't share their tacit knowledge. In their totality beliefs produce a perceived norm, that is, "perceived social pressure to engage or not engage in the sharing of tacit knowledge" (Fishbein and Ajzen 2010: 20). If more important others are believed to approve than disapprove of the person sharing their tacit knowledge and if the majority of important others share their tacit knowledge, individuals are likely to perceive social pressure to engage in the sharing of tacit knowledge.

According to Ajzen (1991: 199) it has been suggested that, at least in certain contexts, we need to consider not only perceived social pressures but also personal feelings of moral obligation or responsibility to perform, or refusal to perform a certain behavior (Gorsuch and Ortberg 1983: 1025; Pomazal and Jaccard 1976: 317; Schwartz and Tessler 1972: 225). Such moral obligations would be expected to influence intentions, in parallel with attitudes, subjective (social) norms and perceptions of behavioral control.

The individual's perceived norms about tacit knowledge sharing will be discussed further in Section 3.5.

3.3.3 Control beliefs

Finally, people also form beliefs about personal and environmental factors, that can help or impede their attempts to share tacit knowledge, i.e., control beliefs. For perceived behavioural control, control beliefs would include individual perceptions regarding the possession of the necessary skills, resources or opportunities to successfully share their tacit knowledge (Fishbein and Ajzen 2010: 153). The individual's evaluations of behavioural control indicate the importance of each skill, resource or opportunity being successful. It is linked to control beliefs, which refers to "beliefs about the presence of factors that may facilitate or impede performance of the behaviour" (Ajzen 1991:191).

In their aggregate, these control beliefs result in a sense of high or low self-efficacy (Bandura 1986a: 185; 1997: 1) or perceived behavioural control with regard to the sharing of tacit knowledge.

If perceived behavioural control beliefs identify more facilitating than inhibiting factors, perceived behavioural control should be high. An individual's control beliefs, thus, have a major part to play in whether or not an individual performs the behaviour in question (Fishbein and Ajzen 2010: 169).

Lack of requisite skill and abilities, or presence of environmental constraints, can prevent people from acting on their intentions. That is, they may lack actual control over performance of the sharing of tacit knowledge. At the lowest level of explanation, therefore, people are said to perform a behaviour because they intend to do so, they have the requisite skills and abilities, and there are no environmental constraints to prevent them from carrying out their intentions (i.e., they have favourable intentions and actual behavioural control). It is only when people do have control over the sharing of tacit knowledge that intention is expected to be a good predictor of the sharing of tacit knowledge.

Actual behavioural control over tacit knowledge sharing behaviour thus moderates the effect of intentions on behaviour (Fishbein and Ajzen 2010: 169).

To predict and understand behaviour fully, we therefore have to assess not only intentions but also actual behavioural control (i.e., relevant skills and abilities as well as barriers to and facilitators of behavioural performance), (Fishbein and Ajzen 2010: 21).

For most behaviours, however, measures of actual control are not available. According to Fishbein and Ajzen (2010: 10) in these instances, researchers can use Fishbein and Ajzen's (2010: 21) measures of perceived behavioural control as a proxy. In terms of the extent that perceived behavioural control accurately reflects actual control, it can be used to improve the behavioural prediction of tacit knowledge sharing behaviour.

3.3.4 Current 'reasoned action' model

To continue with the discussion of the 'reasoned action' model (Figure 3.6), the theory of reasoned action (Fishbein and Ajzen 2010: 21) specifies that once attitudes, perceived norms, and perceived behavioural control beliefs have been formed they are directly accessible an available to guide intentions and behaviour. Specifically, in combination, the individual's attitude towards the sharing of tacit knowledge, their perceived norms with regards to the sharing of tacit knowledge, and their perception of behavioural control over tacit knowledge sharing behaviour leads to the formation of a behavioural intention, or a readiness to share tacit knowledge.

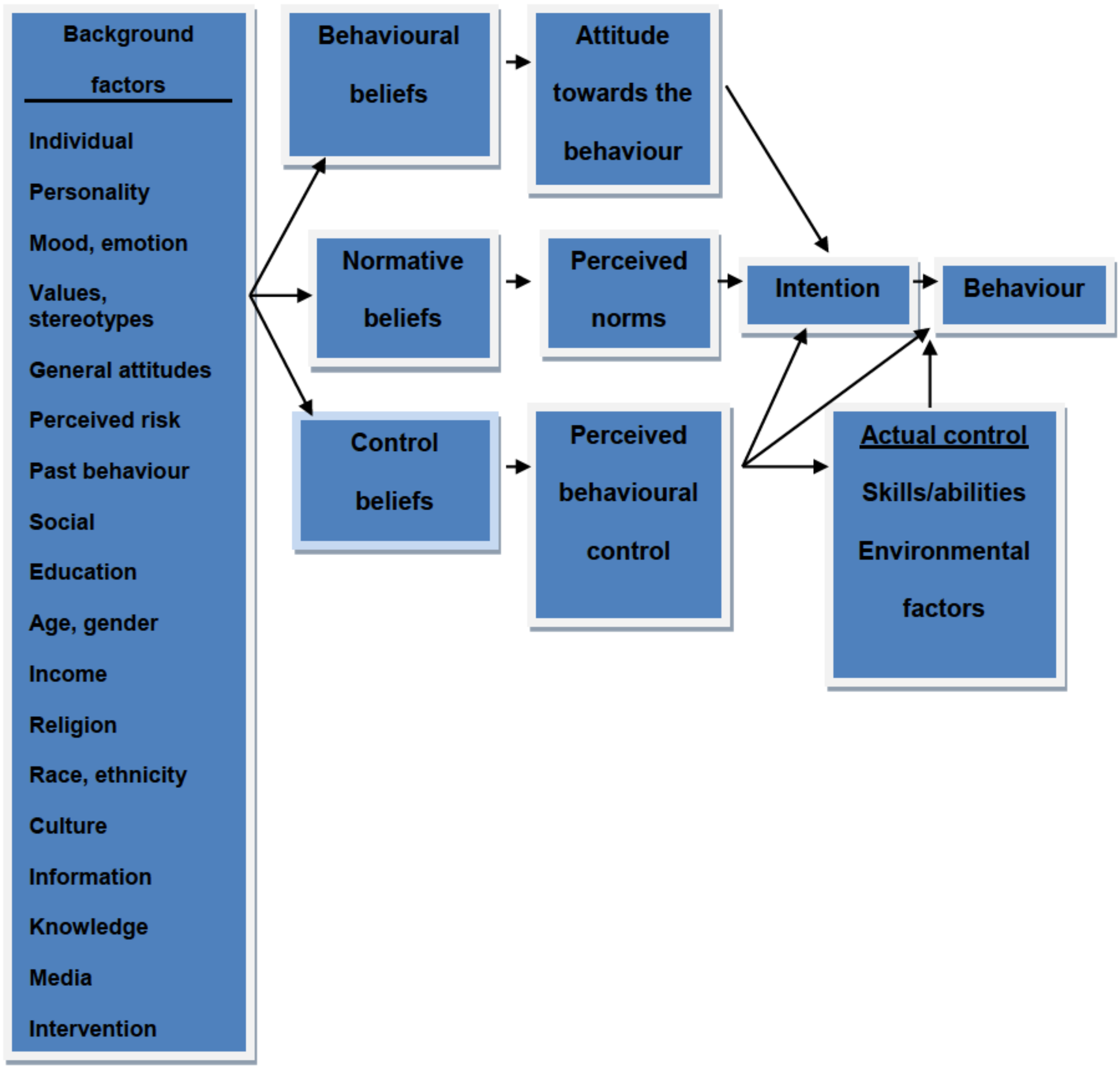

Figure 3.6 Fishbein and Ajzen's (2010: 22) 'Reasoned Action' Model

As a general rule, the more favourable the attitude and perceived norm, and the greater the perceived behavioural control, the stronger should be the person's intention to share tacit knowledge.

However, the relative importance or weight of these three predictors of intentions is expected to vary from one behaviour to another and from one population to another. For example, few studies have examined the relation between specific control beliefs and perceived behavioural control (Ajzen and Madden 1986: 453).

It should be noted that the three predictors of intention, i.e., attitude towards the behaviour, perceived norms and perceived behavioural control can take on different weights (Fishbein and Ajzen 2010: 22). Consider, for example, the decision faced by academics to attend or not attend a professional conference. They may favourably evaluate attending the conference and experience social pressure to attend, but if they have made prior commitments they cannot break, or if they lack the financial resource to cover the cost of registration, transportation, food and lodging, they will perceive that they cannot attend the conference and may form an intention to not attend the conference.

The fact that the three predictors of intentions can take on different weights tells us that the intention to perform a given behaviour is based on particular combination of attitudinal, normative, and behavioural control considerations (Fishbein and Ajzen 2010: 22). Thus, some people may attend a professional conference because they have positive attitudes toward this behaviour, whereas others may do so because of perceived social pressure.

Furthermore, the relative importance of the different predictors can vary from one population to another (Fishbein and Ajzen 2010: 22). Thus, at one university some professors may fail to attend a professional conference because of control issues, but at another they may not attend the conference because they perceive social pressure against this behaviour, that is, because their colleagues and other important referents don't approve of their going to this particular conference.

According to Fishbein and Ajzen (2010: 22) it is at the level of beliefs, that we gain most of the concrete information unique to a given behaviour. At this level we learn about the substantive considerations that guide people's decisions to perform or not to perform the behaviour of interest. This level of analysis offers insight into the ways people think about the behaviour: about its likely consequence, the demands place on them by others, as well as the required resource, possible barriers, and other issues of control (Fishbein and Ajzen 2010: 22). Thus, we may learn that many professors believe that attending a particular conference will enable them to acquire important information and to make new professional connections (behavioural beliefs) that their spouses and department chairs approve and most of their colleagues plan to attend (normative beliefs), and that they have the required time and financial resource (control beliefs). This pattern of beliefs would reasonably lead to a decision to attend the professional meeting.

Other individuals, however, may be found to hold a different set of beliefs. Although they may also believe that they have the time and resources to attend the conference they may believe that they would learn very little of professional value and that there is very little support among professional friends and colleagues for attending this meeting. Clearly, these individuals would be much less likely to attend.

The 'reasoned action' research objectives, literature review and hypotheses are provided in the next section.

3.4 Attitude towards tacit knowledge sharing

The research objective for 'attitude towards tacit knowledge sharing' is:

Ro. 13. To determine the influence of the individual's positive attitude towards tacit knowledge sharing on their intention to share tacit knowledge.

Fishbein and Ajzen (2010: 76) define attitude "as a latent disposition or tendency to respond with some degree of favourableness or unfavourableness to a psychological object". Allport (1935: 810) offered the following definition: "an attitude is a mental and neural state of readiness, organized through experience, exerting a directive or dynamic influence upon the individual’s response to all objects and situations with which it is related”. They found that “an individual’s attitude toward the behaviour in question represents general evaluations of the behavior performance”. They assert that “as an individual expresses a more positive attitude toward knowledge sharing, he/she is more likely to exert more effort to share his knowledge with others within an organisation” (Allport 1935: 810).

Ajzen and Fishbein (1980: 1) state that “limiting the domain of the behavioural intention model to the rational actor, intention to engage in a behaviour is determined by an individual's attitude toward that behaviour”. Their finding that the attitude towards the behaviour leads to a behavioural intention or a readiness to perform the behaviour, has been corroborated by many researchers (Armistead and Meakins 2002; 49; Baum and Ingram 1988: 996; Bock and Kim 2002: 14; Chang 1998: 1825; Hislop 2003: 182; Lin and Lee 2004: 120; Yang 2010: 45).

To conclude, personal beliefs lead to a positive or negative evaluation of the performance of tacit knowledge sharing behaviour. This evaluation is based upon the individual’s beliefs or the outcome expectations of performing the sharing of tacit knowledge. Attitudes are immediate antecedents of tacit knowledge sharing behaviour.

It is therefore proposed that the individual’s positive attitude towards the sharing of tacit knowledge is a significant predictor of an individual’s intention to engage in the sharing of tacit knowledge or not. This leads to the thirteenth hypothesis:

Hypothesis 13. An individual’s positive attitude towards tacit knowledge sharing positively influences their intention to share tacit knowledge.

3.5 Perceived norms

The first research objective for perceived norms about tacit knowledge sharing is:

Ro. 11. To determine the influence of the individual's perceived norms about tacit knowledge sharing on their intention to share tacit knowledge.

The individual's beliefs that important individuals or groups in their lives would approve or disapprove of their sharing their tacit knowledge lead to a perceived norm about the sharing of their tacit knowledge (Ajzen 1991: 179). In Fishbein and Ajzen's (Ajzen 1991: 179; Ajzen and Fishbein 1980: 1; Fishbein and Ajzen 1975: 1) initial formulation of the theories of reasoned action and planned behaviour the term 'subjective norm' referred to "a specific behavioural prescription or prescription attributed to a generalized social agent". They describe it as "a person's perception that important others prescribe, desire, or expect the performance or non-performance of a specific behaviour" (Ajzen 1991: 179; Ajzen and Fishbein 1980: 1; Fishbein and Ajzen 1975: 1). They used the term 'subjective norm' because this term may or may not reflect what most important others actually think should be done.

Fishbein and Ajzen (2010: 133) comment that normative prescriptions represent only one source of perceived normative pressure. They further state that in addition to believing that particular individuals or groups do or do not want us to perform a given behaviour, we may also experience normative pressure because we believe that important others are themselves performing or not performing the behaviour in question (Fishbein and Ajzen 2010: 130).

These two types of norms they termed injunctive and descriptive norms. 'Injunctive norms' refer to "perceptions concerning what should or ought to be done with respect to performing a given behaviour or perceived behaviour of others or perceptions of what others think we should do". (Fishbein and Ajzen 2010: 131).

Where-as descriptive norms refer to "perceptions that others are or are not performing the behaviour in question" (Fishbein and Ajzen 2010: 131). In Fishbein and Ajzen's (2010: 145) way of thinking about descriptive norms, they assume that a person's own behaviour is influenced by the perceived behaviour of others, be it their past behaviour, their current behaviour or their anticipated future behaviour.

The work of Cialdini (2007: 263), and Reno, Cialdini, and Kallgren (1993: 104) suggest that descriptive norms can influence behaviour by providing evidence as to what will likely be effective and adaptive action. If most others are performing a given behaviour, people may assume that it is a sensible thing to do under the circumstances. This is especially true if others are experts with respect to the behaviour in question. By simply registering what most others are doing in a particular situation and be imitating their actions individuals can usually choose efficiently and well. Cialdini (2007: 263) argue that imitating the actions of others offers an information-processing advantage and a decision-making shortcut when choosing how to behave in a given situation.

Fishbein and Ajzen (2010: 130) use the terms 'perceived norm' or 'perceived social pressure' to refer to "the overall normative influence derived from perceived injunctive and descriptive norms". They define perceived norms as "perceived social pressure to perform (or not to perform) a given behaviour" (Fishbein and Ajzen 2010: 130). Perceived norms are measured by asking individuals to indicate whether "important others (that is, self-selected referents) would approve or disapprove of their performing a particular behaviour" (Ajzen 1991: 179).

For the purpose of this study, the term ‘perceived norms’ is used to refer to ‘perceived injunctive norms’. This study only incorporates ‘perceived injunctive norms’ and does not include descriptive norms.

Lewis, Agarwal and Sambamurthy (2003: 662) explain the influence of social pressure (perceived norm) in the following way:

“This effect is manifest via the psychological pathways of internalization and identification. Via internalization, the individual incorporates the opinion of an important referent as part of her own belief structure: in essence, the referent's beliefs become one's own. Via identification, the individual seeks to believe and act in a manner similar to those possessing referent powers”.

The individual’s attitude towards the sharing of tacit knowledge, perceived norms and perceived behavioural control determine the individual’s intention to share tacit knowledge. Other things being equal, the stronger the perceived social pressure, the more likely it is that an intention to share tacit knowledge will be formed. In conjunction with Fishbein and Ajzen (2012: 130), similar arguments have been made by the following authors (Chang 1998: 1825; Fulk 1993: 921; Kurland 1995: 297; Lewis, Agarwal and Sambamurthy 2003: 657; Mathieson 1991: 173; Schmitz and Fulk 1991: 487).

Fishbein and Ajzen (1975: 1) believe that it is better to separate the attitudinal and normative variables despite the fact that several studies suggest that they may be highly correlated (Lee and Green 1991: 289; Shepherd and O'Keefe 1984: 287; Shimp and Kavas 1984: 795; Vallerand, Deshaies, Cuerrier, Pelletier and Mongeau 1992: 98; Venkatesh and Davis 2000: 186).

Miniard and Cohen (1981: 309) question the necessity of these distinctions especially the distinction between behavioral and normative beliefs (and between attitudes and subjective norms). They argue that all beliefs associate the behavior of interest with an attribute of some kind, be it an outcome, a normative expectation, or a resource needed to perform the behavior. Therefore, it should thus be possible to integrate all beliefs about a given behavior under a single summation to obtain a measure of the overall behavioural disposition (Ajzen 1991: 179).

According to Ajzen (1991: 199) the primary objection to such an approach is that it blurs distinctions that are of interest, both from a theoretical and from a practical point of view. They believe that, theoretically, personal evaluation of a behaviour (attitude), socially expected mode of conduct (subjective norm), and self-efficacy with respect to the behavior (perceived behavioural control) are very different concepts each of which has an important place in social and behavioural research (Ajzen 1991: 199).

Moreover, Fishbein and Ajzen (2010: 43) comment that the large number of studies on the theory of reasoned action and on the theory of planned behavior have clearly established the utility of the distinctions by showing that the different constructs stand in predictable relations to intentions and behavior.

Furthermore, Fishbein and Ajzen (1975: 48) contend that “attitudes and norms are not weighted equally in predicting behaviour - depending on the individual and the situation, these factors might be very different effects on behavioral intention; thus a weight is associated with each of these factors in the predictive formula of the theory”. For example, if you do not care what other people think, the subjective norm may not predict your behaviour.

Many studies have found that the individual's 'perceived norm' influences their intention to perform the behaviour in question (Bock et al. 2005: 87; Venkatesh and Davis 2000: 186).

For example, Chow and Chan (2008: 460) in their study, found that organisational members who had a more extensive social network with their colleagues, perceived greater social pressure for sharing their knowledge, because a good relationship resulted in higher expectations of colleagues.

Furthermore, studies using the theory of planned behaviour and reasoned action have found that subjective norms significantly impact in predicting behavioural intentions (Kurland 1995: 297; Chang 1998: 1825). Chang (1998: 1625) found that 'subjective norms' significantly affected moral behavioural intention. In addition, Ruy, Ho and Han (2003: 113) found that physician's 'subjective norms' affected their knowledge sharing intentions. Thus, it is proposed that, individuals who perceive social pressure to share their tacit knowledge experience a stronger intention to share their tacit knowledge (Appendix B3 - Measurement items - question 3, 15 and 24). Hence,

Hypothesis 14. An individual's perceived norms about tacit knowledge sharing positively influences their intention to share tacit knowledge.

The second objective for perceived norms about tacit knowledge sharing is:

Ro. 15. To determine the influence of the individual's perceived norms about tacit knowledge sharing on their attitude towards tacit knowledge sharing.

Although Fishbein and Ajzen do not include a relationship between the person's 'perceived norms' and their attitude toward performing a behaviour, a number of studies have shown that the 'perceived norm' influences an individual's attitude towards the sharing of tacit knowledge (Shepherd and O' Keefe 1984: 287; Shimp and Kavas 1984: 795; Vallerand et al. 1992: 98). Thus, it is further, proposed that the individual's perceived norm will positively influence their attitude towards sharing their tacit knowledge. Therefore:

Hypothesis 15. An individual's perceived norms about tacit knowledge sharing positively influence their attitude towards tacit knowledge sharing.

3.6 Perceived behavioural control over the sharing of tacit knowledge

'Perceived behavioural control' research objective:

Ro. 16. To determine the influence of the individual's perceived behavioural control on their intention to share tacit knowledge.

Within Fishbein and Ajzen's (2010: 20) approach, having a favourable attitude and perceiving social pressure (i.e., perceived norms about tacit knowledge sharing) with regard to the sharing of tacit knowledge may not be sufficient for the formation of an intention to share tacit knowledge. In addition to attitudes towards the sharing of tacit knowledge and perceived norms, intentions are also influenced by perceived behavioural control over the sharing of tacit knowledge.

The individual's control beliefs about tacit knowledge sharing influence their perceived behavioural control over tacit knowledge sharing. The notion that behaviour follows reasonably from beliefs about the behaviour is not unique to Fishbein and Ajzen's model (2010: 20). Much of our knowledge about the role of perceived behavioural control comes from the systematic research program of Bandura, Adams and Beyer (1977: 125) and Bandura, Adams, Hardy and Howells (1980: 39). Bandura's (1986b: 185, 1997: 3) well known social cognitive theory relies in part on behavioural beliefs and outcome expectancies and more importantly, on the construct of self-efficacy (or perceived behavioural control) to explain behaviour. His investigations have shown that people's behaviour is strongly influenced by their behavioural beliefs and by their confidence in their ability to perform it (i.e., by perceived behavioural control).

In examining the literature it can be seen that the terms used to identify and define behavioural control constructs varies greatly across investigators.

In a review of the literature, Skinner (1996: 549) identified no fewer than 100 behavioural control related constructs and definitions. According to Rotter (1966: 1) some of these constructs include the term "control (as in personal control) sense of control, perceived locus of control, outcome control and action control". Rodin (1990: 1) also observed that "these constructs have been called by many different things, including self-directedness, choice, decision freedom, agency, mastery, autonomy, self-efficacy, and self-determination". Thompson and Spacapan (1991: 7) reached a similar conclusion as Skinner (1996: 549) and identified the following additional constructs: "perceptions of control, helplessness, powerlessness, judgments of contingency and control ideology".

One approach to perceived behavioural control can be found in Atkinson's (1964: 242) theory of achievement motivation. An important factor in his theory is the 'expectancy of success', defined as "the perceived probability of succeeding at a given task" (Atkinson 1964: 242). This factor is quite similar to perceived behavioural control in that it refers to a specific behavioral context and not to a generalized predisposition. Somewhat paradoxically, the motive to achieve success is defined not as a motive to succeed at a given task but in terms of "a general disposition which the individual carries about him from one situation to another" (Atkinson 1964: 242). This general achievement motivation is assumed to combine multiplicatively with the situational expectancy of success as well as with another situation specific factor, the 'incentive value' of success.

Fishbein and Ajzen's (2010: 20) perceived behavioural control differs greatly from Rotter's (1966: 1) concept of perceived locus of control. Whereas locus of control is a generalized expectancy that remains stable across situations and forms of action, perceived behavioural control can, and usually does, vary across situations and actions. For example, in attempting to become an airplane pilot, a person may believe that, in general, their outcomes are determined by their own behaviour (internal locus of control), yet at the same time they may also believe that their chances of becoming a commercial airplane pilot are very slim (low perceived behavioural control).

Fishbein and Ajzen's (2010: 20) view of perceived behavioural control is most compatible with Bandura's (1982: 122) concept of self-efficacy which "is concerned with judgments of how well one can execute courses of action required to deal with prospective situations".
In his early writings, Bandura (1986: 359) defined perceived self-efficacy as "people's beliefs about their capabilities to exercise control over their own level of functioning and over events that affect their lives".

More recently, Bandura (1995: 1; 1997: 42; 1998: 95) asserts that self-efficacy is not a context-free global disposition but that, instead, it "should be measured in terms of particularized judgments of capability that may vary across realms of activity under different levels of task demand within a given activity domain, and under different situational circumstances". Thus, in their opinion, "perceived self-efficacy refers to beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura 1997: 3). In other words, it refers to “the conviction that one can successfully execute the behaviour required to produce the outcome”.

According to Bandura (1986b: 185), individuals make personal ability judgments and evaluations through a cognitive appraisal system that is specific to the individual, the task, and the particular situation at any given moment. Thus, self-efficacy beliefs can influence choice of activities, preparation for an activity, effort expended during performance, as well as thought patterns and emotional reactions (Bandura 1982: 122; 1991: 248).

Positive self-efficacy may encourage learning new skills, whereas negative self-efficacy may create resistance in operative capabilities (Bandura 1982: 122; 1991: 248).

Bandura (1982: 122) asserts that the judgment of perceived self-efficacy in the course of action may produce and regulate a person’s capability to deal with his or her environment. The greater people perceive their self-efficacy to be, the more active and longer they persist in their efforts.

Thus, it may be seen that Fishbein and Ajzen (1910: 155) definition of perceived behavioural control as “people’s perceptions of the degree to which they are capable of, or have control over, performing a given behaviour” is very similar to Bandura’s (1991: 257) perception of self-efficacy.

According to Rodin (1990: 1) the various constructs related to perceived behavioural control tend to describe perceived behavioural control as “a general sense of personal competence or perceived ability to influence events”.

Fishbein and Ajzen's (2010: 20) contend that "perceived behavioural control takes into account the availability of information, skills, opportunities and other resources required to perform the behaviour as well as possible barriers or obstacles that may be overcome". These behavioural control beliefs may be based in part on past experience with the sharing of tacit knowledge, but they will usually also be influenced by second-hand information about the sharing of tacit knowledge, by the experiences of acquaintances and friends, and by other factors that increase or reduce the perceived difficulty of the sharing of tacit knowledge. The more opportunities and resources individuals believe they possess, and the fewer barriers or obstacles they anticipate, the greater should be their perceived control over the sharing of tacit knowledge.

Research has revealed that perceived behavioural control may be divided into two categories: 'perceived capacity' and 'perceived autonomy' (Fishbein and Ajzen 2010: 167). Fishbein and Ajzen (2010: 167) maintain that "a comprehensive measure of perceived behavioural control can be obtained by including measurement items representing both perceived capacity and perceived autonomy".

Items relating to perceived capacity refer primarily to the ability to perform a behaviour, i.e., "to the belief that one can, is able to, or is capable of performing the behaviour", (i.e., self-efficacy), (Fishbein and Ajzen 2010: 166). Judgments of the perceived ease or difficulty of performing the behaviour are also included in measures of 'perceived capacity'.

Items relating to 'perceived autonomy' mainly deal with the degree of control over performing the behaviour (Fishbein and Ajzen 2010: 166). Also, included in measures of 'perceived autonomy' are judgments that performance of the behaviour is "up to me".

Fishbein and Ajzen (2010: 166) believe that these two measurement items represent two aspects of perceived behaviour control (and of self-efficacy), not separate indicators of efficacy versus perceived behavioural control. This view has been adopted in this study. Thus, this study includes perceived behavioural control measurement items incorporating the capacity to perform the behaviour (Appendix B3 - Measurement item - question 27 and 20) and perceived autonomy to perform the behaviour (Appendix B3 - Measurement item - question 9 and 2).

Within Fishbein and Ajzen's (2010: 20) approach, having a favourable attitude and perceiving social pressure (i.e., perceived norms about tacit knowledge sharing) with regard to the sharing of tacit knowledge may not be sufficient for the formation of an intention to share tacit knowledge. In addition to attitudes towards the sharing of tacit knowledge and perceived norms, intentions are also influenced by behaviour control beliefs and perceived control over the sharing of tacit knowledge.

Many studies reveal that perceived behavioural control may include natural, cognitive, structural barriers and functional barriers (Millar and Shevlin 2003: 26: Netemeyer Burton and Johnstone 1991: 87)

The barriers to performing tacit knowledge sharing are assessed by the individual to arrive at a decision of the positive benefits or personal costs of performing the sharing of tacit knowledge (Sheppard, Hartwick and Warshaw 1988: 325). This assessment is a significant predictor of an individual's intention to engage in the sharing of tacit knowledge or not. This dilemma, according to Leonard and Sensiper (1998: 113) "is intensified when expertise (i.e., personal reputation) is highly valued in an organisation but mentoring or assisting others is not". Not only does an individual choosing to share tacit knowledge stand to lose his/her unique value within the organisation, but any tacit knowledge shared that is subsequently judged to be unsound or irrelevant can damage his/her reputation.

Bock et al., (2005: 87) in their review of the literature found the following barriers of knowledge sharing: natural barriers such as time and space (Hinds and Pfeffer 2003: 3; Leonard and Sensiper 1998: 112) cognitive barriers that make it difficult for individuals to communicate and otherwise transfer knowledge and structural barriers, such as authority and status hierarchies as well as functional boundaries, that can inhibit open information flows and the development of interpersonal relationships (Gibbert and Krause 2002: 89; Hinds and Pfeffer 2003: 3; von Krogh, Ichijo and Nonaka 2000: 1).

There is general agreement that individual differences in perceived behavioural control play an important role in human functioning and influence the individual's intention to perform the behaviour in question (Fiske and Taylor 1991: 1; Lefcourt 1981: 245; Thompson and Spacapan 1991: 1).

Wasko and Faraj (2005: 35) found self-efficacy/perceived behavioural control to be a strong motivator for academics to share their tacit knowledge with their associated colleagues.

Yang and Farn's (2009: 216) study investigated tacit knowledge sharing among employees from the perspective of social capital and behavioural control. They found that an employee's tacit knowledge sharing intention is affected by affect-based trust, shared values and behavioural control (internal and external behavioural control). They found that internal behavioural control is an important determinant of employees' tacit knowledge sharing intention.

Moreover, Chang (1998: 1825) found that "an employee's internal control about tacit knowledge sharing usually derives from his/her individual characteristics and organisational experiences". Their study demonstrated that when an employee is encouraged to share their tacit knowledge and experiences few obstacles to the sharing of tacit knowledge they are more likely to share their tacit knowledge. It increases their confidence in tacit knowledge sharing behaviour.

Furthermore, Taylor and Todd (1995: 144) indicated that perceived behavioural control (self-efficacy, resource facilitating conditions, and technology facilitating conditions) significantly affected technology usage intentions.

On the other hand, when an employee perceives that they have no opportunities for tacit knowledge sharing, they will not actually share their experiences or 'know-how' with others even though they have strong willingness to do so.

To conclude this section, it is proposed that if an individual possesses the perceived capacity (i.e., self-efficacy), (Appendix B3 - Measurement item - question 27 and 20) and perceived autonomy (i.e., personal control over sharing their tacit knowledge), (Appendix B3 - Measurement item - question 9 and 2), their perceived behavioural control over their tacit knowledge sharing behaviour will be strong and this will positively influence their intention to share their tacit knowledge. Hence:

Hypothesis 16. An individual's perceived behavioural control over tacit knowledge sharing positively influences their intention to share tacit knowledge.

3.7 'Reasoned action' hypothesis

The research objective for 'reasoned action' is:

Ro. 17. To determine the influence of the individual's attitude towards tacit knowledge sharing, their perceived norms about tacit knowledge sharing and their perceived behavioural control *over tacit knowledge sharing on their intention to share tacit knowledge.*

Figure 3.7 provides a schematic presentation of the ‘reasoned action’ variables that were utilized in this study.

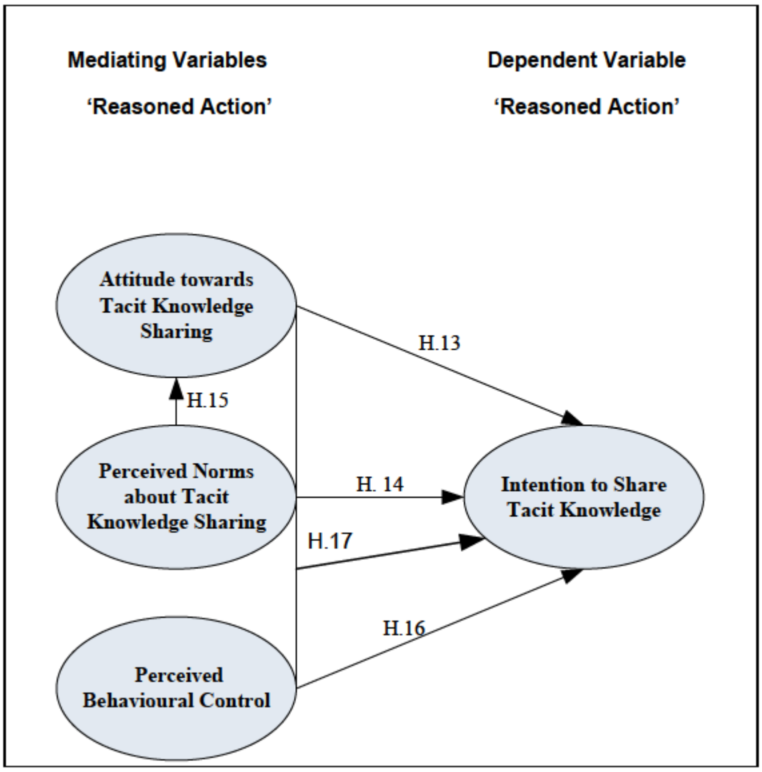

Figure 3.7 Study’s ‘reasoned action’ model.

In terms of the ‘reasoned action’ approach, it is proposed that the individual’s attitude towards tacit knowledge sharing, their perceived norms about tacit knowledge sharing and their perceived behavioural control over tacit knowledge sharing will lead to an intention to share tacit knowledge. Hence:

Hypothesis 17. The greater the individual’s attitude towards tacit knowledge sharing, their perceived norms about tacit knowledge sharing and their perceived behavioural control over tacit knowledge sharing behaviour, the

> *greater will be their intention to share tacit knowledge.*

3.8 Intentions and tacit knowledge sharing behaviour

According to Goethe (1963: 1775) behaviour is a mirror in which everyone shows his image. To conclude this section on the 'reasoned action' approach, a word should be said about actual tacit knowledge sharing behaviour. Over the past several years, research in the field of knowledge sharing has employed the theory of reasoned action to analyze employees' intentions to share knowledge and actual knowledge sharing behaviour. Figure 3.6 is a schematic representation of the full model of the 'reasoned action' approach incorporating behaviour (Ajzen 1991: 179).

Although tacit knowledge sharing behaviour is not examined in this study (only the intention to share tacit knowledge is examined), research has demonstrated that the theory of reasoned action can effectively model and explain organisational behaviours such as tacit knowledge sharing behaviour. Ajzen (2001: 35) argues that "behaviour is a function of compatible intentions and perceptions of behavioral control in that perceived behavioural control is expected to moderate the effect of intention on behaviour, such that a favorable intention produces the behaviour only when perceived behavioural control is strong".

Ryu Ho and Han (2003: 113) demonstrated that professionals' knowledge sharing behaviour is affected by their attitudes, subject norms, and perceived behavioural control. Lin and Lee's (2004: 119) research results indicated that senior managers' intentions to share knowledge positively affected corporate knowledge sharing behaviour.

In addition, Ajzen (1991: 179) found that:

> intention's to perform behaviours of different kinds can be predicted with high accuracy from attitudes toward the

> behaviour, subjective norms, and perceived behavioural control; and these intentions, together with perceptions of behavioural control, account for considerable variance in actual behaviour.

Fishbein and Ajzen (2010: 21) believe that “behavioural intentions are indicators of a person’s readiness to perform behaviour”. They believe that behavioural intentions are an immediate antecedent of behaviour.

According to Ajzen (1991: 185) both, intentions and perceptions of behavioural control, can make significant contributions to the prediction of behaviour, but in any given application, one may be more important than the other and, in fact, only one of the two predictors may be needed.

Evidence concerning the relation between intentions and actions has been collected with respect to many different types of behaviours, with much of the work done in the framework of the theory of reasoned action (Canary and Seibold 1984: 1; Sheppard, Hartwick and Warshaw 1988: 325).

For example, Triandis (1972: 1, 1977: 1) includes intentions, facilitating factors, perceived consequences of performing behaviour, and perceived social influences as important determinants of behaviour.

According to the health belief model (Rosenstock, Strecher and Becker 1994: 5; Strecher, Champion and Rosenstock 1997: 1), decisions to engage in health-related behaviours take into account one’s susceptibility or perceived risk of contracting an illness, perceptions of the severity of illness, beliefs about the costs and benefits of performing the recommended health behaviour (behavioural beliefs), as well as perceived self-efficacy in relation to the behaviour. Other models of this kind include the information-motivation-behavioural skills model (Fisher and Fisher 1992: 455) the AIDS risk reduction model (Catania, Kegeles and Coate 1990: 53) and the theory of trying (Bagozzi and Warshaw 1992: 601). Thus, the types of behaviours involved have ranged from very simple strategy choices in laboratory games to actions of appreciable personal or social significance, such as having an abortion, smoking marijuana, and choosing among candidates in an election. As a general rule it has been found that when behaviors pose no serious problems of control, they can be predicted from intentions with considerable accuracy (Ajzen 2005: 1). Good examples can be found in behaviours that involve a choice among available alternatives. For example, people's voting intentions, assessed a short time prior to a presidential election, tend to correlate with actual voting choice in the range of .75 to .80 (Fishbein and Ajzen 1981a: 340).

It should be noted that a behavioural intention can find expression in behaviour only if the behaviour in question is under volitional control, i.e., if the person can decide at will to perform or not perform the behaviour (Ajzen 1991: 181). Hale, Householder and Green (2003: 259) agree with Ajzen (1991: 181) and comment that "the aim of the theory of reasoned action is to explain volitional behaviours. Its explanatory scope excludes a wide range of behaviours such as those that are spontaneous, impulsive, habitual, the result of cravings, or simply scripted or mindless" (Langer 1989: 1). Such behaviours are excluded because their performance might not be voluntary or because engaging in the behaviours might not involve a conscious decision on the part of the individual.

In addition, the performance of most behaviours depend at least to some degree on such non motivational factors as availability of requisite opportunities and resources (e.g., time, money, skills and abilities, co-operation of others and environmental factors). Ajzen (1991: 183) states that the importance of actual behavioural control is self-evident in that the resources and opportunities available to a person must to some extent dictate the likelihood of behavioural achievement.

At the lowest level of explanation, therefore, people are said to share tacit knowledge because they intend to do so, they have the requisite skills and abilities, and there are no environmental constraints to prevent them from carrying out their intentions (i.e., they have favourable intentions and actual behavioural control). The intention formed in this fashion is now available to determine performance of the sharing of tacit knowledge. Intentions are assumed to capture the motivational factors that influence the sharing of tacit knowledge; they are indications of how hard people are willing to try, of how much of an effort they are planning to exert, in order share their tacit knowledge. As a general rule, the stronger the intention to engage in the sharing of tacit knowledge, the more likely should be its performance (Venkatesh and Morris 2000: 186).

The idea that behavioural achievement depends jointly on motivation (intention) and ability (behavioural control) is not new. It constitutes the basis for theorizing on such diverse issues as animal learning (Hull 1943: 1), level of aspiration (Lewin, Dembo, Festinger and Sears 1944: 1), performance on psychomotor and cognitive tasks (Fleishman 1958: 438; Locke 1965: 719; Vroom 1964: 1), and person perception and attribution (Heider 1944: 358).

In this study actual tacit knowledge sharing behaviour has not been studied, only the intention to share tacit knowledge with the assumption that if the intention to share tacit knowledge is high, it is highly likely that the sharing of tacit knowledge will occur.

Many studies have demonstrated that the greater the intention to perform a behaviour is, the more likely that the behaviour will occur. Academic studies have found that intentions and perceived behavioral control, correlate well with behavioral performance in the following research (Ajzen and Madden 1986: 453; Doll and Ajzen 1990: 1; Locke, Frederick, Lee and Bobko 1984: 241; Santhanam 2002: 135; Schifter and Ajzen 1985: 843; Schlegel, Davernas, Zanna, Decourville and Manske 1992: 358).

Given this strong link between intention and behaviour, it is theoretically justifiable to use behavioural intention as a dependent variable to examine an individual's tacit knowledge sharing behaviour (Chang 1998: 1825; Chau and Hu 2002: 191; Mathieson 1991: 173).

In fact, in a survey-based research, Agarwal and Prasad (1999) argued that intentions are more appropriate than actual behaviour as "they are measured contemporaneously with beliefs". Thus, the use of an individual's intention to share tacit knowledge is considered adequate and desirable (Ryu et al. 2003: 115).

Sheppard et al. (1988: 325) have disagreed with the theory of reasoned action and have made certain exceptions for certain situations when they say that "a behavioural intention measure will predict the performance of any voluntary act, unless intent changes prior to performance or unless the intention measure does not correspond to the behavioural criterion in terms of action, target, context, time-frame and/or specificity". So, for example, in reference to the above statement, if prior to your exercising you learn you have a medical condition, this may affect your behaviour.

3.9 Conclusion

This chapter provided a general review of the theory of reasoned action literature and an in depth review of literature related to each 'reasoned action' measurement construct utilized in this study. The chapter began with the history of the theory of reasoned action and the 'reasoned action' approach. This was followed by a discussion of the behavioural, normative and control beliefs which underlie'reasoned action'.

To summarize this section, attitudes towards the sharing of tacit knowledge are determined by behavioral beliefs, specifically beliefs of outcome evaluation and beliefs about the specific consequences of behaviour multiplied by the outcome evaluation. Personal outcome beliefs and expectations about the sharing of tacit knowledge may lead to a positive or a negative attitude towards the sharing of tacit knowledge. Positive attitudes occur if the individual perceives that some benefit will occur if tacit knowledge is shared. Negative attitudes occur if there is a perception that the sharing of tacit knowledge will incur personal costs. The individual's normative beliefs about tacit knowledge sharing lead to their perceived norms about the sharing of their tacit knowledge. Perceived norms are determined by an individual's normative beliefs, specifically the individual's beliefs about the social expectations of specific others multiplied by the motivation to conform to them. Control beliefs leads to the perception that one has or does not have the ability to share tacit knowledge.

Assuming that attitudes towards the sharing of tacit knowledge and perceptions of social pressure (i.e., perceived norms about tacit knowledge sharing), support performance of the sharing of tacit knowledge, the greater the perceived behavioural control, the stronger should be the intention to share tacit knowledge. Perhaps more important, if people believe that they do not have control over the sharing of tacit knowledge, they may not form strong behavioural intentions to perform it, even if they hold positive attitudes and perceive strong social pressure to do so.

The chapter then went on to look at the research objectives, hypotheses and literature review with regard to the studies model, 'reasoned action' measurement constructs.

The research methodology is presented in the following chapter.

CHAPTER 4

RESEARCH METHODOLOGY

"Thought can live only on grounds which we adopt in the service of a reality to which we submit" (Polanyi 1966: xi).

4.1 Introduction

The previous chapter provided a general review of the theory of reasoned action. This chapter presents the research methodology.

Polanyi (1966a: 1) comments that no rules exist for the development of ideas that lead to a research enquiry. He further states that there are no firm rules to verify or repute proposed solutions to specific problems. In his words:

> rules widely current may be plausible enough, but scientific inquiry often proceeds and triumphs by contradicting them. Moreover, the explicit content of a theory fails to account for the guidance it affords to future discoveries. To hold a natural law to be true, is to believe that its presence may reveal itself in yet unknown and perhaps yet unthinkable consequences; it is to believe that such laws are features of a reality which as such will continue to bear consequences inexhaustibly. It appears then that scientific discovery cannot be achieved by explicit inference, nor can its true claims be explicitly stated. Discovery must be arrived at by the tacit powers of the mind and its content, so far as it is indeterminate, can be only tacitly known (Polanyi 1966a: 1).

In this study the researcher adopted a research methodology that was specifically designed to uncover the 'tacit powers of the mind'. The methodology is described in the following section.

4.2 Research design

The research design consisted of a single case study of a South African University of Technology. It was positivist, empirical and exploratory in nature. According to Aaker, Kumar and Day (2007: 79), exploratory research is used when one is seeking insights into the general nature of a problem, the possible decision alternatives and the relevant variables that need to be considered are being sought.

Yin (2009: 18) defines a case study as “an empirical inquiry that investigates a contemporary phenomenon in-depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident”.

Case study research according to Harrison (2002: 856) is more aptly described as a strategy than a method. It sets out to address the understanding of phenomenon within its operating context. Of necessity, case study research is about making sense of the complexities of a real world, working environment. Thus, the rationale for using a case study was to allow an in-depth examination of a real world problem based at an existing University of Technology.

This study is a representative or typical case (Yin 2009: 18) of a University of Technology. Primary lessons learnt from a representative case may be assumed to be informative about the experience of knowledge sharing behavior in higher education institutions in South Africa.

There are many benefits to using a case study research design. Case study research excels at bringing us an understanding of a complex issue and can extend experience or add strength to what is already known through previous research. Furthermore, this method allowed the researcher to understand the uniqueness and the idiosyncrasy of knowledge sharing behavior in all its complexity.

Another benefit of this method is its use of multiple sources and techniques in the data gathering process. Of great importance here is that by using two sources of evidence the researcher obtained a process of triangulation and corroboration. As Yin (2009: 18) points out, in these circumstances, the case study findings or conclusions are likely to be more convincing and accurate, largely because of the use of multiple sources of evidence.

A further reason for using a case study is that context is very important for understanding social capital and its dimensions (Diani 2004: 137; Foley and Edwards 1999: 141; Woolcock 1998: 151; 2001: 193). One-site sampling schemes are not uncommon in social capital and network analysis, as a clear network boundary and context can be defined under this kind of research design (Krackhardt 1990: 342). Context shapes the norms and culture within a University of Technology and there are strong norms that relate to tacit knowledge sharing behaviour within a University of Technology.

Minbaeva (2007: 567) also believes that context is important. She reviewed extant knowledge transfer literature and identified ninety general determinants of the sharing of knowledge. The result of her analysis showed that in order to have successful sharing of knowledge it is important to look beyond the nature of the knowledge and consider the individual’s involved in the process as well as the context in which the sharing of knowledge takes place.

In addition to the case study design, admixed methods research design was implemented in this study. According to Yin (2009: 18) a mixed methods approach entails the use of both quantitative and qualitative data collection techniques and analysis procedures in the research design. Exploratory, qualitative interviews and an empirical, quantitative survey were conducted.

According to Jones and Woolcock (2009: 5) the distinction between the qualitative paradigm and the quantitative paradigm lies in the quest for understanding and for an in-depth inquiry. The goal in using a mixed method approach was “to work iteratively towards approaches that are increasingly more refined, valid, reliable and useful” (Jones and Woolcock 2009: 5).

Social capital because it is multi-dimensional is most suitable for a mixed methods research design. Social capital research must capture this multi-dimensionality. Using a qualitative and quantitative research paradigm allowed the researcher to identify the social capital dimensions, and latent variables in the measurement model. The researcher obtained a more comprehensive picture of the interrelationships and pathways between the measurement indicators. A wider and deeper understanding was obtained of the issues involved.

Furthermore, the benefits of integrating quantitative and qualitative research methods include:

- “more informed development of hypotheses
- better data collection processes
- fewer researcher-imposed parameters;
- deeper understanding of the context of analysis and results
- exploration of new lines of thinking unanticipated by the research person and an
- understanding of the nuances of related processes and cause-and effect relations” (Dudwick, Kuehnast, Nyhan, Jones and Woolcock 2006: 6).

A further benefit of integrating quantitative and qualitative research methods includes triangulation of the findings. According to Bryman

(2006: 98) triangulation involves measuring a phenomenon in two or three (or more) different ways in order to generate a more accurate measurement of it and to ensure that findings can be cross-checked and validated. In this study ‘triangulation’ was used so that the strengths of one methodological approach compensated for the weaknesses of the other (Dudwick et al. 2006: 38).

This study consisted of three stages, namely a literature survey, exploratory, qualitative interviews and an empirical, quantitative survey. The three stages are detailed below:

Stage 1 - Literature survey

An interdisciplinary review of the literature was conducted to determine how tacit knowledge, social capital and the theory of reasoned action were conceptualized within the relevant bodies of literature and to determine if appropriate scales were available to measure the studies variables.

Based on the literature review, key components of the measurement constructs of social capital, ‘reasoned action’ (Fishbein and Ajzen 2010: 1) and tacit knowledge sharing behaviour were conceptualized and relationships among the variables were determined. A theoretical model of the individual’s intention to share tacit knowledge was then developed.

By accessing interdisciplinary knowledge and multi-dimensionality an attempt was made to embrace the full complexity of the problem situation in order to deliver a more comprehensive understanding through synthesis.

Stage 2 - Exploratory, qualitative interviews

The formative, exploratory aspect of this study was based upon Fishbein and Ajzen's (2010: 1) 'reasoned action' approach. In line with their work, the behaviour of interest was "clearly defined in terms of its target, action, context and time elements," i.e., the sharing of tacit knowledge between co-workers at a University of Technology.

Nine exploratory, semi-structured, in-depth interviews were conducted with staff of the University of Technology, in order to "elicit salient beliefs, behavioural outcomes, normative referents, and control factors" (Fishbein and Ajzen 2010: 451). The interviews were formulated to obtain direct measures of attitude towards the sharing of tacit knowledge, perceived norm about tacit knowledge sharing and perceived behavioral control over tacit knowledge sharing.

By eliciting these beliefs and attitudes, insight was gained into the underlying cognitive foundation of the individual, i.e., why people hold certain attitudes, perceived norms, and perceptions of behavioral control (Fishbein and Ajzen 2010: 451).

With regard to the interviews, Yin (2009: 18) observed that as compared to other research methods, case studies and the use of personal interviews, require an inquiring mind during data collection. The key to successful interviews is the ability to pose and ask good questions. Questions asked of all respondents in the interviews were largely open ended (Appendix B2 - Interview guide). As may be seen in the interview guide, general questions were asked, with the view to allowing the respondents opportunity to openly express and describe as widely as they could their own roles in tacit knowledge sharing practices, as applied to their particular work environment. At no time was it intended to limit a respondent's view, rather the intention was to understand the tacit knowledge sharing experiences of those interviewed.

One of the purposes of the interviews was to identify the ‘perceived behavioural control measurement items’ identified in the research model, as there was limited and inconclusive information with regard to this variable. In a mature field of study where the beliefs that underlie a focal behavior are well specified, prior literature is usually a sufficient source for identifying the relevant beliefs (as well as their motivational drivers). However, in this study, the existing understanding of the factors that shape an individual’s intentions to engage in tacit knowledge sharing is anything but mature.

Consequently, respondents were interviewed to validate and supplement, the measurement constructs identified from the existing literature.

Informed consent (Appendix A1 and A2 - Letters of Information and Consent) was sought from all those who participated in the interviews.

Stage 3 - Empirical, quantitative, survey

Quantitative research consisted of the utilization of a questionnaire in a cross sectional survey (i.e., at one point in time). This design was preferred for its descriptive and predictive functions associated with correlational research (Murtonen 2005: 263). This was also suitable to assess interrelationships between the measurement constructs and allowed the researcher to describe observed phenomena by conducting structural equation modeling on the data.

The purpose of the empirical, quantitative survey was to provide a core set of survey questions for generating quantitative data. It was designed to obtain respondents self-reported perceptions of tacit knowledge sharing (in the form of work experience, ‘know-what’ and ‘know-how’) in a University of Technology.

4.2.1 Research site

This study was conducted in a South African University of Technology. This university has an emphasis on career-focused academic programmes that resonate with the needs of a growing and diverse South African economy (Du Pré 2009: 1).

The university offers undergraduate and postgraduate programmes in six faculties: Accounting and Informatics, Applied Sciences, Arts and Design, Engineering and the Built Environment, Health Sciences and Management Sciences (Du Pré 2009: 1). These faculties are spread across 5 different campuses in different geographical regions (Du Pré 2009: 1). In total, six faculties and fifty two departments, including all support departments, were targeted, ranging in traditional disciplines such as 'civil engineering' and 'quantity surveying' to new specializations such as 'chiropractic and somatology' (Du Pré 2009: 1). The university is characterised by being research-informed rather than research-driven with a focus on strategic and applied research that can be translated into professional practice. The recently promulgated Higher Education Qualifications Framework (HEQF 2007: 1) distinguishes between two model types of curriculum and qualification: one that aims to produce disciplinary adepts, and is thus formative or research-based ; the other that aims to produce knowledgeable professions, and is thus oriented more to the demands of the workplace (Muller 2009: 217). The university under study is actively promulgating research and research related activities in their strategic plan. Research output is commercialised thus providing a source of income for the university. Learning programmes, in which the emphasis on technological capability is as important as cognitive skills are developed around graduate profiles that are informed by the needs of industry and the professions.

The university may be referred to as bureaucratic organisation with a rigid structure. Ajmal and Koskinen (2008: 7) found that rigid and formal structures limit knowledge sharing and collaborative activities, even though they improve functional efficiency. Klein and Kozlowski (2000: 82) also found that a rigid organisational structure can result in a lack of communication or difficulty in the relationship between the source and the recipient of knowledge.

The university was formally established and has 1.) a dedicated academic staff complement that is responsible for teaching, learning and research activities and 2.) a specialized administrative staff that is responsible for maintaining the organisation as a going concern and for coordinating the activities of its staff. As a large and complex organisation, the university requires an especially elaborate administrative apparatus. In the university there is a separation of the academic and administrative functions. There are detailed procedures, rules, regulations and policies that all staff are expected to follow. There is strict enforcement of administrative procedures and rigid compliance with them. In addition, within the detailed rules, regulations and policies, there is an elaborate informal social system that exists within the university.

Ivory, Alderman Thwaites, Mc Loughlin and Vaughn (2006: 226) argue that while loose organisational structures play a supportive role in knowledge creation and exchange, a rigid structure is characterized by limited responsibility for the employees, fixed rules and regulation, hierarchy, and tight control form the top. This means that tight coupling and inflexible formal structures reduce the ability of departments to share knowledge since the organisational structure limits the interaction among the different functional areas, which hinders the knowledge integration process. Within the University of Technology under study, tight coupling and inflexible formal structures are evident. Each department operates independently with little communication between departments. There is a strong separation between management and academic staff. Boone and Ganeshan (2008: 159) found that formal organisational structures cause blockage of tacit and explicit knowledge in network channels.

Grant (1997: 453) believes that "many current trends in organisational design can be interpreted as attempts to access and integrate the tacit knowledge of organisational members while recognizing the barriers to the transfer of such knowledge".

4.2.2 Qualitative data collection method

Qualitative data was collected through nine semi-structured, in-depth interviews (Appendix B2 - Interview Guide) with staff of the University of Technology. Each interview was tape recorded. After completion of the interviews, the recorded interviews were transcribed and thematically analysed. The thematic content analysis of the interview responses resulted in a list of the observed variables which informed the latent variables. These lists in conjunction with the literature review were used to construct the social capital and 'reasoned action' measurement items that were included in the final questionnaire.

4.2.3 Quantitative data collection method

A survey method was adopted for quantitative data collection

For the survey, respondents were personally e-mailed and requested to complete an online, anonymous questionnaire. The e-mail included the purpose of the study, a request for their participation, the explanation of the procedure for submitting the questionnaire and a hyperlink to the online version of the questionnaire. The subjects were assured in the e-mail that individual responses would be kept confidential and participation in the study was strictly voluntary. The participants completed the questionnaire on the web site and confidentially submitted it by clicking the “submit the questionnaire” button at the end of the questionnaire.

A commercial web survey software package was used to administer the survey. The survey was designed using advanced electronic mail functions that allowed respondents to register their responses directly onto the survey which then fed an Excel spreadsheet database. Thus data capture and storage software was used for the survey. The procedure for developing on-line surveys, outlined by Dillman, Tortora and Boluker (1998: 1) was followed. They state that the online version may increase the return rate because it allows respondents to save time in filling out the survey and provides convenience for submitting it, compared to the print-based version.

In addition, to further ensure a good return rate of questionnaires, questionnaires were also manually delivered to respondents with self-addressed, return envelopes attached. Respondents could send either the electronic or manually filled in questionnaire directly back to the researcher either via e-mail, fax or internal mail.

One follow up electronic mailing was done to improve the response rate.

4.2.4 Population and sample

The target population for this study was all salaried staff at the University of Technology (i.e., two thousand five hundred and twenty nine salaried staff). A one site sampling scheme which included all of the Durban-based campuses of the university were used, in order to provide a clear network boundary. These respondents included males and females, all ages, various occupational positions and the following race groups: Black, White, Asian and Coloured.

The sample size for the qualitative interviews consisted of nine respondents from different departments and levels in the university

(Table 6.4). The sampling approach for the interviews was purposive sampling. The rationale for this was that by deliberately targeting a cross section of the university staff, representativeness of the university was achieved. It ensured that the respondents were typical of the population (Cresswell 2007: 125). Since the current study was a case study it was important to interview respondents with the most relevant information. Doing so provided a true picture of the university in as far as the constructs under study were concerned (Saunders, Lewis and Thornhill 2009: 106).

An attempted census was used to recruit the respondents for the survey. For the survey, the sample was drawn using self-selected sampling and included the total administrative, academic and management staff as well as technicians and support services staff, across all levels of the university, in order to gather sufficient information from different perspectives.

Five hundred and ninety (twenty three percent return rate) respondents completed the survey. Two hundred and fifty four (forty three percent) online questionnaires and three hundred (fifty one percent) manual questionnaires were received. Thirty six (six percent) questionnaires were discarded, which left a total sample of five hundred and fifty four respondents.

There is little consensus on the recommended sample size for SEM. Sivo, Fan, Witta and Willse (2006: 267), Garver and Mentzer (1999: 33), Hoelter (1983: 325) and Weston and Gore (2006: 734) propose a 'critical sample size' of two hundred.
Various authors have specified the ideal sample for structural equation modeling (SEM). Mueller (1996: 67) recommended at the very least 5:1, preferably at least 10:1 to the number of parameters to be estimated as minimum sample size required for SEM analysis. Since twenty four parameters were selected in this study, a sample of at the

very least one hundred and twenty or preferably two hundred and forty was needed for the analysis.

Schreiber, Nora, Stage, Barlow and King (2006: 323) mention that although sample size needed is affected by the normality of the data and estimation method that researchers use, the generally agreed-on value is ten participants for every free parameter estimated.

Kline (1998: 343) indicated ten to twenty participants per estimated parameter would result in an adequate sample. In other words, as a rule of thumb, any number above two hundred is understood to provide sufficient statistical power for data analysis.

The sample size of five hundred and fifty four for this study was thus acceptable.

4.2.5 Measurement development and research instrument

An overview of the development and design of the research instrument for this study is provided below. The development of the measurement constructs, measurement items and study model is presented in Section 5.2.

The research instrument consisted of an interview guideline (Appendix B2 - Interview Guide) and a self-report questionnaire (Appendix B1 - Questionnaire) consisting of two sections preceded by a covering letter explaining the nature of the research, the estimated time necessary to complete the survey, the voluntary nature of participation, and a letter indicating informed consent.

With regard to the questionnaire, a multi-item method was used to increase the accuracy of measurement.

Section A contained thirty five Likert scale statements. Section B contained measures of demographic details or other control variables that may be of interest for the behavior under investigation. These included university sector, department, job position, gender, education, age and race.

Respondents were asked to evaluate the significance of the measurement items using a Likert scale of 1-5, where a value of 5 represented "strongly agree" and 1 represented "strongly disagree".

Likert's (1932: 1) criterion of internal consistency was applied to ensure that the items comprising the final measurement scale were all indicators of the same underlying evaluative continuum and that a single score represented the overall measurement construct. Factor analysis was used to select the measurement items and to ensure that the subscales had high consistency.

Appendix B3 contains a list of the prior studies that have used the measurement items.

The research proposal and final questionnaire was reviewed and accepted by the Institutional Research Ethics Committee (Appendix A3 - Ethical Clearance Certificate).

4.2.6 Pilot study

The studies questionnaire was pre-tested and a pilot study was conducted.

According to Treece and Treece (1986: 25) "pre-testing is intended to measure the effectiveness of the research instrument in relation to aspects such as its length, wording and validity whilst the pilot study is the preliminary small study". Thorough scrutiny and analysis of the research proposal and questionnaire was conducted by six international

Professors to assess its logical consistencies, ease of understanding, sequence of items and contextual relevance. The comments collected from these subject matter experts led to several minor modifications.

In order to ensure the validity and reliability of the questionnaire, a pilot study was conducted to test the applicability of the questionnaire and to develop the logistics of the survey. The data obtained in the pilot study was correlated with previous studies and was used to select reliable items for use in the final questionnaire. Respondents were e-mailed and requested to complete and submit an on-line survey. In addition to the on-line survey, paper copies of the survey were posted to the respondents. Respondents were requested to complete only the electronic survey or the posted paper survey.

One hundred and ten questionnaires were obtained for the pilot study. These questionnaires were not used in the final study data. All of the measurement items from the pilot study were pre-tested and statistically analysed. Data from the pilot study was used to select reliable and valid measurement items for use in the final questionnaire.

Comments and suggestions on the measurement item contents and structure of the questionnaire were solicited telephonically from selected respondents who agreed (prior to completing the survey) to provide comments.

The pilot study checked that the:

- survey covered the purpose of the research,
- questions and the answer codes were relevant in the local context and university context,
- questions and response options were culturally sensitive and that the
- language was understood.

The pilot questionnaire was also used to evaluate the utility of the control measures such as demographic characteristics, social structure variables, etc., and to assess whether they had high internal consistency.

In addition, statistical analysis was performed on the completed pilot study questionnaires and as a result several measurement items were discarded or re-worded and new measurement criteria were formulated. The data obtained in the pilot study was correlated with previous studies and was used to select reliable items for use in the final questionnaire.

4.3 Validity

Validity clearly applies to research methods involving positivistic elements (Yin 2009: 17). According to Sekaran (2003: 21) validity refers to “the evidence that the instrument, technique or process used to measure a concept does indeed measure the intended concept” or according to Ticehurst and Veal (2000: 23) refers to “…. the extent to which the data collected truly reflect the phenomenon being studied”. Sekaran (2003: 27) comments that in terms of the internal and external validity, the researcher is concerned about the issue of the authenticity of the cause and effect relationship (internal validity) and their generalisability to the external environment Dudwick, Kuehnast, Nyhan Jones and Woolcock (2006: 38) espouse that

> The inherently imprecise nature of the issues being studied in social capital research and inability of researchers to “control” for other factors that may influence research outcome’s, means that the researchers have a strong ethical and empirical obligation to verify the accuracy of their claims.

In qualitative research, it often occurs that subjective judgments are used when collecting data. In order to overcome subjective judgments, minimize research bias and to increase the construct validity two sources of evidence i.e., the exploratory qualitative interviews and the empirical quantitative survey, were collected in this study. The value of two sources of evidence is the result of converging lines of inquiry, i.e., the effective triangulation of information.

A number of steps were taken for the exploratory qualitative interviews and the empirical quantitative survey to ensure the validity of the study.

These are outlined in section 4.3.1 and section 4.3.2.

4.3.1 Validity of qualitative research

Concepts like social capital are not value free and are open to different interpretations by different people. As a result, the interview schedule was designed and pre-tested to ensure that the questions were clear to the respondents and that it yielded results relevant to the research objectives. This ensured that the responses from participants during the interviews were consistent.

4.3.2 Validity of quantitative research

Wegner (1995: 17) believes that "the design of a questionnaire is critical to ensure that the correct research questions are addressed and that accurate and appropriate data for statistical analysis is collected".

In order to test the validity of the empirical survey, the construct validation of principles of translation validity (face and content) and criterion-related validity (predictive, concurrent, convergent and discriminant validity) was used (Trochim 2001: 12940). This assisted in testing the usefulness of the research model. Translation validity was used to assess the degree to which accurate translation of the constructs occurred while operationalizing the measurement instruments for testing the model. Content validity for inclusion of measurement items within the questionnaire was established by ensuring consistency between the measurement items and the extant literature (Bock et al. 2005: 92). It was determined by ensuring that the questionnaire covered the necessary content that was relevant to the hypotheses that were formulated (Rudestam and Newton 1992: 67). In addition, the research met the two principal standards for ensuring content validity with regard to fit, as it was both sensible and resulted in a representative collection of measurement items (Nunnally and Bernstein 1994: 4). Content validity was done by pre-testing and pilot-testing the research instrument.

Criterion-related validity was used to assess the measurement accuracy of the questionnaire and to check the predictive capability based on the theory of the measurement construct.

4.4 Reliability

According to Saunders, Lewis and Thornhill (2003: 11) reliability is "the degree to which data collection method(s) yield consistent findings, similar observations would be made or conclusions reached by other researchers or there is transparency in how sense was made from the raw data". Ticehurst and Veal (2000: 24) contend that reliability refers to the "extent to which research findings would be the same if the research were to be repeated at a later date or with a different sample of subjects". Rudestam (1992: 67) states that "reliability refers to the ability of a measure to produce consistent results".

In order to ensure the reliability of the exploratory qualitative interviews, a CD of interview transcripts was produced and all of the interviews were transcribed and thematically coded.

With regard to the empirical, quantitative survey, a database of research results was created to assist external researchers to find the documents and statistical results quoted in the research. In addition, the statistical results for this study are presented in such a way as to allow an external researcher to perform additional structural equation modeling on them (Appendix D - Statistical Tables).

Furthermore, the Cronbach's Alpha Coefficients statistic was used to assess the internal consistency of the measuring instrument.

Nunnaly and Bernstein (1994: 4) and Fields and Buitendach (2011: 6) suggest that a Cronbach Alpha of at least .7 is an acceptable level of internal consistency. Any measurement item that did not meet this criterion was eliminated during the pilot study. Each set of items designed to directly assess a given construct had a high degree of internal consistency (e.g., a high alpha coefficient), and the measures of the different constructs exhibited discriminant validity.

In addition, the reliability of the measurement constructs was determined statistically by means of relevant SEM statistical tools. These are reported in Section 6.4. Confirmatory factor analysis was used as a means of evaluating the quality of the scales to be included in the study.

To reduce possible social desirability bias (Tsai and Ghosal 1998: 468), the researcher (1) promised that all individual responses would be kept completely confidential and (2) confirmed that analyses would be restricted to an aggregated level that would prevent the identification of any individual.

4.5 Research model

The development of the research model is discussed in Chapter 5.

Figure 4.8 depicts the proposed study model for the present study. The model describes tacit knowledge sharing between individuals, identifying factors that have a significant influence on the knowledge sharing process and illustrating the relationships between these factors.

4.6 Research hypotheses

The core hypothesis was the following:

It is proposed that network ties (structural dimension of social capital), trust, shared norms and values (relational dimension of social capital) and shared vision and goals (cognitive dimension of social capital) act as determinants for the "individual's attitude towards the sharing of tacit knowledge" and that the "individual's attitude towards tacit knowledge sharing", "perceived norms about knowledge sharing" and their "perceived behavioural control over tacit knowledge sharing," act as determinants for the individual's "intention to share tacit knowledge".

Hypothesized relationships were drawn from previous research and theory (Armitage and Conner 2001: 477; Chow and Chan 2008: 460; Ryu, Ho and Han 2003: 113), (Appendix B3 - Measurement Constructs, Measurement Items and Prior Studies).

It was at the individual level that all of the hypotheses were formulated and tested on (1) how the three dimensions of social capital influence the attitude towards tacit knowledge sharing and (2) how the 'reasoned action' constructs of attitude towards tacit knowledge sharing, perceived norms about tacit knowledge sharing and perceived behavioural control, in turn, influence the individual's intention to share tacit knowledge (Fishbein and Ajzen 2010: 22).

Accordingly, all of the measurement constructs and measurement items were formulated and tested at the individual level.

4.7 Qualitative data analysis

A qualitative, content analysis of the responses to questions in the exploratory interviews was conducted, in order to reduce the data through a process of coding and to develop a list of model salient outcomes, referents, and control factors (Henning 2004: 104). These lists in conjunction with the theoretical review were used to construct measurement items to be included in the final questionnaire.

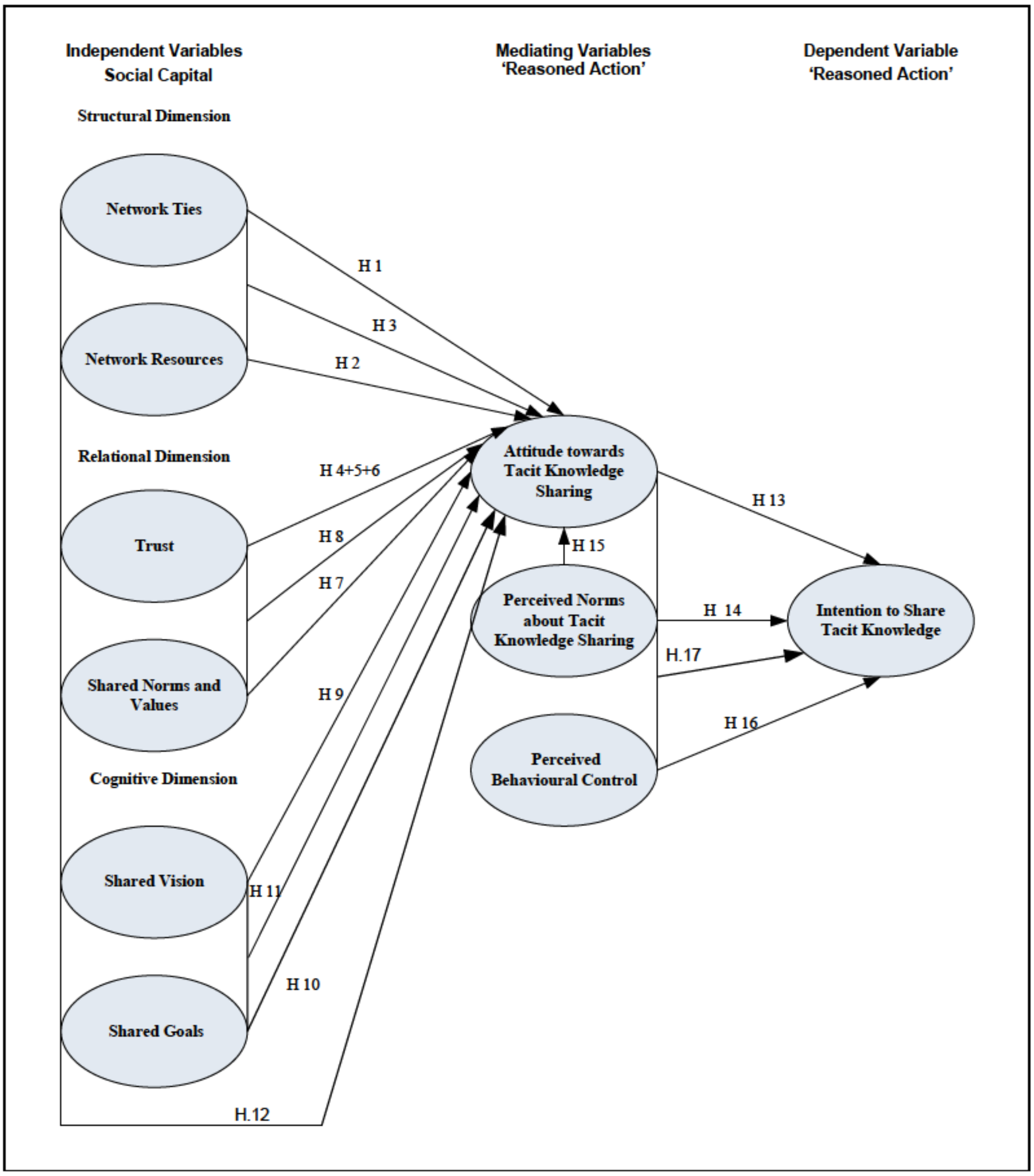

Figure 4.8 Study model

Table 4.1 depicts the dimensions of social capital, the measurement constructs and hypotheses for each measurement construct.

Table 4.1 Dimensions, measurement constructs and hypotheses

Dimension	Measurement Construct	Hypothesis
Structural Dimension	Network Ties	1. Individuals who report strong network ties (i.e., close relationships) will display a positive attitude towards tacit knowledge sharing.
	Network Resources	2. Individuals who report greater access to information, tacit knowledge and resources within their work social network will display a positive attitude towards tacit knowledge sharing.
	Structural Dimension	3. Individuals who report a high level of structural social capital (strong network ties and a high level of network resources), will display a positive attitude towards tacit knowledge sharing.
Relational Dimension	Trust - (affect-based)	4. Individuals who report affect-based trust towards their co-workers will display a positive attitude towards tacit knowledge sharing.
	Trust - (cognitive-based)	5. Individuals who report cognitive-based trust towards their co-workers will display a positive attitude towards tacit knowledge sharing.
	Trust - (affect-based and cognitive-based).	6. Individuals who report trust towards their co-workers will display a positive attitude towards tacit knowledge sharing.
	Shared Norms and Values	7. Individuals who report a perception of shared norms and values between themselves and their co-workers will display a positive attitude towards tacit knowledge sharing.
	Relational Dimension	8. Individuals who report a high level of relational social capital (trust, shared norms and values) will display a positive attitude towards tacit knowledge sharing.
Cognitive Dimension	Shared Vision	9. Individuals who report a perception of a shared vision between themselves and their co-workers will display a positive attitude towards tacit knowledge sharing.
	Shared Goals	10. Individuals who report a perception of shared goals between themselves and their co-workers, will display a positive attitude towards tacit knowledge sharing.

	Cognitive Dimension	11. Individuals who report a high level of cognitive social capital (shared vision and goals) will display a positive attitude towards tacit knowledge sharing.
	Social Capital	12. Individuals who report a high level of structural social capital (strong social interaction network ties and a high level of network resources), relational social capital (trust, shared values and norms) and cognitive social capital (shared vision and goals) will display a positive attitude towards tacit knowledge sharing.
'Reasoned Action' Mediating Variables	Attitude towards Tacit Knowledge Sharing	13. An individual's positive attitude towards tacit knowledge sharing positively influences their intention to share tacit knowledge.
	Perceived Norms about Tacit Knowledge Sharing	14. An individual's perceived norm's about tacit knowledge sharing positively influences their intention to share tacit knowledge.
		15. An individual's perceived norms about tacit knowledge sharing positively influence their attitude towards tacit knowledge sharing.
	Perceived Behavioural Control	16. An individual's perceived behavioural control over tacit knowledge sharing positively influences their intention to share tacit knowledge.
	'Reasoned Action'	17. The greater the individual's attitude towards tacit knowledge sharing, their perceived norms about tacit knowledge sharing and their perceived behavioural control over tacit knowledge sharing behaviour, the greater will be their intention to share tacit knowledge.

Qualitative data was analysed separately using thematic analysis (Miles and Huberman 1994: 50). Thematic analysis involves a search for themes that develop in relation to the investigation and description of a phenomenon. Themes relating to the variables of social capital, 'reasoned action' and tacit knowledge sharing behaviour were identified and coded in the interview transcripts (Thomas and Harden 2007: 45). The identified themes captured a set of factors that the interviewees had consistently emphasized as an influence on their tacit knowledge sharing behaviors. To analyse data gathered in this stage, a three-stage, interpretive approach to analysis developed by Strauss and Corbin (1990: 273) was adopted, i.e.:

- Open coding: the text was read reflectively to identify relevant categories;
- Axial coding: categories were refined, developed and related or interconnected;
- Selective coding: the ‘core category’ or central category that ties all of the categories in the theory together were identified and related to other categories.

Thus, initially free line by line conducting was carried out, followed by organizing codes into areas to create themes and finally, construction of analytical themes. In this way, descriptive and analytical themes were generated.

Then, the emerging themes were chosen according to their relevance to the research question. This analysis then informed the development and implementation of the survey.

4.8 Quantitative data analysis

This study posited the need for both descriptive and inferential statistics. Descriptive statistics, such as frequency distributions, means, standard deviations, and percentages, were used to describe the data using a program called SPSS 10.0 (Birley and Moreland 2007: 351). The statistical software programs Amos 16.0 was used in the analysis of the SEM data.

The data was analyzed using the scores obtained from the questionnaires. The saved online and manual responses were coded into an EXCEL spreadsheet to be prepared for analysis. Each response was saved into the same text file in a server.

In order to test the significant differences in responses with regard to the categories of the demographic variables, the Independent Sample t-test statistic or Analysis of Variance statistic (where applicable) was used.

The Cronbach's Alpha statistic was applied to the questions that pertain to each of the constructs in order to test for consistency and hence reliability. In order to assess whether relationships existed between constructs, the Pearson's Product Moment Correlation Coefficient statistic was used.

The analysis of the dimensions of social capital were anchored in the distinctions between structural, relational and cognitive dimensions of social capital and the analysis of the knowledge sharing variables were anchored in the 'reasoned action' model developed by Fishbein and Ajzen (2010: 22). The analytic objective was to be able to relate the dimensions of social capital to the outcome variables of the individual's intention to share tacit knowledge.

Inferential statistics in the form of hypotheses testing was used to test the hypothesized study model using AMOS 16.0 software to perform structural equation modeling (SEM), including confirmatory factor analysis. According to Weston and Gore (2006: 732) "SEM's goal is to find the most parsimonious summary of the inter-relationships among variable's, which accurately reflect the associations observed in the data".

According to Gall, Borg and Gall (1996: 58) "structural equation modeling can be used to test theories of causal relationships among variables". SEM was applied in this study in order to test the hypothesized study model for the prediction of the individual's intention to share tacit knowledge. It should be noted that although causal relationships are hypothesized in this study, causality may not be inferred by SEM results. Causality must be assessed by examining the soundness of the underlying theory and research design (Weston and Gore 2006: 723).

SEM was used because it permitted the measurement of several variables and their interrelationships simultaneously (Hoe 2008: 77). It is more versatile than other multivariate techniques because it allows for simultaneous, multiple dependent relationships between variables. According to Hoe (2008: 76) "SEM is a powerful statistical technique that combines the measurement model or confirmatory factor analysis (CFA) and the structural model into a simultaneous statistical test".

SEM may be thought of a combination of factor analysis and path analysis. In terms of factor analysis, SEM provides information on the interrelationships between variables and in terms of path analysis, SEM can test relationships between hypotheses (Weston and Gore 2006: 720). It takes a confirmatory approach to the analysis of a structural theory bearing on some phenomena (Byrne 2001: 1). In the present study, this helped to establish the relative predictive importance of the independent variables on the dependent variable.

The following SEM strategy was adopted for analyzing the proposed model. The raw data for the variables were input into the Amos 16 software to generate the iterations, goodness-of-fit indices and standardized paths. The SEM model consisted of two sub-models: a measurement model and a structural model. The purpose of the SEM model was to explain why variables are correlated in a particular fashion (Kelloway 1998: 1). The measurement model was estimated first and after modifications to obtain a better fit, the structural model with paths was analysed. The model tests were based on the covariance matrix using maximum likelihood estimation.

The stages in the adoption of SEM are described in Chapter 5.

4.9 Conclusion

The previous chapter provided a review of the theory of reasoned action literature. This chapter outlined the research methodology. The research design consisted of a case study which utilized a mixed methods design which consisted of exploratory, qualitative interviews and an empirical qualitative survey at a University of Technology. This chapter initially presented the research design, research site, data collection method and an outline of the target population and sample. This was followed by a discussion of the measuring instruments and the measurement constructs used for data collection. Their validity and reliability levels were indicated. The chapter proceeded by presenting the research model and the research hypotheses. It concluded with a presentation of the qualitative and quantitative data analysis utilized in the study. Descriptive and inferential statistics were applied to the data. The proposed model was tested using SEM. The next chapter discusses the development of the measurement items and the measurement model.

CHAPTER 5

MODEL DEVELOPMENT

5.1 Introduction

The preceding chapter discussed the research methodology. This chapter begins with a discussion of the development of the social capital and reasoned action' measurement constructs. This is followed by the criteria of structural equation modeling analysis. Finally the stages applied in the SEM are outlined.

There was no known comprehensive standardized measuring instrument available to address the problem statement and the various sub-problems of this study. Consequently, measurement constructs and items were developed based on a review of the literature, specifically on the theory of social capital and the theory of reasoned action (Fishbein and Ajzen 2010: 22). An extensive review of the literature of twenty five existing questionnaires and qualitative data collection instruments, which focused on social capital and the sharing of tacit knowledge, was conducted. The focus on the development of the measurement constructs and items was on the sharing of individual tacit knowledge in the form of work experience 'know-what' and 'know-how'. For this study, the majority of the measurement items included in the questionnaire, had been used by several researchers (although some in different contexts, i.e., not knowledge sharing), (Appendix B3 - Measurement Constructs, Measurement Items and Prior Studies).

The level of analysis was at the individual level. The development of the measurement constructs is discussed in the following sections.

5.2 Development of social capital measurement constructs

How does one measure social capital? According to Bayat (2005: 12) an important debate about social capital is the direction and degree of causality. There are three contending frameworks in the research on social capital. The first is the social capital thesis (claiming substantial cause on behalf of social capital), which signifies that social capital is an independent variable which leads to better economic gains and better governance (Putnam, Leonardi and Nanetti 1993: 1). The second is the structuralist or institutionalist position asserting causal priority for structures and claiming social capital to be a residual effect of structures (Coleman 1988: 95). This indicates that social capital is endogenous, dependent and a by-product of the institutional context. The third is the intermediate position, implying contingent causal value (Krishna 2002: 437).

Thus, in analyzing the survey data, it is necessary to consider the status of each variable: which variable is independent, which is dependent, and if any, which is latent (Grootaert, Narayan, Jones and Woolcock 2003: 1). To that end, setting up a clear-cut hypothesis is definitely required.

The core hypothesis for this study was the following:
It is proposed that network ties (structural dimension of social capital), trust, shared norms and values (relational dimension of social capital) and shared vision and goals (cognitive dimension of social capital) act as determinants for the “individual’s attitude towards the sharing of tacit knowledge” and that the “individual’s attitude towards tacit knowledge sharing”, “perceived norms about knowledge sharing” and their “perceived behavioural control over tacit knowledge sharing,” act as determinants for the individual’s “intention to share tacit knowledge”.

In this study, the dimensions of social capital served as the independent variable and the 'reasoned action' variable of an individual's intention to share tacit knowledge served as the dependent variable.

Scholars agree that it is important to recognize that social capital is not a uni-dimensional concept, but is rather multi-dimensional in nature, encompassing many aspects of a social context, such as network ties, trusting relations, and value systems that facilitate actions of individuals located within that context (Tsai and Ghoshal 1998: 465).

Due to the multi-dimensional nature of social capital, Lin (2003: 145) comments that measuring the level of social capital in organisations can be complex. She further elaborates that while there is high consistency in the definitions of social capital at a general level, including the forms and dimensions it embraces, at an operational level the interpretations of what social capital is and is not are diverse. Correspondingly, methods used to measure social capital are varied, reflecting the diversity of its interpretations.

Putnam (1995a: 65) concurs with Lin (2003: 145) and argues that clarifying the dimensions of social capital is a top priority. He makes the point that social capital has many complicated attributes related to a social context. Woolcock and Narayan (2000: 225) is of the opinion that because definitions of social capital are multi-dimensional and because there are several measures for social capital, obtaining a single, true measure is probably not possible

Thus, a tool for measuring social capital must provide a common conceptual framework that helps unify the different dimensions of social capital (i.e., the structural, relational and cognitive dimensions) and should encompass the different aspects of a social context such as network ties, trust and norms, etc.

There is a general agreement that, at least at this point in time, the measurement of social capital can only be done indirectly and by using some proxy variables. Depending on its definition, different proxy measurements are used. In addition, judging from the fact that social capital encompasses a large array of concepts, researchers have to specify proper proxy variable(s) in each dimension and collect appropriate and reliable data through intensive interview or questionnaire surveys and, if necessary, participatory methods with a view to capturing social capital comprehensively.

The underlying considerations of constructing the questionnaire for the purpose of this study can be most accurately illustrated by the point that "social capital is an aggregate concept that has its basis in individual behavior, attitudes and predispositions" (Brehms and Rahn 1997: 999).

According to Lin (2003: 63) as there are a large array of social capital concepts and because the measures of social capital vary identifying the locally meaningful measures of social capital for a given context is a more empirical task. For example, studies of social capital differ in the way in which they have addressed the issues of network and trust. Some assess social capital in terms of network density; others rely on a measure of trust.

Given that social capital is multi-dimensional and because there are several measures of social capital, the survey tool in this research was designed to capture this multi-dimensionality and variation and in line with Krishna and Shrader's (2002: 2) argument, three dimensions of social capital were utilized in this study, i.e., the structural, relational and cognitive dimemsions of social capital. The following social capital measurement constructs and items were developed:

(a) Structural dimension of social capital

The structural dimension of social capital included:

- Network ties (Appendix B3 - Three measurement items - question 11, 21 and 12) and
- Network resources (Appendix B3 - Three measurement items - question 14, 33 and 7).

(b) Relational dimension of social capital

The relational dimension of social capital included:

- Trust

Trust included:

  - Affect-based trust, which included perceptions of reciprocal concerns and interpersonal caring (Appendix B3 - Three measurement items - question 6, 17 and 1) and
  - Cognitive-based trust, which included judgment of the other person's competence, reliability, dependability and knowledge ability in the work setting (Appendix B3 - Three measurement items - question 30, 8 and 32).

- Shared norms and values

The normative measurement constructs were distinguished in dimensions based on distance from the respondent, that is, a peer (i.e., "my co-workers think that I should") and an authority (i.e., employer-boss - "my boss thinks that I should") dimension was formulated.

Shared norms and values included:

  - Social norms - (i.e., acceptable social behavior with regard to the sharing of tacit knowledge), (Appendix B3 - One measurement item - question 10).
  - Norms of social support - (i.e., benevolence and altruistic behaviour that relates to the sharing of tacit knowledge), (Appendix B3 - Two measurement items - question 23 and question 4) and

- Norms of reciprocity - (i.e., sharing relationships with others in terms of the sharing of tacit knowledge), (Appendix B3 - One measurement item - question 35).

(c) The cognitive dimension of social capital

The cognitive dimension of social capital included:

- Shared vision (Appendix B3 – Two measurement items - question 31, 5 and 34) and
- Shared goals (Appendix B3 – Two measurement items - question 13, 16 and 22).

In developing the study model, the impact of each dimension of social capital has been considered independently from the other dimensions.

Although the interaction between the measurements constructs of network ties, network resources, trust, shared norms and values, shared vision and goals is not being studied in this research, it is acknowledged that these dimensions may be inter-related in important and complex ways.

5.3 Development of 'reasoned action' measurement constructs

Ajzen (1991: 192) states that it is not always recognized that the expectancy-value model of attitude embodied in the theory of reasoned action postulate a relation between a person's salient beliefs about the behavior and his or her attitude toward that behavior. He suggests that these salient beliefs must be elicited from the respondents themselves, or in pilot work from a sample of respondents that is representative of the research population, prior to formulating measurement constructs.

An arbitrarily or intuitively selected set of belief statements will tend to include many associations to the behaviour that are not salient in the population, and a measure of attitude based on responses to such statements need not correlate highly with a standard measure of the attitude in question.

Generally speaking, results of empirical investigations suggest that when attitudes are estimated on the basis of salient beliefs, correlations with a standard measure tend to be higher than when they are estimated on the basis of an intuitively selected set of beliefs (Fishbein and Ajzen 1975: 1).

The studies research interviews were formulated to obtain individual salient beliefs and direct measures of attitude towards the sharing of tacit knowledge, perceived norm about tacit knowledge sharing and perceived behavioral control over tacit knowledge sharing.

By eliciting these beliefs and attitudes, insight was gained into the underlying cognitive foundation of the individual, i.e., why people hold certain attitudes, perceived norms, and perceptions of behavioral control (Fishbein and Ajzen 2010:451).

It should be noted that the individual’s beliefs were only examined in the formative, interview stage to assess the ‘reasoned action’ measurement constructs. Measurement constructs were not developed for the individual’s belief system.

It should be noted that there are a number of differing opinions about the measurement construct ‘perceived behavioural control’ in the literature. There are many ways of assessing ‘perceived behavioural control’ and a lot of opposing views about how to measure it. The individual’s perception of behavioural control with respect to a given behaviour can be assessed in two ways: by specifying behaviour and possible barriers or by directly asking about control over performance of the behaviour (Fishbein and Ajzen 2010: 159). In this study, information was obtained with regard to the barriers for the sharing of tacit knowledge, in the exploratory interviews. In the survey, the measurement items were constructed by asking questions directly about the individual's perceived behavioural control over the sharing of tacit knowledge.

Bandura (2001: 1) states that there is no all-purpose measure of perceived behavioural control (or perceived self-efficacy as he refers to it) because most of the items in an all-purpose measure may have little or no relevance to the selected domain of functioning. He continues by suggesting that "in an effort to serve all purposes, items in a global measure are usually cast in a general, decontextualized form leaving much ambiguity about exactly what is being measured and the level of task and situational demands that must be managed".

Vispoel and Chen (1990: 40) also state that no single standardized measure of 'perceived behavioural control' is appropriate for all studies and advise researcher's to develop new or significantly revise existing measures for each study.

In response to the above, Bandura (2001: 1) proposed a guide for constructing self-efficacy (i.e., perceived behavioural control) scales. In this guide, he listed a few important things which should be considered to develop a scale. First, self-efficacy items should accurately reflect the construct and should also be distinguished from other constructs, such as self-esteem and locus of control. Second, since self-efficacy is concerned with perceived capability, items should use phrases such as '*can do* 'rather than '*will do'*. Third, self-efficacy should also be measured against levels of task demand that represent gradations of challenges or impediments to successful performance.

Ajzen (2001: 27) argues that 'perceived behavioural control' is expected to moderate the effect of intention on behavior, such that a favourable intention produces the behaviour only when perceived behavioural control is strong. Thus, behavioural intention to share tacit knowledge is an indication of an individual's readiness to share tacit knowledge.

For accurate prediction, several conditions have to be met. First, the measures of intention and of perceived behavioural control must correspond to or be compatible with the behaviour that is to be predicted (Ajzen 1985: 1; Ajzen and Fishbein 1977: 888). That is, intentions and perceptions of control must be assessed in relation to the particular behaviour of interest, and the specified context must be the same as that in which the behaviour is to occur. For example, if the behaviour to be predicted is "donating money to the Red Cross," then we must assess intentions "to donate money to the Red Cross" (not intentions "to donate money" in general nor intentions "to help the Red Cross"), as well as perceived control over "donating money to the Red Cross".

The second condition for accurate behavioural prediction is that intentions and perceived behavioural control must remain stable in the interval between their assessment and observation of the behaviour.

Intervening events may produce changes in intentions or in perceptions of behavioural control, with the effect that the original measures of these variables no longer permit accurate prediction of behaviour.

The third requirement for predictive validity has to do with the accuracy of perceived behavioural control. Predictions of behaviour from perceived behavioural control should improve to the extent that perceptions of behavioural control realistically reflect actual control. The relative importance of intentions and perceived behavioural control in the prediction of behaviour is expected to vary across situations and across different behaviours. When the behaviour/situation affords a person complete control over behavioural performance, intentions alone should be sufficient to predict behaviour, as specified in the theory of reasoned action. The addition of perceived behavioural control should become increasingly useful as volitional control over the behaviour declines.

The ‘reasoned action’ measurement constructs and items were developed either by adapting measures that had been validated by other researchers (where reliability, validity, and usefulness had been demonstrated) and then modifying them for use in a tacit knowledge sharing context or by converting the definitions of measurement constructs into a survey format. The items were formulated to be exactly compatible with the behavioural criterion and to be self-directed in line with Fishbein and Ajzens (2010: 450) recommendations. The following ‘reasoned action’ (Fishbein and Ajzen 2010: 22) measurement constructs and measurement items were developed:

(a) Attitude towards tacit knowledge sharing
(Appendix B3 - Question 28, 19 and 25).

(b) Perceived norms about tacit knowledge sharing
(Appendix B3 - Question 3, 15 and 24).

(c) Perceived behavioural control over the sharing of tacit knowledge.
Perceived behavioural control included:

- Perceived capacity (Appendix B3 - Question 27 and question 20) and
- Perceived autonomy (Appendix B3 - Question 9 and 2).

(d) Intention to share tacit knowledge
(Appendix B3 - Question 18, 29 and 26).

The individual’s attitude towards knowledge sharing, their perceived norms about tacit knowledge sharing and perceived behavioural control over the sharing of tacit knowledge served as mediating variables and the individual’s intention to share tacit knowledge served as the dependent variable in the studies model.

Appendix C2 provides operational definitions for the measurement constructs. These constructs were designed from Fishbein and Ajzen's (2010: 1) research but adapted to suit the knowledge sharing context.

5.4 Criteria of structural equation modeling analysis

The following section provides information on the SEM analysis of the study model and the development of the final set of models.

The general SEM model consists of two sub-models: a measurement model and a structure model. The propositions composing both models are most frequently drawn from previous research or theory although the role of informed judgment, hunches, and dogmatic statements of belief should not be discounted (Bollen and Long 1993: 1). However derived, the purpose of the model is to explain why variables are correlated in a particular fashion. Criteria for SEM analysis are documented in the following section.

5.4.1 Non normality and missing data problems

Thirty six questionnaires that had missing values were discarded.

5.4.2 Outliers

Prior to implementing structural equation modeling outliers (very high or very low scores) were identified as part of the initial screening process. No outliers were deleted.

5.4.3 Model identification

Before starting confirmatory factor analysis of the measurement model, the valid estimation of model parameters requires that the model be identified. The identification of a model refers to the question of whether there is sufficient information (i.e., an adequate number of observed variances and covariance's) to allow estimation of all of the model parameters. In other words, there should be an adequate number of observed variances and covariance's to estimate all of the unknowns.

There are three possibilities (Anderson and Gerbing 1988: 185): 1) just-identified, 2) over-identified, and 3) under-identified. If a model is just-identified, the model has just enough information (i.e., just enough number of observed variances and covariance's) to estimate all parameters. The model is over-identified when there is more than just enough information to estimate all parameters. In order to obtain a test of the overall model fit, the model must be over-identified. In practice, one would usually attempt to specify a hypothesized model that is over-identified in order to allow estimation of all model parameters and to test for the overall fit of the model. Lastly, the model is under-identified when there is not sufficient information to estimate all parameters.

To satisfy the t-rule (i.e., to be over-identified), a model should provide equal or greater number of variances and covariance's of the observed variables than the number of model parameters to be estimated. Each measurement model in this study was identified to ensure that a) there existed a unique solution for the models parameters and b) in theory and practice the model could be estimated with observed data c) the minimum conditions of identifiability were met, i.e., the number of known values must equal or exceed the number of free parameters in the model and (d) the model was well specified, i.e., the measures that define it were strongly related to one another. All of the models in this study were over-identified and thus a test of each model was possible.

5.4.4 Path diagram

On the path diagram latent variables are represented by eclipses and measured variables or indicators are represented by rectangles, for example, questionnaire items. Latent variables (or factors) are theoretical constructs that cannot be observed directly; instead, they are assumed to underlie one or more directly observed variables. Unidirectional arrows indicate a direct effect of latent variables on measured variables.

In the context of SEM research, observed variables can be represented by the questionnaire items as in the present study. In the present study, there were six latent variables and three mediating variables. For the SEM analysis, each of these was measured with two or more observed variables (that is, questionnaire items).

Standardised regression coefficients are printed beside each path. Numbers beside the lines represent the magnitude of the effects. The numbers at the tails of arrows represent the variances of errors. Beside each dependent variable (figure next to square block) is printed the R^2 relating that variable to a latent variable R^2 = percentage of variance in the dependent variable accounted for by the predictor(s) = amount of noise in the data. A high value of R^2 suggests that the regression model explains the variation in the dependent variable well.

If the consensus of an item is high it will not contribute to the prediction of another variable due to the low variance (Van den Putte and Hoogstraten 1997: 333).

5.4.5 Measurement model and confirmatory factor analysis

It is customary that a study of hypothesized causal relationships among latent variables having multiple observed indicators consists of two separate steps (Anderson and Gerbing 1988: 186; Hair, Anderson, Tatham, William and Black 1998: 1).

First, a confirmatory factor analysis (CFA) was conducted to describe how well the observed indicators served as a measurement instrument for the latent variables. Indicators that were weakly correlated with the other indicators of the same construct were eliminated from the analysis. Two indicators or more were used to represent the underlying construct.

CFA focuses on the extent to which the observed variables are linked to their underlying observed variables. Thus, the strengths of the regression paths from the factors to the observed variables (the factor loadings) are of primary interest.

While the proportion of variance (R^2) accounted for by all latent variables was used to evaluate reliability, validity was assessed by the magnitude of the factor loadings linking the observed and latent variable in the confirmatory factor analysis.

Because the CFA model focuses solely on the link between factors and their measured variables within the framework of SEM, it represents what has been called a measurement model. Then, if an acceptable measurement model has been found according to the above criteria, a hypothesized full structural equation model with latent variables is tested to assess hypothesized causal links among the latent variable. This two-step process was followed in this study.

Thus, CFA was performed on the initial measurement model. The measurement model measured the relationship between the observed variables (i.e., the questionnaire items) and the constructs these variables are hypothesized to measure (Bock et al. 2005: 92). The specification of the measurement model is a formal statement of one's beliefs about the actual causal processes leading to the ultimate outcome. It allowed the researcher to evaluate how well the observed (measured) variables combined to identify underlying hypothesized constructs. The hypothesized constructs are referred to as latent variables in SEM. The scale of each latent variable was fixed by assuming that the variance of each latent variable was equal to one.
Once an acceptable measurement model had been found from the confirmatory factor analysis, the measurement model was then incorporated into a structural equation model with latent variables in order to test hypothesized causal links among the latent variables.

5.4.6 Model Fit

An important aspect of the evaluation of an estimated model is determining whether the model is consistent with, or fits, the empirical data. Model fit refers to the ability of a model to reproduce the data (i.e., usually the variance-covariance matrix). A good-fitting measurement model is required before interpreting the causal paths of the structural model.

There are several indicators of goodness-of-fit and most SEM scholars recommend evaluating the models by observing more than one of these indicators (Hair et al. 1998: 1; Hoe 2008: 77; Kelloway 1998: 1).

It should be noted "that there exists considerable disagreement over what constitutes acceptable values for global fit indices" (Weston and Gore 2006: 741). The most stringent concept of fit recommends that the model must exactly replicate the observed data. Although, numerous indices have been proposed and used, thus far no one index has been found superior in all situations.

Marsh, Balla and McDonald (1988: 391) proposed that the criteria for ideal fit indices are relative independence of sample size, accuracy and consistency to assess different models, and ease of interpretation aided by a well-defined pre-set range.

According to Weston and Gore, (2006: 741) "statisticians agree that researchers should evaluate fit in terms of (a) significance and strength of estimated parameters, (b) variance accounted for in endogenous observed and latent variable, and (c) how well the overall model fits the observed data, as indicated by a variety of fit indices".

A second perspective is that models approximating the observed data are acceptable (Weston and Gore 2006: 741). Martens (2005: 269) study suggested that the perspective commonly taken by social scientist reflects the assumption that approximating observed data is acceptable and can result in important contributions to the literature (Weston and Gore 2006: 741).

Following the recommendations of Boomsma (2000: 473) and Garver and Mentzer (1999: 33), for the current study, the following common indices were employed to assess the model fit to the data, i.e., the Chi square or CMIN/DF index, (Bentler 1990: 238), the Comparative Fit Index (CFI) and the Root Mean Square Error of Approximation (RMSEA) index (Steiger 1989: 75; Steiger 1990: 173; Steiger and Lind 1980: 1) as detailed in Table 5.2. As Steiger (1990: 173) developed the RMSEA index, his recommended indices were used in the assessment of the study models fit. Park (2003: 51) also made use of his indices in his study. Table 5.2 provides the 'goodness of fit' indices used in this study.

Table 5.2 'Goodness of fit' indices

'Goodness of Fit' Indices	Values (Recommended)
CMIN/DF	2-3 - for an acceptable fit. <2 for a good fit.
NFI	>.9 for an acceptable fit.
CFI	>.9 for an acceptable fit. >.95 for a good fit.
RMSEA	<.10 for a good fit <.05 for a very good fit. <.01 for an outstanding fit.

In addition, a more detailed assessment of the fit of the model can help to pinpoint the location of any model fit problems and identify possible model revisions, for example, the differences between observed values and reproduced values for specific variances and covariances (covariance residuals) may be examined.

Each of the model fit indices, used in this study, is discussed in more detail below:

CMIN/DF

Chi-square ($\chi2$) is the most common method of evaluating 'goodness-of-fit'.

$\chi2$ tests are tests of model misspecification (Bollen 1989: 278). An alternate evaluation of the chi-square ($\chi2$) statistic is to examine the ratio of $\chi2$ to the degrees of freedom (d.f.) for the model (Joreskog and Sorbom 1993: 1).

A small $\chi2$ value relative to its degree of freedom is indicative of good fit. Kline (1998: 343) suggested that a $\chi2$/d.f. ratio of 3 or less is a reasonably good indicator of model fit. Weston and Gore (2006: 743) suggested CMIN /DF should be between 2 and 3 for an acceptable fit and <2 for a good fit. Thus, a significant chi square ($\chi 2$) suggests that the model does not fit the data. In contrast, a non significant chi square ($\chi 2$) is indicative of a model that fits the data well (Weston and Gore 2006: 742). This is because the chi-square ($\chi 2$) test is used to assess actual and predicted matrices. Therefore, low $\chi 2$ values, which result in significance levels greater than 0.05 or 0.01, indicate that the actual and predicted inputs are not statistically different. The significance levels of 0.1 or 0.2 should be exceeded before non-significance is confirmed (Fornell 1983: 443).

It should be noted that Weston and Gore (2006: 742) report that two limitations exist with the Chi-square ($\chi 2$) statistic. First, this statistic tests whether the model is an exact fit to the data. They point out that finding an exact fit is rare. Second, “as with most statistics, large sample sizes (especially if the observations are greater than two hundred) increase power, resulting in significance with small effect sizes” (Henson 2006: 601). Consequently, a non-significant Chi square ($\chi 2$) may be unlikely, although the model may be a close fit to the observed data. They comment that “researchers typically consider additional fit indices to determine whether the model fit is acceptable” (Weston and Gore 2006: 742).

In the case of this study, with a large sample size, in line with Steiger’s (1990: 177) recommendation, the researcher has ignored the significant Chi-square ($\chi 2$) result and concentrated on the RMSEA which is relatively independent of sample size (Elias, Hattie and Douglas 1990: 2).

Comparative fit index (CFI)

The CFI, proposed by Bentler (1990: 400), is another measure of how much better the model fits compared to an independence model.

Bentler's CFI (1990: 400) is an example of an incremental fit index (IFI). Bentler (1990: 400) developed the CFI as a non centrality parameter-based index to overcome the limitation of sample size effects. This type of index compares the improvement of the fit of the researcher's model over a more restricted model, called an independence or null model, which specifies no relationships among variables.

CFI ranges from 0 to 1.0 with values closer to 1.0 indicating better fit (Weston and Gore 2006: 742). CFI should be >.9 for an acceptable fit and >.95 for a good fit (Hu and Bentler 1995: 8; 1998: 424; 1999: 1; Weston and Gore 2006: 743).

Root mean square error of approximation (RMSEA)

The RMSEA, which was developed by Steiger (1989: 75), is based on the analysis of residuals with smaller values indicating a better fit to the data. Steiger (1989: 75) suggested that values below 0.10 indicate a good fit to the data, and values below 0.05 a very good fit to the data (Park 2003: 51; Sugawara and Mac Calum 1993: 369, Weston and Gore, 2006: 743). Values below 0.01 indicate an outstanding fit to
The data, although Steiger (1989: 75) and Sugawara and Mac Calum (1993: 369) noted that these values are rarely obtained.
RMSEA is an extremely informative criterion in evaluating model fit. The RMSEA index measures the discrepancy between the observed and estimated covariance matrices per degree of freedom (Steiger 1990: 173). It measures the discrepancy in terms of the population and not the sample. Thus, the value of this fit index is expected to better approximate or estimate the population and not be affected by sample size

The RMSEA index corrects for a model's complexity (Steiger 1990: 173; Steiger and Lind 1980: 1). As a result when two models explain the observed data equally well, the simpler model will have the more favorable RMSEA value. A RMSEA value of .00 indicates that the model exactly fits the data. A recent practice is to provide the ninety percent confidence interval as well for the RMSEA, which incorporates the sampling error associated with the estimated RMSEA (Weston and Gore 2006: 742).

In the final step, the researcher tested the hypothesized causal relationships between the observed (measured) and unobserved (latent) variables to estimate and evaluate the structural portion of the model. These relationships may be specified as covariances, correlations, direct effects or indirect (mediated) effects. These are explained in more detail below.

5.4.7 Model revision and re-specification process

The analysis procedure described thus far has been set in a confirmatory framework. In other words, an initial model has been hypothesized and the model has been tested with data. The study would remain purely confirmatory if the initially hypothesized model were evaluated and found to be acceptable. If, on the other hand, the initial model were judged to be unacceptable, it is common practice to introduce an exploratory element into the study by considering possible model revisions based on the data in the study. Such model revisions would usually consist of the addition of one or more paths to the initial model or the removal of constructs.

Weston and Gore (2006: 744) make the point that “rarely is a proposed model the best fitting model”. Consequently, revision or modification (re-specification) may be needed. Re-specification involves adjusting the estimated model by freeing (estimating) or setting (not estimating) parameters.

An aid for identifying possible paths to be added to a model is the modification index. This index consists of recommended changes (expressed as a decrease in the chi-square statistic) if a path were added to the model. Thus, the absence of any large modification indices would be consistent with a good model fit. The goal of their vision process is a theoretically credible model that is judged acceptable in the empirical model evaluation.

Weston and Gore (2006: 739) recommend, in agreement with other researchers (Anderson and Gerbing 1988: 186; Kline 2005: 1), "that researchers make reasonable necessary changes to the measurement model when encountering problems with the model".

After estimating the model, the models fit to the data was evaluated in order to determine whether the associations among the measured and latent variables in the estimated model adequately reflected the associations in the data.

As a result of the poor fit of the hypothesized model to the data, revision of the model into several models was conducted, based upon theoretical credibility. Modification indices were used to add or delete paths in the revised models to arrive at the final best fit model (Marcoulides and Drezner 2001: 247, 2003: 154; Schumacker and Lomax 2010: 73).

The hypothesized model fit indices and the revision process is discussed further in the following sections. The advantage of the revised models was that they were an acceptable fit, they worked and were stable.

5.4.8 Covariance matrix

Covariances are analogous to correlations in that they are defined as "non-directional relationships among independent latent variables" (Weston and Gore 2006: 727). "It is a measure of the average relationship between two variables. It is the average cross-product divided by one less than the number of observations" (Field 2009: 783). Covariance is an unstandardised form of correlation between all pairs of variables. They are indicated on the path diagram as double headed arrows.

Analysis of covariance is a statistical procedure that uses the F-ratio to test the overall fit of a linear model controlling for the effect that one or more covariated have on the outcome variables (Field 2009: 783).
If covariance is a positive number, there is a positive relationship between the variables and if it is a negative number there is a negative relationship between the variables. The number of cells shown in the matrix reflects the number of sample moments.

5.4.9 Correlation matrix

The primary purpose of the correlation matrix is to examine the relationships among the exogenous and endogenous constructs. It describes the relationship between the two constructs.

In this study, the researcher has set one factor loading for each latent variable at 1.0 to scale the latent variable. "When a path loading for an independent variable is set to 1.0, the variance of the independent latent variable is estimated" (Weston and Gore 2006: 731). Correlations range from -1 to +1. The direction of the relation is indicated by the sign and the degree of the relationship is indicated by the absolute size of the correlation.

By examining the correlation matrix the reader is able to test his/her hypothesize about which relationships are significantly different from zero and which are not (for example, .04 is not significantly different from zero. whereas .81 is significantly different from zero).

5.4.10 Standardised total, direct and indirect effects

In the structural model, there is a set of structural equations. The "equations in the structural portion of the model specify the hypothesized relationships among latent variables" (Weston and Gore 2006: 726).

"Directional effects describe the relationships between the latent variables and indicators (called factor loadings) and relationships between latent variables and other latent variables (called path coefficients)", (Weston and Gore 2006: 731). They are similar to those found in ANOVA and multiple regression (Weston and Gore 2006: 726). They are indicated on the path diagram as single-directional arrows. Note: these should not be interpreted as causality.

An indirect effect is the relationship between an independent latent variable and a dependent latent variable that is mediated by one or more latent variables (Weston and Gore 2006: 728). On the other hand, total effect is equal to any direct effect plus the sum of any indirect effects of one variable on the other.

5.4.11 Structural equation modeling results

When reading applied research concerning SEM, it is often difficult to judge its merits. In line with Boomsma (2000: 462) view that "all information should be reported that enables a researcher to replicate the published empirical research", a full set of statistical results is presented in Appendix D. Each stage in the process of confirmatory and SEM analysis is also reported. As a result of the SEM analysis, the hypothesized, theoretical model was revised into a set of models.

Due to the page limitations for a thesis, the results of the measurement models for the revised models have not been presented in the body of this thesis. For all of the models, confirmatory factors analysis, measurement model identification and measurement model fit to the data was performed on each individual model. All the measurement models were over-identified, the reliability and validity for each measurement model was confirmed and each measurement model revealed an acceptable or good fit to the data. On this basis structural equation modeling was performed on each model.

The full set of statistical results (i.e., the measurement model and the structural model) including the covariance and correlation matrixes for each model is presented in Appendix D.

In the body of the thesis, only the results for the standardized, structural models have been presented.

5.5 Stages adopted in the structural equation modeling

The stages in the structural equation modeling were modeled after the stages recommended by Hair, Anderson, Tatham and Black (1998: 592) and Anderson and Gerbing (1988: 414).

Table 5.3 outlines the stages that were adopted in the SEM process:

Table 5.3 SEM stages

Stages	SEM Analysis	Activity
Stage 1	Developed a theoretically based model	Data collection.
		Identified the model (Determined degrees of freedom).
Stage 2	Constructed a path diagram of causal relationships	Defined exogenous and endogenous constructs.
		Developed the path diagram and linked relationships in the path diagram.
Stage 3	Specified the measurement model	Specified the sample.
		Analysed responses of demographic

		categories (Kruskall Wallis and Mann-Whitney U Tests).
		Converted the path diagram into a measurement model.
		Determined the number of indicators.
		Determined average scores of constructs.
		Performed confirmatory factor analysis (i.e, specified which variables defined each construct).
		Tested for construct reliability (Cronbach's Alpha).
		Identified correlations of constructs and indicators.
		Specified the measurement model with direct causal links among the variables.
		Evaluated measurement model fit.
		Identified potential model changes.
		Developed the final measurement model.
Stage 4	Developed the SEM	Ascertained the regressions to each question individually.
		Tested the hypotheses (Pearson's Product Moment Correlation Coefficient and Spearman's Correlation Coefficient).
Stage 5	Chose the input matrix type	Developed the correlation matrix.
		Developed the variance/covariance matrix.
Stage 6	Evaluated model/Estimated and evaluated goodness-of-fit	Examined standardized residuals.
		Evaluated structural model fit.
Stage 7	Model interpretations/modifications	Identified potential model revisions.
		Re-specified the SEM model.

		Developed final SEM model.

5.6 Conclusion

This chapter began with a discussion of the development of the social capital measurement constructs. The multi-dimensional nature of social capital was discussed highlighting the array of social capital factors that are relevant in specific contexts. Then, the development of the study's social capital measurement constructs, i.e., the structural, relational and cognitive dimensions were outlined. The chapter proceeded to discuss the development of the 'reasoned action' measurement constructs which were developed based upon the work of Fishbein and Ajzen (2010: 20). The chapter continued by discussing the criteria of structural equation modeling analysis. Finally, the stages applied in the SEM were outlined.

The results of the study are presented in the following chapter.

CHAPTER 6

RESULTS

6.1 Introduction

The previous chapter presented a discussion of the development of the model and measurement items for the study. This chapter presents the findings of the study. It begins with a demographic analysis of the participants. Then, the statistics for reliability and validity are presented. This is followed by an analysis of the qualitative results of the study, which is followed by the results of the quantitative study. Finally, the results of confirmatory factor analysis and the results of the SEM analysis are presented.

6.2 Demographic analysis - Qualitative research

This section provides the demographics for the qualitative research. Nine respondents were interviewed from different levels in the university.

Table 6.4 reflects the demographics of the qualitative research.

Table 6.4 Demographics of qualitative research

Demographic	Category	Frequency
Gender	Male	2
	Female	7
Race	White	5
	Asian	2
	Black	2
Job Position	Management	2

	Lecturer	3
	Support Staff	3
	Administrative Staff	1
Age	18-29	1
	30-39	1
	40-49	3
	50-59	4

6.3 Demographic analysis - Quantitative research

The final sample for the quantitative research consisted of five hundred and fifty four respondents. The demographics for the quantitative research are presented in the following sections.

The non-parametric Kruskal Wallis test was applied to all of the demographic results. "This is a test of whether more than two independent groups differ. It is the non-parametric version of one-way independent ANOVA" (Field 788: 2009).
The test was performed in order to compare the medians between the different sets of data.

If there was a significant difference as shown by Kruskal Wallis, each pair was tested separately using the Man-Whitney U test in order to assess where the differences lay***.***

The tables reflecting the frequency, percent, valid percent and cumulative percent, means and standard deviations of the respondent's faculties, permanency, job position, age, race, gender and education are presented in Appendix D.

Due to page number constraints these tables are presented in the following sections in graphical form only.

6.3.1 Faculties

Figure 6.9 graphically illustrates the percentages of respondents in each faculty (Appendix D1 - Table D1.1). 12.3 percent of respondents came from the Health Sciences Faculty, 11.9 percent came from the Management Science Faculty, 8.5 percent came from the Arts and Design Faculty, 7.4 percent came from the Applied Science Faculty and 6 percent came from the Accounting and Informatics Faculty. 8.7 percent came from Engineering and the Built Environment. 1.3 percent of the respondents were from Executive Management and 28.7 percent were support staff (Appendix D1 - Table D1.2).

There were no significant differences in the means scored with regard to the different faculties (Appendix D1 - Table D1.2).
In addition, the Kruskal Wallis test revealed no significant differences with regard to the measurement constructs between the different faculties (Appendix D1 - Table D1.3).

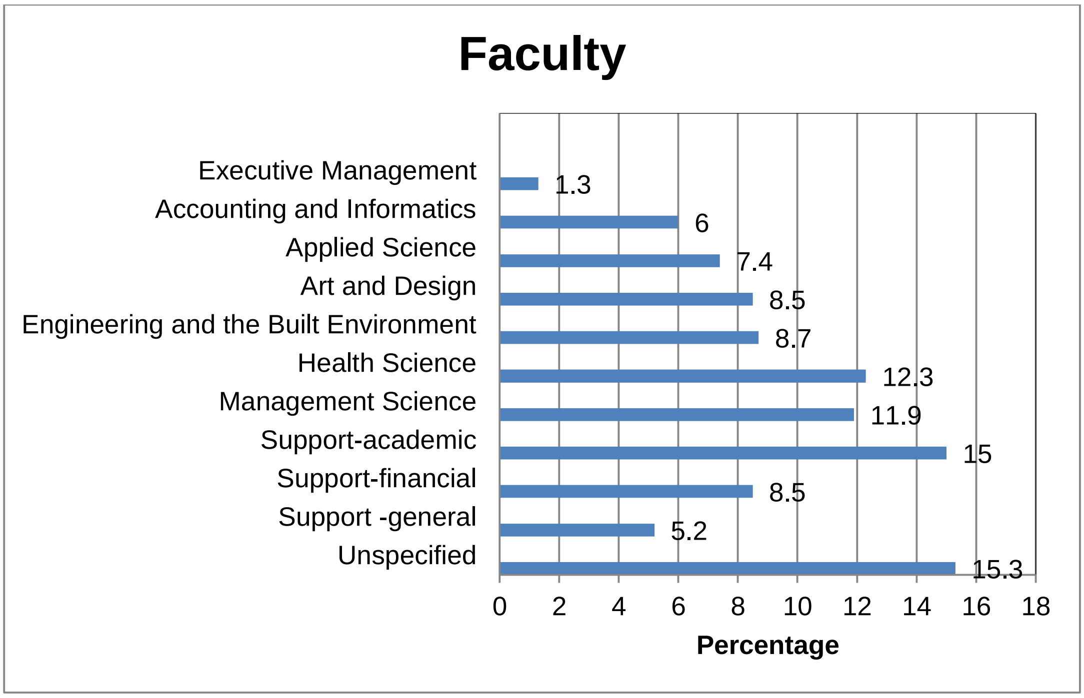

Figure 6.9 Faculties

6.3.2 Permanent and non-permanent staff members

Figure 6.10 represents the percentage of permanent staff and non-permanent staff members. 78.16 percent were permanent members of staff and 21.66 percent of respondents were not permanent staff members (Appendix D1 - Table D1.4).

There were no significant differences in the means scored with regard to permanent and non-permanent staff other than the mean for each construct was lower for the permanent staff than for the non-permanent staff for every construct (Appendix D1 - Table D1.8).

The Kruskal Wallis test revealed no significant differences in the measurement constructs between the permanent and non-permanent staff (Appendix D1 - Table D1.6).

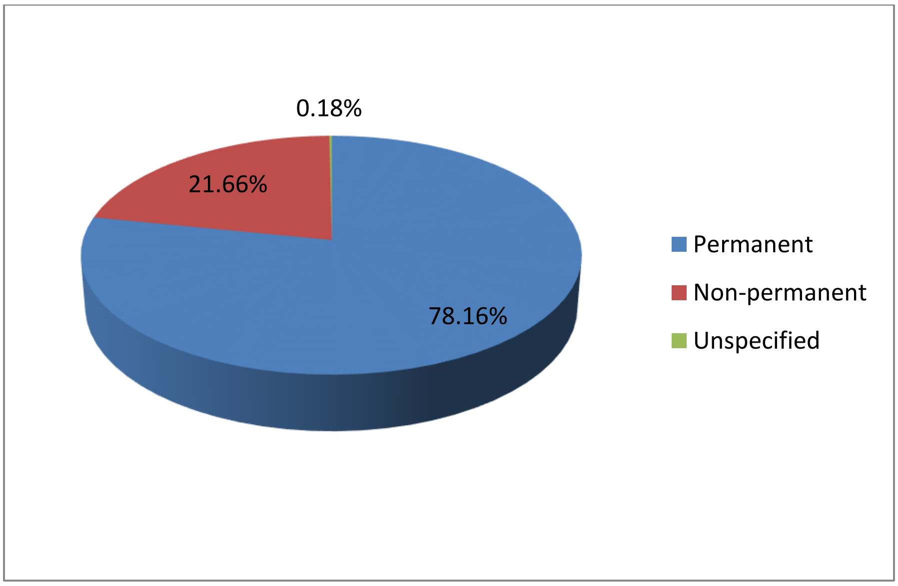

Figure 6.10 Permanent and non-permanent staff members

6.3.3 Job position

Figure 6.11 represents the job position of respondents. 33 percent were administrative staff, 32.5 percent were lecturers, 10.5 percent were senior lecturers, 6.5 percent were junior lecturers (total of 49.5 percent were lecturers), 8.1 percent were technicians, 2.5 percent were full or associative professors and 6.5 percent of the respondents came from management.

Senior management scored a higher mean than all other staff members on network ties (3.92), shared norms and values (3.97), shared goals (4.11), perceived norms about tacit knowledge sharing (4.14), perceived behavioural control (4.30) and intention to share tacit knowledge (4.37).

In contrast, junior management showed the lowest mean of all the staff with regard to network ties (2.91), shared norms and values (3.03), and perceived norms about tacit knowledge sharing (3.51).

Technicians showed the lowest mean of all the staff on perceived behavioural control (3.74), and intention to share tacit knowledge (3.71) and attitude towards sharing tacit knowledge (3.80) (Appendix D1 - D1.8).

The Kruskal Wallis test (Appendix D1 - Table D1.9) revealed the following significant differences:

Network Resources

$\chi^2(N = 552, 8) = 17.294$, $p = .027$;

Junior lecturers scored, on average, higher than junior management ($Z = -1.961$, $p < .050$), senior lecturer ($Z = -3.518$, $p < .0001$), lecturer (Z = -

2.318, $p = 0.020$), technician ($Z = -2.541$, $p = .011$) and administrative staff ($Z = -3.146$, $p = .002$).

Lecturers scored higher than senior lecturers ($Z = -2.613$, $p = .009$)

Trust

$\chi^2(N = 552, 8) = 26.777$, $p = .001$;

Junior lecturers scored, on average, higher than junior management ($Z = -2.583$, $p = .010$), middle management ($Z = -2.569$, $p = .010$), senior lecturers ($Z = -3.604$, $p <.0001$), lecturers ($Z = -2.425$, $p = .012$), administrative staff ($Z = -2.807$, $p = .005$) and technician ($Z = -3.418$, $p = .001$).

Lecturers scored higher than senior lecturers ($Z = -2.953$, $p = .003$) and technician ($Z = -2.788$, $p = .005$).

Administrative staff scored higher than senior lecturers ($Z = -2.066$, $p = .039$).

Shared Norms and Values

$\chi^2(N = 552,8) = 34.897$, $p<.0005$;

Senior management scored higher than junior management ($Z = -3.467$, $p <.0001$), senior lecturers ($Z = -2.392$, $p = .017$) and technicians ($Z = -2.427$, $p = .015$).

Lecturers scored higher than junior management ($Z = -3.376$, $p = .001$), senior lecturers ($Z = -3.112$, $p = .002$) and technicians ($Z = -2.766$, $p = .006$).

Junior lecturers scored higher than middle management ($Z = -2.055$, $p = .040$), junior management ($Z = -3.963$, $p <.0005$), senior lecturers ($Z = -3.570$, $p <.0005$), lecturers ($Z = -2.141$, $p = .032$) and technicians ($Z = -3.346$, $p = .001$).

Administrative staff scored higher than junior management ($Z = -2.615$, $p = .009$), senior lecturers ($Z = -2.109$, $p = .035$) and junior lecturers ($Z = -2.828$, $p = .005$).

Shared Vision

$\chi^2(N = 552, 8) = 16.960$, $p = .031$;

Senior management scored higher than junior management ($Z = -2.074$, $p = .041$) and senior lecturers ($Z = -2.192$, $p = .028$).

Lecturers scored higher than senior lecturers ($Z = -2.596$, $p = .009$).

Junior lecturers scored higher than senior lecturers ($Z = -2.566$, $p = .010$).

Administrative staff scored higher than senior lecturers ($Z = -2.678$, $p = .007$).

Shared Goals

$\chi^2(N = 552, 8) = 18.888$, $p = .015$;

Senior management scored higher than junior management ($Z = -2.012$, $p = .044$) and senior lecturers ($Z = -2.447$, $p = .014$).

Lecturers scored higher than senior lecturers ($Z = -2.972$, $p = .003$).

Junior lecturers scored higher than senior lecturers ($Z = -3.252$, $p = .001$) and technician ($Z = -1.995$, $p = .046$).

Administrative staff scored higher than senior lecturers ($Z = -3.076$, $p = .002$).

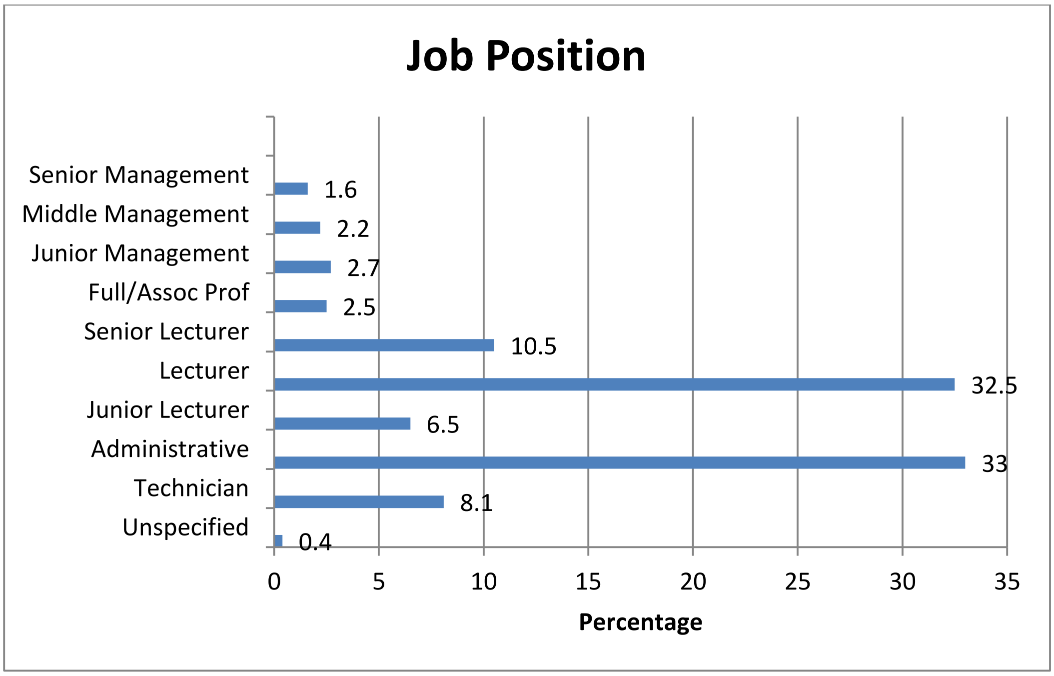

Figure 6.11 Job position

6.3.4 Age

Figure 6.12 represents the age of respondents (Appendix D1 - Table D1.10). 15.9 percent were between the ages of 18-29, 26 percent were between the ages of 30-39, 26.2 percent were between the ages of 40-49, 22.7 percent were between the ages of 50-59, 7.9 percent were between the ages of 60-69 and .7 percent was over the age of 70.
There were no significant differences in the means scored with regard to the ages of respondents (Appendix D1 - Table D1.11).

The Kruskal Wallis (Appendix D1 - Table D1.12) test showed several significant differences between the different age groups with regard to the following constructs:

Network resources

$\chi^2(N = 551, 5) = 12.692$, $p = .026$;

18 - 29 scored higher than 50 - 59 ($Z = -2.971$, $p = .003$);

30 - 39 scored higher than 50 - 59 ($Z = -2.707$, $p = .007$) and

40 - 49 scored higher than 50 - 59 ($Z = -2.285$, $p = .022$).

Trust

$\chi^2(N = 551, 5) = 26.379$, $p<.0005$;

18 - 29 scored higher than 30 - 39 ($Z = -2.983$, $p = .003$), 40 - 49 ($Z = -4.275$, $p <.0005$) and 50 - 59 ($Z = -4.123$, $p <.0005$) and

30 - 39 scored higher than 40 - 49 ($Z = -2.069$, $p = .039$).

Shared Norms and Values

$\chi^2(N = 551, 5) = 30.601$, $p<.0005$;

18 - 29 scored higher than 30 - 39 ($Z = -3.599$, $p<.0005$), 40 - 49 ($Z = -4.787$, $p <.0005$), 50 - 59 ($Z = -4.688$, $p <.0005$) and 60 - 69 ($Z = -2.741$, $p = .006$).

Shared Vision

$\chi^2(N = 551, 5) = 16.761$, $p = 005$;

18 - 29 scored higher than 30 - 39 ($Z = -2.497$, $p = .013$), 40 - 49 ($Z = -2.950$, $p = .003$) and 50 - 59 ($Z = -3.043$, $p = .002$).

70+ scored higher than 30 - 39 ($Z = -2.381$, $p =.017$), 40 - 49 ($Z = -2.151$, $p = .031$), 50 - 59 ($Z = -2.294$, $p = .022$) and 60 - 69 ($Z = -1.996$, $p = .048$).

Shared Goals

$\chi^2(N = 551, 5) = 20.152$, $p = .001$;

18 - 29 scored higher than 30 - 39 ($Z = -3.229$, $p = .001$), 40 - 49 ($Z = -3.805$, $p <.0005$), 50 - 59 ($Z = -3.959$, $p <.0005$) and 60 - 69 ($Z = -2.535$, $p = .011$).

Intention to Share Tacit Knowledge

$\chi^2(N = 551, 5) = 13.197$, $p = .022$;

18 - 29 scored higher than 40 - 49 (Z = -2.512, p = .012), 60 - 69 (Z = -2.656, p = .008) and 70+ (Z = -2.260, p = .024).

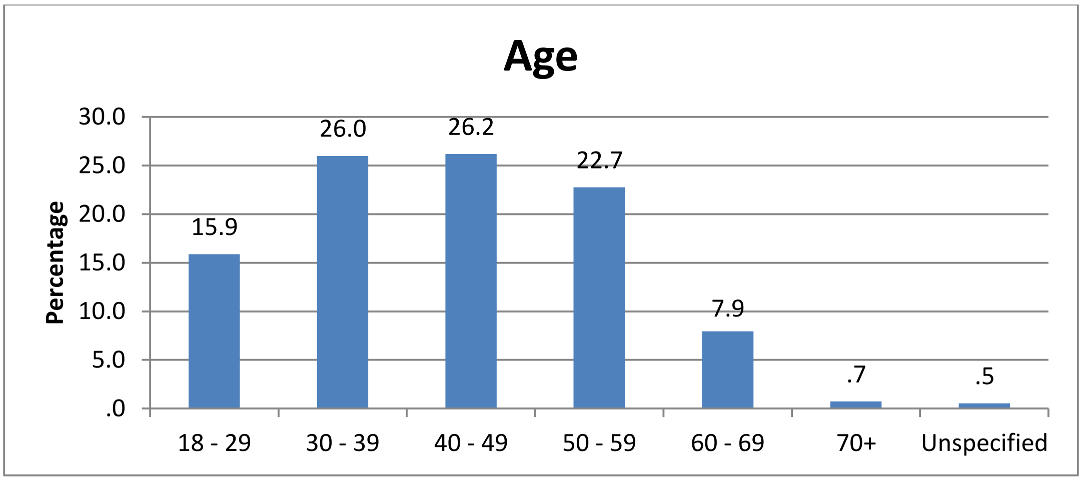

Figure 6.12 Age

6.3.5 Race

Figure 6.13 represents the race group of respondents. 34.84 percent were Black, 37.18 percent were Asian, 24.19 percent were White and 3.43 percent were Coloured (Appendix D1 - Table D1.13).

There were no significant differences in the means with regard to race (Appendix D1 - Table D1.14).

The Kruskal Wallis test (Appendix D1 - Table D1.15) showed several significant differences between race groups with regard to the following constructs:

Network Ties

$\chi^2(N = 552, 3) = 8.22, p = 0.032$:

Blacks and Asians scored significantly higher than Whites ($Z = -2.071$, $p = .038$; and $Z = -2.085$, $p = .037$, respectively).

Blacks and Asians scored significantly higher than Coloureds ($Z = -2.109$, $p = .035$; and $Z = -1.994$, $p = .046$, respectively).

Trust

$\chi^2(N = 552, 3) = 18.498, p < .0005$:

Blacks scored significantly higher, on average, than Whites ($Z = -3.197$, $p = .001$), Asians ($Z = -3.593$, $p < .0005$) and Coloureds ($Z = -2.555$, $p = .011$).

Shared Norms and Values

$\chi^2(N = 552, 3) = 20.185, p < .0005$:

Blacks scored significantly higher, on average, than Whites ($Z = -3.776$, $p < .0001$), Asians ($Z = -3.279$, $p = .001$) and Coloureds ($Z = -2.725$, $p = .006$).

Shared Vision

$\chi^2(N = 552, 3) = 32.363, p < .0005$:

Blacks scored significantly higher, on average, than Whites ($Z = -5.253$, $p < .0001$), Asians ($Z = -3.699$, $p < .0001$) and Coloureds ($Z = -2.717$, $p = .007$).

Asians scored significantly higher than Whites ($Z = -2.111$, $p = .035$).

Shared Goals:

$\chi^2(N = 552, 3) = 29.590$, $p <.0005$:

Blacks scored significantly higher, on average, than Whites ($Z = -5.111$, $p <.0001$), Asians ($Z = -3.141$, $p = .002$) and Coloureds ($Z = -2.416$, $p = .016$).

Asians scored significantly higher, on average, than Whites ($Z = -2.627$, $p = .009$).

Attitude towards Tacit Knowledge Sharing

$\chi^2(N = 552, 3) = 14.789$, $p = 0.002$:

Blacks scored significantly higher, on average, than Whites ($Z = -3.619$, $p <.0001$).

Asians scored significantly higher, on average, than Whites ($Z = -2.438$, $p = .015$).

Intention to Share Tacit Knowledge

$\chi^2(N = 552, 3) = 37.147$, $p <.0005$:
Blacks scored significantly higher, on average, than Whites ($Z = -5.823$, $p <.0001$), Asians ($Z = -4.034$, $p <.0001$) and Coloureds ($Z = -2.292$, p - .022).

Asians scored significantly higher, on average, than Whites ($Z = -2.221$, $p = .026$).

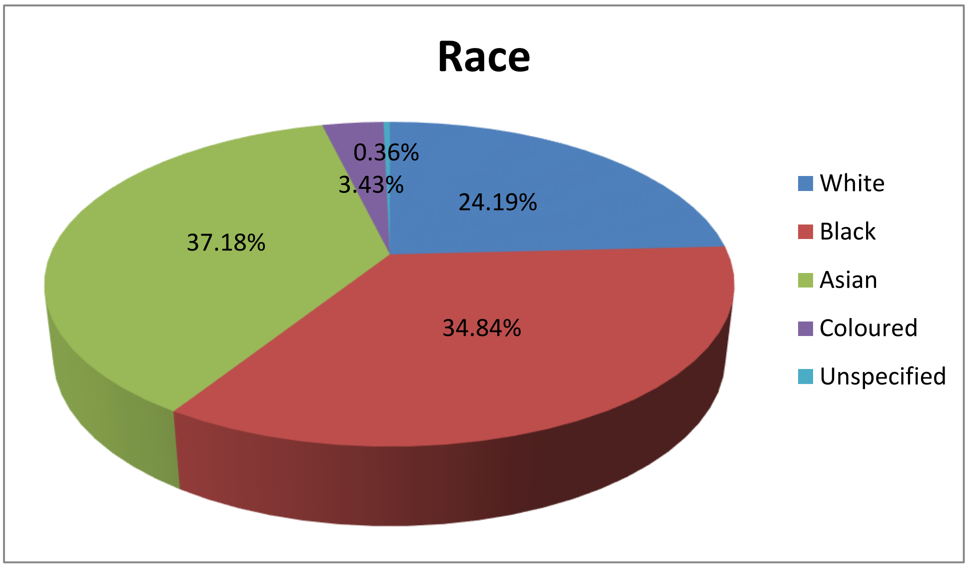

Figure 6.13 Race

6.3.6 Gender

Figure 6.14 represents the gender of respondents. 55.05 percent were female and 44.58 percent were male.

Analysis showed that no significant differences were present between the mean score for males and females in any of the measurement constructs (Appendix D1 - Table D1.17).

The Kruskal Wallis test (Appendix D1 - Table D1.18) was applied to test whether there was a difference between the mean scores for males and females in any of the measurement constructs. The Kruskal Wallis test revealed no significant differences between males and females (Appendix D1 - Table D1.18).

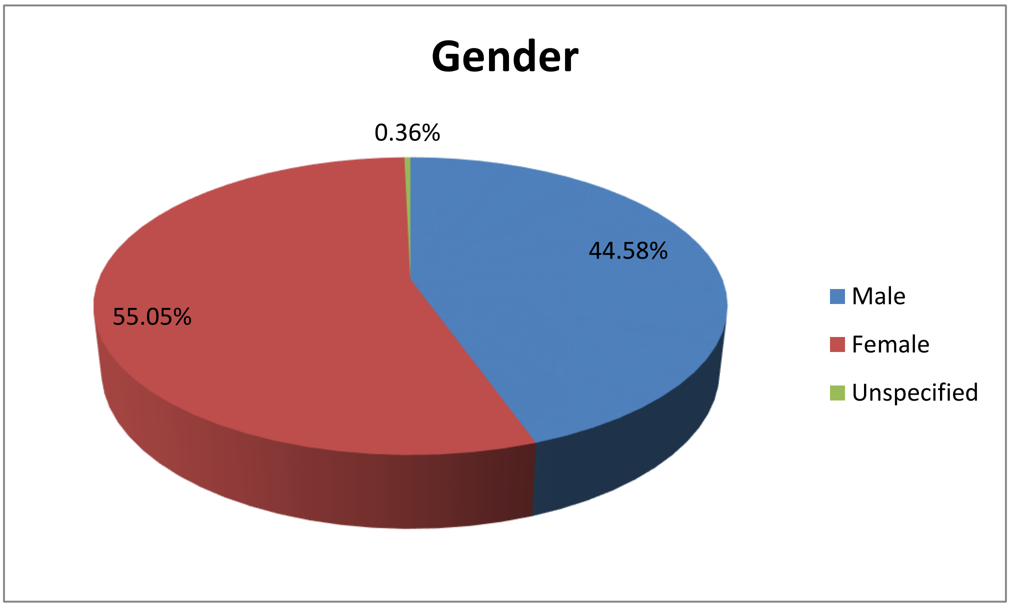

Figure 6.14 Gender

6.3.7 Education

Figure 6.15 represents the education of respondents, 5.8 percent had a high school education, 2.2 percent had a college education, 14.6 percent had a diploma qualification, 21.3 percent had a degree qualification, 14.6 percent had an honours qualification, 33.8 percent had a master's qualification and 7.6 percent had a doctoral qualification.

There were no significant differences in the means of the constructs for education (Appendix D1 - Table D1.20) and in terms of the Kruskal Wallis test results (Appendix D1 - Table D1.21).

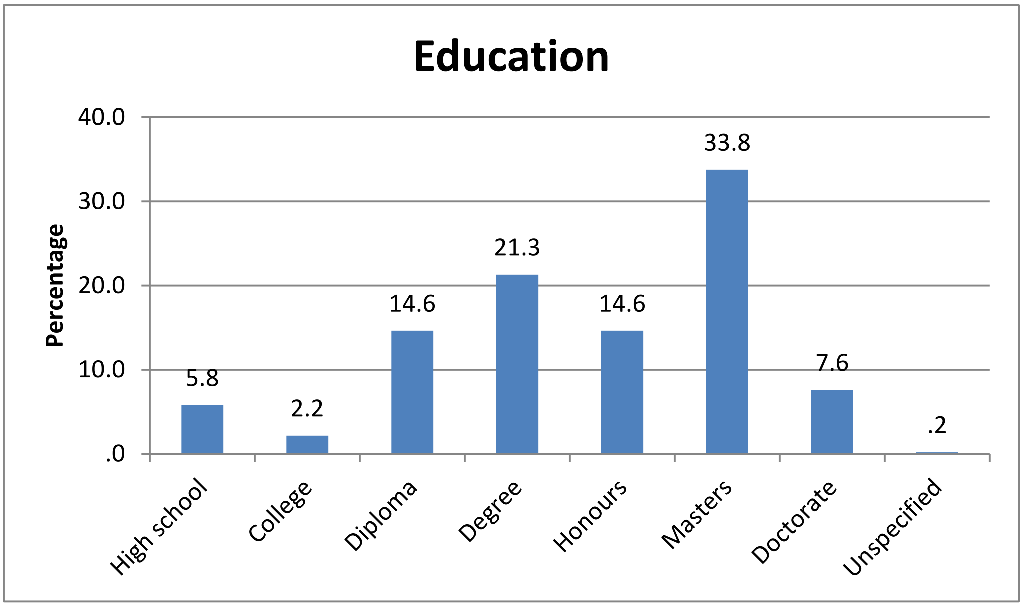

Figure 6.15 Education

6.4 Reliability and validity

From the statistical perspective, according to Cooper and Schindler (1998: 50), the validity of a sample needs to be tested: and is determined by two criteria; accuracy and precision. The involvement of all levels of staff, in this study, reduced bias sampling with respect to these criteria.

6.4.1 Cronbach Alpha test

In order to test the reliability (ability of the measures to produce consistent results when the same entities are measured under different conditions (Field 2009: 792), the researcher applied the Cronbach's (1951: 297) Alpha test. An Alpha value which exceeds 0.7 indicates that the individual questions measure the latent construct.

Table 6.5 Cronbach Alpha test results

Measurement Construct	Measurement Items Questions	Cronb. Alpha	Item Deleted	Cronb. Alpha of Remaining Items
Social Interaction Network Ties	11, 12, 21	0.669	21	0.734
Network Resources	7, 14, 33	0.743		
Trust	1, 6*, 8, 17, 30*, 32	0.854		
Shared Norms and Values	4, 10, 23, 35	0.759		
Shared Vision	5, 31*, 34	0.734		
Shared Goals	13, 16, 22	0.872		
Attitude towards Tacit Knowledge sharing	19, 25, 28	0.763		
Perceived Norms about Tacit Knowledge Sharing	3, 15, 24	0.570	24	0.603
Perceived Behavioural Control	2, 9, 20, 27	0.471	2, 9	0.683
Intention to Share Tacit Knowledge	18, 26, 29	0.733	29	0.839
Structural, Relational and Cognitive Dimensions of Social Capital	11, 12, 21, 7, 14, 33, 1, 6, 8, 17, 30, 32, 4, 10, 23, 35, 5, 31, 34, 13, 16, 22	0.945		
'Reasoned Action' Measurement Constructs	19, 25, 28, 3, 15, 24, 2, 20, 27	0.815		

In order to improve the reliability of the measurement items question twenty one, twenty four, two, nine and twenty nine were eliminated prior to conducting structural equation modeling.

For the SEM, each set of items designed to directly assess a given construct had a high degree of internal consistency (i.e., a high Alpha Coefficient), and the measures of the different constructs also exhibited discriminant validity.

The reliability measures of the measurement items that were used in the structural equation modeling are discussed further in the individual results for each dimension of social capital.

6.4.2 One-sample t-test results

To ascertain the agreement to each question individually, a one-sample t-test was applied to each of the 40 questions (Table 6.6). This tests whether the average score is significantly different from a neutral score of 3. An average score significantly bigger (smaller) than 3 indicates agreement (disagreement).

Table 6.6 One-sample t-test results

Q.	Measurement Items	Mean	Std Dev.	Sig. (2-tailed)**	Interpretation Significant
1	My co-workers will always keep the promises they make to me.	3.18	1.085	<0.0005	Agreement
2	I have a great deal of personal control over the amount of work experience and know-how that I share with my co-workers.	3.75	.952	<0.0005	Agreement
3	My boss thinks that I should share my work experience and 'know-how' with my co-workers.	3.70	.961	<0.0005	Agreement
4	There are people among my co-workers who give me help, support and encouragement.	4.08	.894	<0.0005	Agreement
5	There is total agreement on my department's vision across all levels and functions.	3.05	1.190	.354	-
6	I trust my co-workers	3.40	1.180	<0.0005	Agreement
7	I have gained resources through my social relationships at work.	3.42	1.078	<0.0005	Agreement
8	My co-workers are reliable.	3.44	1.038	<0.0005	Agreement
9	Whether I share my work experience or 'know-how' with my co-workers is entirely up to me.	3.63	.963	<0.0005	Agreement
10	In general, my norms and values and the norms and values held by my co-workers	3.02	1.079	.694	-
11	I have a network of close co-workers from similar social and work groups with whom I can share my work experience and 'know-how'.	3.33	1.035	<0.0005	Agreement
12	Many of my co-workers are close friends, i.e., people that I feel at ease with or can talk to about private matters.	3.01	1.126	.792	-
13	My co-workers and I, agree on what is important at work. We share the same collective work goals.	3.47	1.078	<0.0005	Agreement
14	I have gained information and knowledge through my work social network.	3.61	.988	<0.0005	Agreement
15	My co-workers think that I should share my work experience and 'know-how' with other staff members.	3.47	.874	<0.0005	Agreement
16	My co-workers and I are enthusiastic about pursuing the collective goals and mission of the university.	3.51	1.059	<0.0005	Agreement
17	My co-workers and I have a sharing relationship. We can freely share our ideas, feelings and hopes.	3.44	1.085	<0.0005	Agreement
18	I intend to share my work experience and 'know-how' with my co-workers more frequently in the future.	3.75	.852	<0.0005	Agreement

19	Sharing my work experience and know-how with my co-workers is and enjoyable	3.83	.880	<0.0005	Agreement
20	I have the confidence to share my work experience and know-how with my co-workers	3.97	.843	<0.0005	Agreement
21	In general, I have a very good, close working relationship with my co-workers.	3.71	.969	<0.0005	Agreement
22	My co-workers and I are committed to the goals of this university.	3.68	.977	<0.0005	Agreement
23	If I shared my problems with my co-workers, I know that they will respond constructively and caringly.	3.44	1.039	<0.0005	Agreement
24	Most people, whose opinion I value, would approve of my sharing my work experience and 'know-how' with my co-workers.	3.95	.715	<0.0005	Agreement
25	Sharing my work experience and 'know-how' with my co-workers is valuable to me.	3.97	.794	<0.0005	Agreement
26	I intend to share expertise from my education and training with my co-workers more frequently in the future.	3.86	.798	<0.0005	Agreement
27	I have the ability to share my work experience and 'know-how' with my co-workers.	4.12	.669	<0.0005	Agreement
28	Sharing my work experience and 'know-how' with my co-workers is good.	4.14	.712	<0.0005	Agreement
29	I will always share my 'know-where' and 'know-whom' with my co-workers at their request.	4.04	.773	<0.0005	Agreement
30	My co-workers are generally competent in what they do at work.	3.63	1.112	<0.0005	Agreement
31	My co-workers and I share the same vision and ambitions at work.	3.44	1.153	<0.0005	Agreement
32	My co-workers are generally knowledgeable about their job.	3.79	.902	<0.0005	Agreement
33	My social relationships at work provide me with access to my co-workers work experience and 'know-how'.	3.44	.924	<0.0005	Agreement
34	My co-workers and I share a commitment to a common purpose.	3.57	.970	<0.0005	Agreement
35	If I shared my work experience and know-how with my co-workers, they will be willing to share their work experience and 'know-how' with me.	3.53	.947	<0.0005	Agreement

Except for questions five, ten and twelve, there was significant (p<.0005) agreement with each of the measurement constructs.

6.4.3 Sign test results

In addition to the one-sample t-test, all the questions were checked for validity by applying the non-parametric sign test. The sign test tests whether two related samples are different (Field 2009: 793). In this test the magnitude of change is ignored.

This test showed that all questions revealed a significant agreement with each of the measurement constructs, i.e. there was no difference (Appendix D2 - Table D2.1).

6.4.4 Wilcoxon Signed-Rank Test

Each construct was tested with the Wilcoxon Signed-Rank test (Appendix D2 - Table D2.2) to see whether the average value was significantly different from neutral 3. The Wilcoxon Signed-Rank test is a non parametric test that looks for differences between two related samples. It is the non-parametric equivalent of the related t-test. The test provides information about the relative magnitude of change. All measurement items were significantly greater than three - indicating significant agreement with the measurement construct. In addition all of the 'reasoned action' constructs scored higher than the social capital constructs. Specifically the:

Average score for *'Network Ties'* indicated significant agreement - Z(N = 554 = -9.587, p <.005).

Average score for *'Network Resources'* indicated significant agreement - Z(N = 554 = -12.129, p <.005).

Average score for *'Trust'* indicated significant agreement -Z(N = 554 = -12.025, p <.005).

Average score for 'Shared Norms and Values' indicated significant agreement -Z(N = 554 = -13.351, p <.005).

Average score for *'Shared Vision'* indicated significant agreement -Z(N = 554 = -8.765, p <.005).

Average score for *'Shared Goals'* indicated significant agreement -Z (N = 554 = -12.012, p <.005).

Average score for *'Attitude towards Tacit Knowledge Sharing'* indicated significant agreement -Z(N = 554 = -18,970, p <.005).

Average score for *'Perceived Norms about Tacit Knowledge Sharing'* indicated significant agreement - Z(N = 554 = -17.609, p <.005).

Average score for *'Perceived Behavioural Control'* indicated significant agreement - Z(N = 554 = -19.083, p <.005).

Average score for *'Intention to Share Tacit Knowledge'* indicated significant agreement -Z(N = 554 = -18,600, p <.005).

6.4.5 Pearson's Product Moment Correlation Coefficient test results

In order to test the hypotheses (i.e., whether there was a significant linear relationship between the two variables), all of the measurement constructs were correlated with the application of the Pearson's Product Moment Correlation Coefficient statistic. This statistic is a "standardized measure of the strength of relationship between two variables" (Field 2009: 791). For validity: each result was confirmed with the non-parametric form, Spearman's Rank-Order Correlation Coefficient statistic, as well. The results for the studies, measurement items are listed below in brackets. In this test r = -1 to +1. As r approaches 1 the degree of linear relationship between variables becomes stronger. A positive sign indicates a direct linear relationship. The results below may be interpreted in the following way: for example, Hypothesis 10 - Respondents who scored high on their perception of shared goals, also scored high on their attitude towards tacit knowledge sharing - Respondents who scored low on their perception of shared goals, also scored low on their attitude towards tacit knowledge sharing.

The Pearson's Product Moment Coefficient for each hypothesis is reported below:

Structural dimension - Network ties:

Hypothesis 1

Individuals who report strong network ties (i.e., close relationships) will display a positive attitude towards tacit knowledge sharing.

For hypothesis 1, there was a significant positive correlation between strong network ties and the individual's attitude towards tacit knowledge sharing ($r = 0.460$, $p<0.0005$ - for questions 11, 12 and 21), ($r = .548$, $p<0.0005$ for questions 11 and 12).

Structural dimension - Network resources:

Hypothesis 2

Individuals who report greater access to information, tacit knowledge and resources within their work, social network will display a positive attitude towards tacit knowledge sharing.

For hypothesis 2, there was a significant positive correlation between the individual's access to resources through their social network and their attitude towards tacit knowledge sharing ($r = 0.401$, $p<0.0005$, for questions 7, 14 and 33).

Structural dimension of social capital:

Hypothesis 3

Individuals who report a high level of structural social capital (strong network ties and a high level of network resources) will display a positive attitude towards tacit knowledge sharing.

For hypothesis 3, there was a significant positive correlation between a high level of structural social capital and their attitude towards tacit knowledge sharing (r = 0.418, p<.0005, for questions 11, 12, 7, 14, and 33).

Relational dimension - Affect-based trust:

Hypothesis 4. Individuals who report affect-based trust towards their co-workers will display a positive attitude towards tacit knowledge sharing.

For hypothesis 4, there was a significant positive correlation between affect-based trust and the individual's attitude towards tacit knowledge sharing (r = 0.450, p<0.0005 for questions 6, 17 and 1).

Relational dimension - Cognitive-based trust:

Hypothesis 5

Individuals who report cognitive-based trust towards their co-workers will display a positive attitude towards tacit knowledge sharing.

For hypothesis 5, there was a significant positive correlation between cognitive-based trust and the individual's attitude towards tacit knowledge sharing (r = 0.410, p<0.0005 for questions 30, 8 and 32).

Relational dimension - Trust:

Hypothesis 6

Individuals who report trust (affect-based trust and cognitive-based trust) towards their co-workers will display a positive attitude towards tacit knowledge sharing.

For hypothesis 6, there was a significant positive correlation between the individual's who report trust and their attitude towards tacit knowledge sharing (r = 0.462, p<0.0005 for questions 6, 17, 1, 30, 8 and 32).

Relational dimension - Shared norms and values:

Hypothesis 7

Individuals who report a perception of shared norms and values between themselves and their co-workers will display a positive attitude towards tacit knowledge sharing.

For hypothesis 7, there was a significant positive correlation between shared norms and values and the individual's attitude towards tacit knowledge sharing ($r = 0.537$, $p<0.0005$ for questions 4, 10, 23 and 35).

Relational dimension of social capital:

Hypothesis 8

Individuals who report a high level of relational social capital (trust, shared norms and values) will display a positive attitude towards tacit knowledge sharing.

For hypothesis 8, there was a significant positive correlation between relational social capital and an individual's attitude towards tacit knowledge sharing ($r = 0.514$, $p<0.0005$ for questions 1, 6, 17, 8, 30, 32, 4, 10, 23 and 35).

Cognitive dimension - Shared vision:

Hypothesis 9

Individuals who report a perception of a shared vision between themselves and their co-workers will display a positive attitude towards tacit knowledge sharing.

For hypothesis 9, there was a significant positive correlation between shared vision and the individual's attitude towards tacit knowledge sharing ($r = 0.496$, $p<0.0005$ for questions 5, 31 and 34).

Cognitive dimension - Shared goals:

Hypothesis 10

Individuals who report a perception of shared goals between themselves and their co-workers, will display a positive attitude towards tacit knowledge sharing.

For hypothesis 10, there was a significant positive correlation between shared goals and the individual's attitude towards tacit knowledge sharing ($r = 0.525$, $p<0.0005$ for questions 13, 16 and 22).

Cognitive dimension of social capital:

Hypothesis 11

Individuals who report a high level of cognitive social capital (shared vision and goals) will display a positive attitude towards tacit knowledge sharing.

For hypothesis 11, there was a significant positive correlation between a high level of cognitive social capital and the individual's attitude towards tacit knowledge sharing ($r = 0.538$, $p<0.0005$ for questions 13, 16, 22, 5, 31 and 34).

Social capital:

Hypothesis 12

Individuals who report a high level of structural social capital (strong network ties and a high level of network resources), relational social capital (trust, shared norms and values) and cognitive social capital (shared vision and goals) will display a positive attitude towards tacit knowledge sharing.

For hypothesis 12, there was a significant positive correlation between the structural, relational and cognitive social capital dimensions and the individual's positive attitude towards tacit knowledge sharing ($r = 0.559$, p<0.0005 for questions 11, 12, 21, 7, 14, 33, 1, 6, 8, 17, 30, 32, 4, 10, 23, 35, 5, 31, 34, 13, 16 and 22).

‘Reasoned action’ - ‘Attitude towards tacit knowledge sharing’:

Hypothesis 13.

An individual’s positive attitude towards tacit knowledge sharing positively influences their intention to share tacit knowledge.

For hypothesis 13, there was a significant positive correlation between the individual’s attitude towards tacit knowledge sharing and their intention to share tacit knowledge ($r = 0.767$, $p<0.0005$ for questions 19, 25 and 28).

‘Reasoned action’ - ‘Perceived norms about tacit knowledge sharing’:

Hypothesis 14

An individual’s perceived norms about tacit knowledge sharing positively influences their intention to share tacit knowledge.

For hypothesis 14, there was a significant positive correlation for the individual’s perceived norms about tacit knowledge sharing and their intention to share tacit knowledge ($r = 0.459$, $p<0.0005$ for questions 3, 15 and 24), ($r = 0.384$, $p<0.0005$ for questions 3 and 15).

Hypothesis 15

An individual’s perceived norms about tacit knowledge sharing positively influences their attitude towards tacit knowledge sharing.

For hypothesis 15, there was a significant positive correlation between the individual’s perceived norms about tacit knowledge sharing and their attitude towards tacit knowledge sharing ($r = 0.469$, $p<0.0005$ for questions 3, 15 and 24), ($r = 0.370$, $p<0.0005$ for questions 3 and 15).

‘Reasoned action’ - ‘Perceived behavioural control’:

Hypothesis 16

An individual’s perceived behavioural control over tacit knowledge sharing positively influences their intention to share tacit knowledge.

For hypothesis 16, there was a significant positive correlation between an individual’s perceived behavioural control over tacit knowledge sharing and their intention to share tacit knowledge ($r = 0.570$, $p<0.0005$ for questions 2, 20, 27 and 9).

‘Reasoned action’:

Hypothesis 17

The greater the individual’s attitude towards tacit knowledge sharing, their perceived norms about tacit knowledge sharing and their perceived behavioural control over tacit knowledge sharing behaviour, the greater will be their intention to share tacit knowledge.

For hypothesis 17, there was a significant positive correlation between the individual’s attitude towards tacit knowledge sharing, their perceived norms about tacit knowledge sharing and their perceived behavioural control over tacit knowledge sharing behaviour and their intention to share tacit knowledge ($r = 0.723$, $p<0.0005$ for questions 19, 25, 28, 3, 15, 24, 2, 20 and 27).

6.5 Average scores of measurement constructs - (a) and (b)

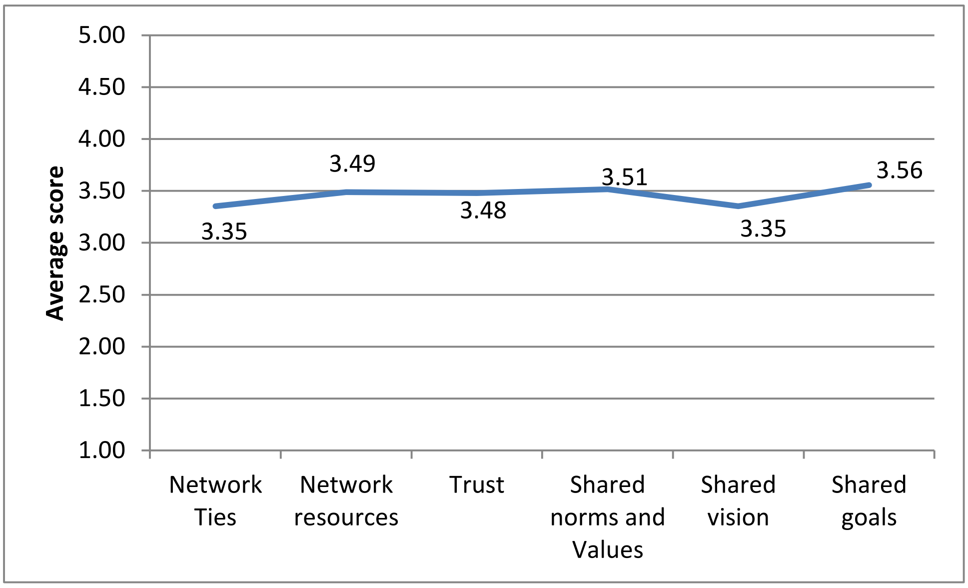

Figure 6.16 Average scores for measurement constructs (a)

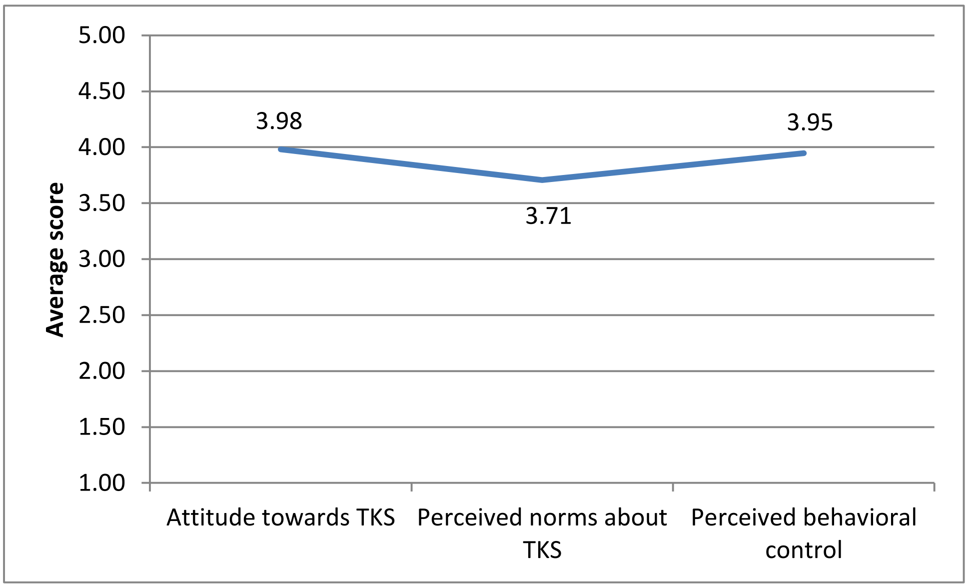

Figure 6.17 Average scores for measurement constructs (b)

Figure 6.16 and Figure 6.17 represent the average scores for the measurement constructs. The individual's attitude towards tacit knowledge sharing registered the highest average score with network ties and shared vision registering the lowest average score.

6.6 Qualitative analysis

The qualitative interviews were thematically analysed and Table 6.7 reflects the frequency of participant's responses to specific themes. Below follows a brief discussion of the qualitative research findings.

Sharing of tacit knowledge

The general sentiment expressed by the majority of respondents was that they did share information and generally found it beneficial or useful. Most sharing of the sharing of tacit knowledge was conducted with staff members that were in close proximity to one another. In addition, respondents relied a lot on electronic communication via e-mail.

The type of knowledge that was shared was work-related (six responses). Five respondents reported that knowledge sharing led to specific actions or changed behaviour. It was found that although the knowledge sharing led to changed behaviour (five responses) it did not change the individual's attitude (four responses). Some of the respondent's individual responses to the sharing of tacit knowledge are documented below:

> "the more I can share, the better it is, the easier it is".

> "Also, to do with Web CT. It's a huge learning curve for all of us and it's developing all the time - so as we develop …development happens, so the knowledge is shared with me on how to work on it, how to work further on it, how to sort out problems, where we didn't know how to do it before, so it's part of the development of the program".

> "It was a learning experience, and it helped formulate, for me, some framework within which I can operate".

> "That's because I worked on other spaces where it's not a 'free space' in terms of you knowing, especially if you are new in the space, and you are a lot younger and a certain race (black), it is not easy, you are not supposed to be intelligent enough to contribute something, you should just do as you are told".

Network ties

Most of the respondents built network ties with colleagues generally within their own departments and utilized their network ties for sharing information, knowledge and resources. With regard to network ties, the following comments were made by respondents:

> "You've got to make connections and you've got to formulate your little network, your social circles, even if its within your own department and I find across departments as well…I find it good to be able to liaise with people and to make,… to build relationships, so that it is beneficial for me to do that cause it does help in the work situation, it helps with so many different areas of one's job, because knowledge is shared a lot through relationships".

A further finding with regard to network ties was that a large proportion of the respondents tended to share information with colleagues that they had worked with for a long time (five to nine years) as opposed to recently employed colleagues.

One participant confided that:

> “the longer you know somebody, the more you build your relationship and the more you share”.

The responses revealed that respondents were less likely to share information with recently employed colleagues and part time colleagues.

Respondents expressed a need for the appropriate environment and the right context for the sharing of tacit knowledge (i.e., meetings) but many expressed the view that a great deal of their tacit knowledge was obtained in informal corridor meetings.

Trust

Half of the respondents reported that they trusted their colleagues in their own department. An interesting finding was that more than half of the sample had performed favours for colleagues and yet there was a lack of agreement in their responses that colleagues were close friends.

Norms and values

Respondents generally tended to share more tacit knowledge with colleagues who had similar norms values to them (five responses).

Vision and goals

Similar vision and goals was less important to respondents than shared norms and values.

Race

Respondents appeared guarded or confused with regard to race issues and the sharing of tacit knowledge. They were evasive or attempted to answer in politically correct ways.

One respondent expressed the view that:

> "we have got quite a mixed culture base within our department and I think it's fascinating, sometimes, to see if from a different point of view and you do change your thinking".

Barriers to the sharing of tacit knowledge

Respondents tended to find it easier to list the barriers to knowledge sharing than to list the benefits of knowledge sharing. The main barrier to the sharing of tacit knowledge was power dynamics and political cliques, which were very prevalent in the University of Technology (eight responses). The second strongest barrier was that respondents did not receive any credit or acknowledgement for the sharing of their tacit knowledge (five responses). The third strongest barrier was related to the personality of colleagues (four responses) and the fear of humiliation (four responses). The following viewpoints were expressed with regard to the barriers for tacit knowledge sharing:

> "They have done the work and they don't want give away their work - might be lack of some confidence and they are scared that the next person might laugh at it".

> "They've done the research, where you have a new part-time person coming in and a person will know that that person is going to be there for just a little while, people will tend to not communicate with them very much because there is no point, because they are going to be here for a little while - but if you know somebody has been here for ten years and you know they are going to be here for the next ten years, you will invest in sharing information with them"

"It's a personality type, possibly, who want to cling on their own things because they feel they've put the effort and time into developing their material, therefore, it's almost like a selfish thing. Well, I did it. I spent time doing it, therefore, I don't want others to benefit from my expertise and time".

Benefits of sharing tacit knowledge

The major benefit of the sharing of tacit knowledge related to increased learning and the development of people (four responses). A secondary benefit was an improved relationship with colleagues (three responses).

Table 6.7 Coding summary for open-ended comments

Category	Sub-category	Frequency
Information shared with:	HOD/supervisor.	4
	Ex students/students.	2
	Professional Associations.	1
	Industry.	1
	Faculty boards.	1
	Colleagues.	8
	Colleagues who reciprocated.	1
Network ties	Shared with contacts within department.	6
Norms and values-Information shared with colleagues who had:	Similar norms and values.	5
	Religious beliefs.	1
	Work ethics.	3
	Goals.	1
	Vision.	1
	Culture.	3
Barriers to sharing knowledge	Personality type.	4
	Insecurity.	2
	Fear of humiliation/scared, defensiveness.	4

	Fear of losing job/work.	2
	Too busy/ no time to share/slows the process.	3
	Ideas don’t get acknowledged/no credit/not appreciated/ information not highly regarded.	5
	Power dynamics/political cliques.	8
	Self-recognized status.	1
	Poor self esteem.	1
Benefits of sharing knowledge	Improved relationship with colleagues.	3
	Teamwork.	1
	Learning experience/Development of people.	4
	Cognitive reflection.	2
Trust	Trusted colleagues in department.	4
	Trusted some colleagues.	3
	Trusted no-one.	2
	Performed favours for people in department.	4
	Found people were untrustworthy-fraudulent behavior.	1

6.7 Study model - SEM results for structural model

6.7.1 Study model - Path diagram

Figure 6.18 depicts the hypothesized, study, measurement model with standardized coefficients.

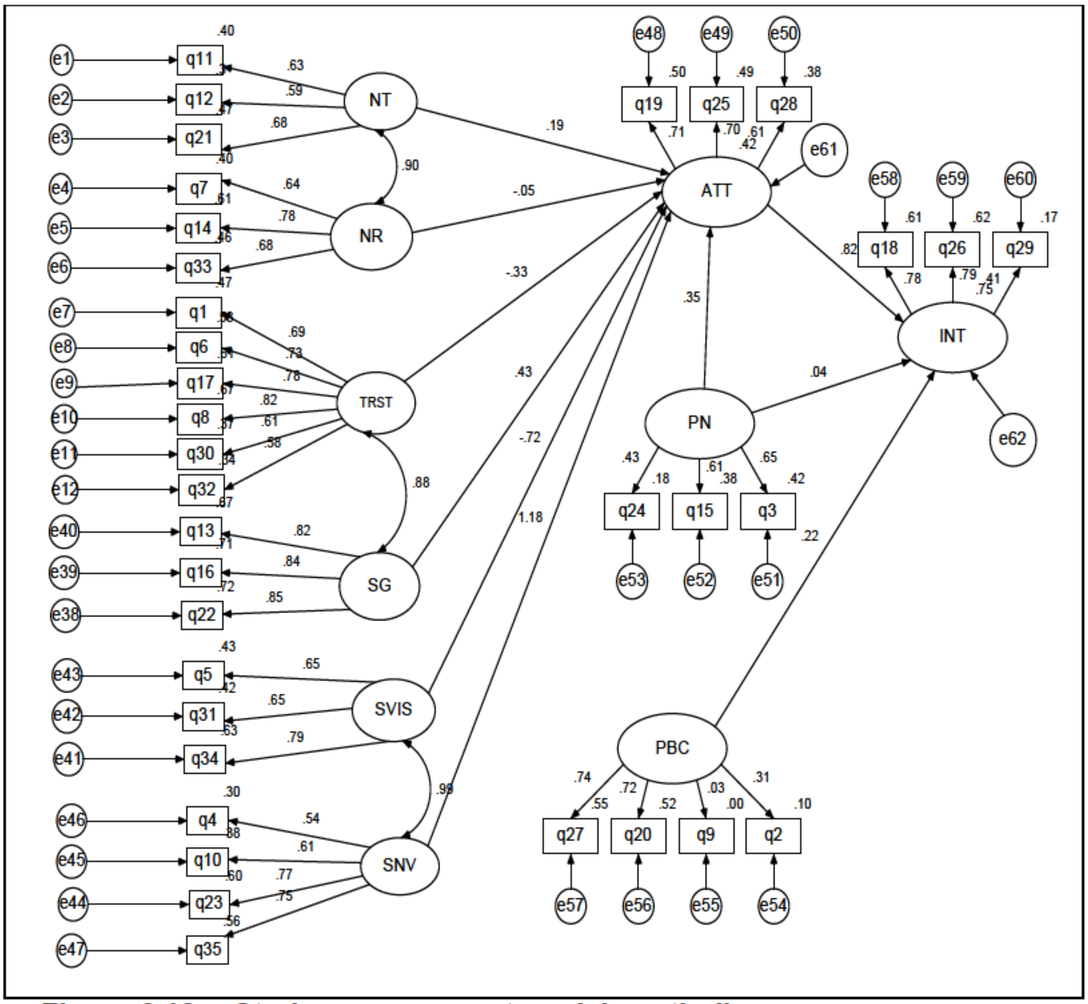

Figure 6.18 Study measurement model - path diagram.

6.7.2 Study model - Structural model fit indices

The model fit indices for the study model are provided in tabular form below:

CMIN

CMIN/DF should be between 2 and 3 for an acceptable fit and <2 for a good fit.

The ratio of χ^2 (3880.5) to the degrees of freedom (547) was 7.094 (Table 6.8).

Since this value is >3, it indicates that the data does not fit the model globally.

However, this statistic does suffer from limitations and a non-significant value may be unlikely even though the model may be a close fit to the data (Weston and Gore 2006: 742).

Table 6.8 Study Model - CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	118	3880.543	547	.000	7.094

CFI

CFI should be>.9 for an acceptable fit and >.95 for a good fit.

The comparative fit index (CFI) was 0.675 (Table 6.9).

Table 6.9 Study Model - CFI

Model	NFI	RFI	IFI	TLI	CFI
Default model	.642	.611	.676	.646	.675

RMSEA

RMSEA should be <.10 for a good fit and <.05 for a very good fit.

The root mean square residual of approximation (RMSEA) was 0.105 (.102; .108. p = .005), (Table 6.10).

Table 6.10 - Study Model - RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.105	.102	.108	.000

These fit indices indicate that there was a poor fit. In addition, there was a standardized value >1 on the path from SNV to ATT. This can be valid sometimes but usually indicates a problem.

The poor fit was possibly due to the complexity of the model and due to the occurrence of improper estimates (i.e., the presence of Haywood cases). In addition, due to the sensitivity of SEM statistical analysis, the different constructs were not distinct enough, variables from one construct appeared to be closely related with another construct.

SEM analysis of the initial proposed model revealed a close correlation between 'network ties' and 'network resources' (0.896), between 'trust' and 'shared goals' (0.882) and between 'shared norms and values' and 'shared vision' (0.991), which were not correlated in the hypothesized study model.

The inter-relationship between the social capital measurement constructs were not studied in this research, although it is accepted that they may be highly inter-related.

It is widely accepted that structural, relational and cognitive dimensions of social capital are complementary. Many empirical studies such as Krishna and Uphoff (1999: 1) and Isham and Kähkönen (1999: 155) summarize that structural and cognitive social capital respectively facilitates and supports mutually beneficial collective action.

Based upon the SEM analysis of the initial measurement model, a decision was taken to drop some questions, in order to achieve a higher Cronbach Alpha value (greater reliability). The questions that were dropped were the following:

- Structural dimension - question 21 (standardised regression weight - .696, reliability - .48),
- Perceived norms - question 24 (standardised regression weight - .460, reliability - .20),
- Perceived behavioural control - question 9 (standardised regression weight - .012, reliability - .00), question 2 (standardised regression weight - .315, reliability - .10) and
- Intention to share tacit knowledge - question 29 (standardised regression weight - .443, reliability - .20).

The poor relationship between 'perceived behavioural control' and the individual's intention to share tacit knowledge warrants some discussion here. Fishbein and Ajzen (2010: 153) comment that "as a possible explanation of behaviour, the construct of control rivals the attitude construct in popularity". This study found that the explanatory powers of the 'attitude' measurement construct were far superior to the powers of the measurement construct of 'perceived behavioural control'.

Fishbein and Ajzen (2010: 159) combine self-efficacy (termed 'perceived capacity' by Fishbein and Ajzen (2010: 166) and control (termed 'perceived autonomy' by Fishbein and Ajzen (2010: 166) into one measurement construct termed 'perceived behavioural control'. Several investigators (Armitage and Conner 1999: 1375; 2001: 47; Terry and O' Leary: 1995: 199; Manstead and van Eekelen 1998: 1375) have questioned the unitary conception of perceived behavioural control and have argued that there are important differences between self-efficacy expectations and perceived control. In line with current theory, this study incorporated two 'perceived capacity' questions (question 27 and question 20) and two 'perceived autonomy' questions (question 9 and question 2) in the 'perceived behavioural control measurement' construct. Each of these questions had been validated in many studies (Armitage, Conner, Loach and Willets 1999: 301; Armitage and Conner 2001: 480; Bock et al., 2005: 34; Fishbein and Ajzen 2010: 155; Lin and Lee 2007: 125; Yang and Farn 2009: 217).

This study's results revealed that the 'perceived behavioural control' questions (question 27, 20, 9, 2) had a low internal consistency (Alpha Coefficient -.471). The perceived autonomy questions (question 9, 2) had an almost acceptable Alpha Coefficient of .683. This finding is in line with other studies findings. Specifically, Fishbein and Ajzen (2010: 167) report that a meta-analysis of ninety studies that used multi-item scales to assess perceived behavioural control reported the average Alpha Coefficient to be about .65.

A further finding was that there was a large discrepancy between the theoretical and the observed relations for the perceived autonomy questions (question 9 and 2) in the SEM analysis, which motivated the removal of the ‘perceived behavioural’ measurement construct from the study model. This finding is in line with Ajzen’s (1991: 206) finding that there “are still many issues that remain unsolved”.

This finding has been corroborated in a number of studies which have found that the theory of reasoned action displays acceptable correlations but when tested with SEM analysis, performs poorly.

According to Van den Putte and Hoogstraten (1997: 321) very few model fits are found in the literature with regard to the theory of reasoned action.

Boomsma (2000: 475) makes the comment that “changing one parameter most often triggers changes in many other parameters as well….a minor parameter change can have significant and often unpredictable effects in any part of the model”.

In line with Boomsma’s (2000: 475) comment, with regard to this study, it is believed that due to the sensitivity of SEM analysis, the high correlations between the social capital measurement constructs contributed towards low correlations between the social capital constructs and attitude in the study model.

In order to reduce the complexity of the initial model and remove the effect of inter-relationships between the social capital dimensions, it was decided that each social capital dimension should be tested individually. This it was hoped would remove the effect of the correlations between dimensions. An examination of the literature confirmed that this was theoretically possible.

In addition, the poor fit of the model was also attributed to the effects of ‘perceived behavioural control’ so ‘perceived behavioural control’ was not included in the revised models.

In addition, as the initial study SEM analysis revealed an association between perceived norms and the individual’s attitude towards tacit knowledge sharing (standardized regression weight - .520) which was not included in the initial hypothesized measurement model, this relationship was included in the revised set of models.

Thus, the findings discussed above gave rise to the development of a new set of models. Each developed model was defensible from a theoretical perspective and a potentially adequate fit to the data.

Cochran and Chambers (1965: 252) recommend that “when constructing a causal hypothesis one should envisage as many different consequences of its truth as possible, and plan observational studies to discover whether each of these consequences is found to hold”.

Thus, the following set of theoretically credible model’s were produced:

- Structural dimension of social capital (incorporating ‘network ties’, ‘network resources’, ‘attitude towards tacit knowledge sharing’, ‘perceived norms about tacit knowledge sharing’ and the individual’s ‘intention to share tacit knowledge’).
- Relational dimension of social capital (incorporating ‘trust’, and ‘shared norms and values’, ‘attitude towards tacit knowledge sharing’, ‘perceived norms about tacit knowledge sharing’ and the individual’s ‘intention to share tacit knowledge’). Within this dimension, individual models of ‘trust’ and ‘shared norms and values’ were also tested.
- Cognitive dimension of social capital (incorporating ‘shared vision’, ‘shared goals’, ‘attitude towards tacit knowledge

sharing', 'perceived norms about tacit knowledge sharing' and the individual's 'intention to share tacit knowledge').

- Social capital ('network ties', 'network resources', 'trust', 'shared norms', 'shared values', 'shared vision', 'shared goals' and the individual's 'attitude towards tacit knowledge sharing').
- 'Reasoned action' (incorporating 'attitude towards tacit knowledge sharing', 'perceived norms about tacit knowledge sharing' and the individual's 'intention to share tacit knowledge').

The SEM results of these revised set of models are presented in the following sections.

6.8 Structural dimension - SEM Results for structural model

6.8.1 Structural dimension - Path diagram

The structural model, path diagram with standardized coefficients for the structural dimension of social capital is represented in Figure 6.19.

6.8.2 Structural dimension - Structural model fit indices

The model fit indices for the structural model of the structural dimension are provided in tabular form below Figure 6.19:

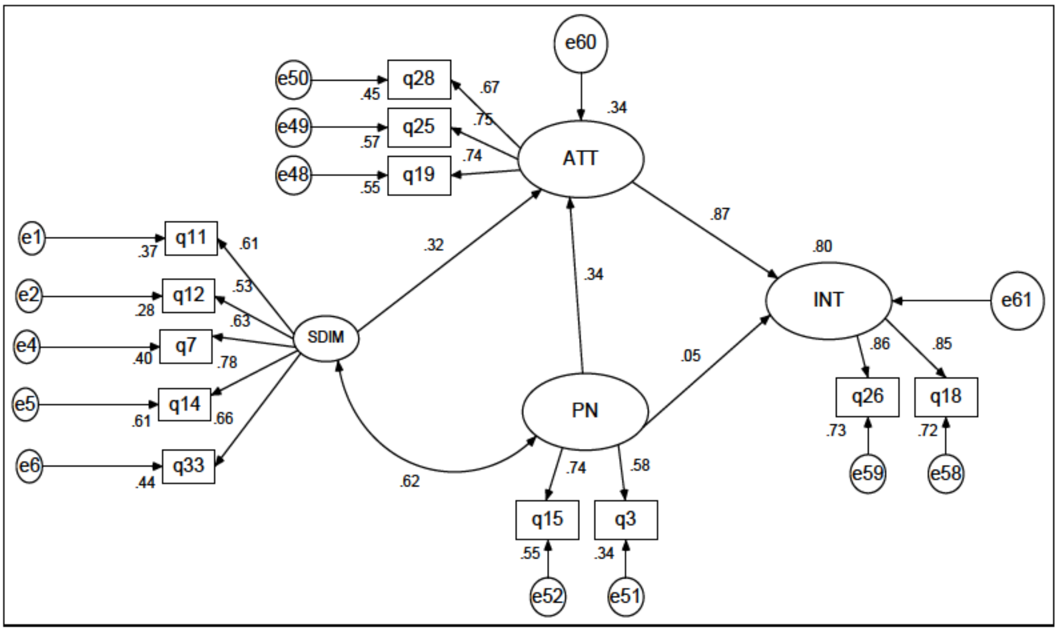

Figure 6.19 Structural dimension - Path diagram

CMIN

CMIN/DF should be between 2 and 3 for an acceptable fit and <2 for a good fit.

The CMIN fit indices for the structural dimension model are:

The ratio of χ^2 (170.2) to the degrees of freedom (49) was 3.475.

Since this value is >3, it indicates that the data does not fit the model globally.

However, this statistic does suffer from limitations and a non-significant value may be unlikely even though the model may be a close fit to the data (Weston and Gore 2006: 742).

Table 6.11 Structural dimension - CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	41	170.268	49	.000	3.475

CFI

CFI should be>.9 for an acceptable fit and >.95 for a good fit.

The comparative fit index (CFI) was 0.95.

Table 6.12 Structural dimension - CFI

Model	NFI	RFI	IFI	TLI	CFI
Default model	.931	.908	.950	.932	.950

RMSEA

RMSEA should be <.10 for a good fit and <.05 for a very good fit.

The root mean square residual of approximation (RMSEA) was .067 (.056; .078. p = .005).

Table 6.13 Structural Dimension - RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.067	.056	.078	.006

These fit indices indicate that there is a good fit for the structural dimension model.

6.8.3 Structural dimension - Reliability

Table 6.14 reflects the estimated factor loadings and reliability for the structural model of the structural dimension of social capital.

The estimated standardised regression weights reflect the validity of each observed variable as a measure of the latent variable. Ideally, these should be at least 0.5. The figures listed in Table 6.14 are all good. These loadings are all significantly different from zero at the 0.001 level.

The estimated correlations between latent variables are all positive.

Reliability is calculated as estimate. The reliability of each observed

variable, as a measure of the latent variable, ranged from .28 to .73.

Table 6.14 Structural dimension - Reliability

Factor/Variable		Standardized Regression Weights	Reliability
SDIM	q11	.610*	.37
	q12	.525*	.28
	q7	.634*	.40
	q14	.784*	.61
	q33	.664*	.44
ATT	q28	.673*	.45
	q25	.754*	.57
	q19	.745*	.55
INT	q26	.855*	.73
	q18	.847*	.72
PN	q15	.744*	.55
	q3	.584*	.34

* Statistically significant at α = 0.01

6.8.4 Structural dimension - Factor correlations

Table 6.15 presents the factor correlations for the structural dimension. All of the measurement constructs significantly correlated with highest correlation being between the individual's attitude towards tacit knowledge sharing and their intention to share tacit knowledge (.893), (Appendix D4 - Table D4.28).

Table 6.15 Structural dimension - Factor correlations

	SDIM	PN	ATT	INT
SDIM	1.000			
PN	.621	1.000		
ATT	.525	.532	1.000	
INT	.486	.512	.893	1.000

6.8.5 Structural dimension - Causal effects

Table 6.16 represents the estimated, standardized causal effects for the structural dimension of social capital

SDIM had a total causal effect on ATT (.316) and PN had a total causal effect on ATT (.336). This, in both cases, was entirely a direct effect. SDIM had no direct effect on INT (.000) but there was an indirect effect of .274.

PN had a non-significant (.051) direct effect on INT. Most of the total effect of PN on INT was contributed to an indirect effect (.291).

ATT (.866) had the largest total causal effect on INT which was due to an entirely direct effect.

Table 6.16 Structural dimension - Causal effects

Outcome	Determinant	Causal Effects		
		Direct	Indirect	Total
ATT	SDIM	.316*	.000	.316*
	PN	.336*	.000	.336*
INT	SDIM	.000	.274*	.274*
	PN	.051	.291*	.342*
	ATT	.866*	.000	.866

* Statistically significant at $\alpha = 0.01$

Table 6.17 presents the hypotheses for the structural dimension with their corresponding causal effects.
A total of four hypotheses were developed in order to test the relationship between the structural dimension of social capital and the individual's intention to share tacit knowledge (Table 4.1).

Hypothesis 3, 13 and 15 were confirmed/accepted in the structural dimension, SEM analysis.

Hypothesis 14 was not confirmed/accepted in the structural dimension SEM analysis.

Table 6.17 Structural dimensions - Hypotheses and causal effects

Dimension	Measurement Construct	Hypothesis	Causal Effect
Social Capital	Structural Dimension	3. Individuals who report a high level of structural social capital (strong social interaction network ties and a high level of network resources), will display a positive attitude towards tacit knowledge sharing.	.316*
'Reasoned Action' Mediating Variables	Attitude towards Tacit Knowledge Sharing	13. An individual's positive attitude towards tacit knowledge sharing positively influences their intention to share tacit knowledge.	.866*
	Perceived Norms about Tacit Knowledge Sharing	14. An individual's perceived norm's about tacit knowledge sharing positively influences their intention to share tacit knowledge.	.051
	Norms about Tacit Knowledge Sharing	15. An individual's perceived norms about tacit knowledge sharing positively influence their attitude towards tacit knowledge sharing.	.336*

* Statistically significant at $\alpha = 0.01$

Figure 6.20 represents the estimated, standardized direct effects for the structural dimension of social capital (Table 6.16).

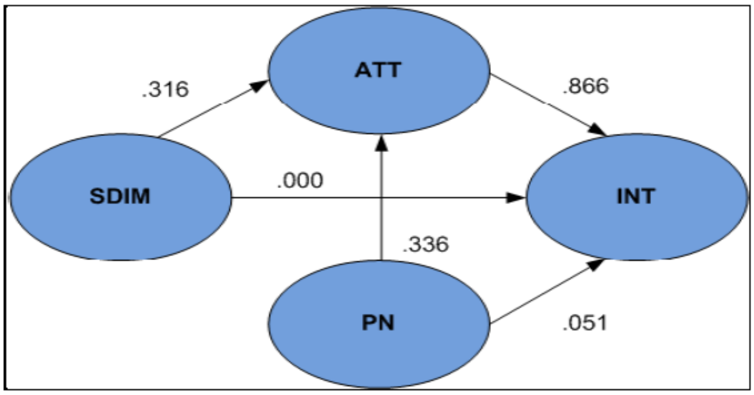

Figure 6.20 Structural dimension - Direct causal effects

The total causal effect, direct causal effects and indirect causal effects for each measurement item (i.e., questions) for each social capital dimension are presented in the Appendices.

6.9 Relational dimension -SEM results for structural model

6.9.1 Relational dimension - Path diagram

The structural model, path diagram with standardized coefficients for the relational dimension of social capital is represented in Figure 6.21.

3 paths were added as a modification - between question 30 and question 32, between question 28 and question 25 and between RDIM and PN. This led to a significant improvement in the model fit for the relational dimension: chi-square = 486.708 - 330.992; df = 115 - 112 = 3; $p < .001$.

6.9.2 Relational dimension - Structural model fit indices

CMIN

CMIN/DF should be between 2 and 3 for an acceptable fit and <2 for a good fit.

The ratio of χ^2 (330.9) to the degrees of freedom (112) was 2.955 (Appendix D5 - Table D5.1).

Since this value is <3, it indicates that the data fits the model globally.

Table 6.18 Relational dimension - CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	58	330.992	112	.000	2.955

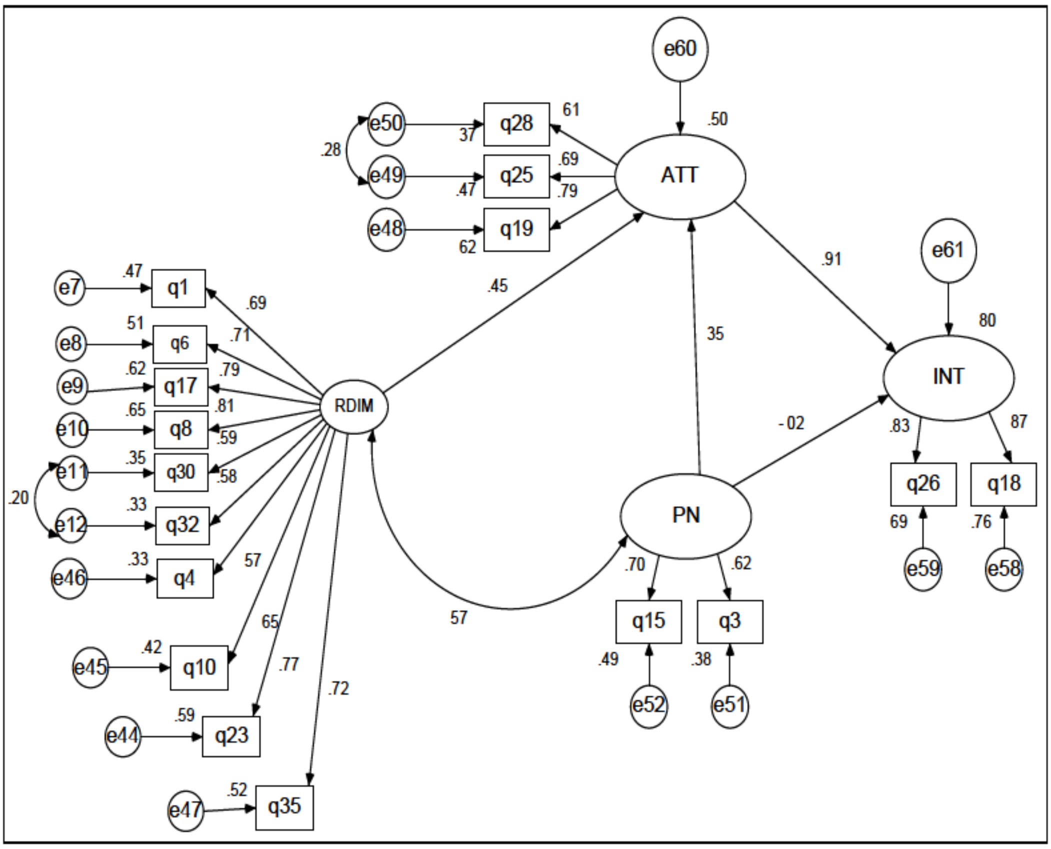

Figure 6.21 Relational dimension - Path diagram

CFI

CFI should be>.9 for an acceptable fit and >.95 for a good fit.

The comparative fit index (CFI) was 0.950 (Appendix D5 - Table D5.2).

Table 6.19 Relational Dimension - CFI

Model	NFI	RFI	IFI	TLI	CFI
Default model	.926	.910	.950	.939	.950

RMSEA

RMSEA should be <.10 for a good fit and <.05 for a very good fit.

The root mean square residual of approximation (RMSEA) was 0.059 (.052; .067. p = .005), (Appendix D5 - Table D5.3).

Table 6.20 Relational Dimension - RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.059	.052	.067	.018

These fit indices above indicate that there is a good fit for the relational dimension model.

6.9.3 Relational Dimension - Reliability

Table 6.21 reflects the estimated standardized factor loadings and reliability for the structural model for the relational dimension of social capital.

The estimated standardised regression weights reflect the validity of each observed variable as a measure of the latent variable. Ideally, these should be at least 0.5. The figures listed above are all good. These loadings are all significantly different from zero at the 0.001 level.

The estimated correlations between latent variables are all positive.

Reliability is calculated as estimate. The reliability of each observed variable, as a measure of the latent variable, ranged from .33 to .76.

Table 6.21 Relational dimension - Reliability

Factor/Variable		Standardized Regression Weights	Reliability
RDIM	q1	.688*	.47
	q6_recoded	.714*	.51
	q17	.790*	.62
	q8	.807*	.65
	q30_recoded	.591*	.35

	q32	.577*	.33
	q4	.572*	.33
	q10	.649*	.42
	q23	.767*	.59
	q35	.720*	.52
ATT	q28	.606*	.37
	q25	.689*	.47
	q19	.790*	.62
PN	q15	.701*	.49
	q3	.617*	.38
INT	q26	.833*	.69
	q18	.870*	.76

* Statistically significant at α =0. 01

6.9.4 Relational dimension - Factor correlations

Table 6.22 represents that factor correlations for the relational dimension of social capital (Appendix D5 - Table D5.15).

All of the measurement constructs significantly correlated with the highest correlation being between the individual's attitude towards tacit knowledge sharing and their intention to share tacit knowledge (.895).

Table 6.22 Relational dimension - Factor correlations

	RDIM	PN	ATT	INT
RDIM	1.000			
PN	.566	1.000		
ATT	.649	.602	1.000	
INT	.577	.527	.895	1.000

6.9.5 Relational dimension - Causal effects

Table 6.23 below represents the causal effects for the relational dimension of social capital (Appendix D5 - Tables D5.30, D5.31 and D5.32).

RDIM had a total causal effect on ATT (.453.) and PN had a total causal effect on ATT (.346). This, in both cases, was entirely a direct effect.

RDIM had no direct effect on INT (.000) but there was an indirect effect on INT (.411).

PN had a non-significant, negative (-.019.) direct effect on INT. Most of the total effect of PN on INT was contributed to an indirect effect (.313).

ATT (.906) had the largest total causal effect on INT which was due to an entirely direct effect.

Table 6.23 Relational dimension - Causal effects

Outcome	Determinant	Causal Effects		
		Direct	Indirect	Total
ATT	RDIM	.453*	.000	.453*
	PN	.346*	.000	.346*
INT	RDIM	.000	.411*	.411*
	PN	-.019	.313*	.295*
	ATT	.906*	.000	.906*

* Statistically significant at α = 0.01

Table 6.24 represents the relational dimension measurement constructs, hypotheses and corresponding causal effects.

A total of four hypotheses were developed in order to test the relationship between the structural dimension of social capital and the individual's intention to share tacit knowledge.

Hypothesis 8, 13 and 15 were confirmed/accepted in the relational dimension SEM analysis.

Hypothesis 14 was not confirmed/accepted in the relational dimension SEM analysis.

Table 6.24 Relational dimension - Hypotheses and causal effects

Dimension	Measurement Construct	Hypothesis	Causal Effect
Social Capital	Relational Dimension	8. Individuals who report a high level of relational social capital (trust, shared values and norms) will display a positive attitude towards tacit knowledge sharing.	.453*
'Reasoned Action' Mediating Variables	Attitude towards Tacit Knowledge Sharing	13. An individual's positive attitude towards tacit knowledge sharing positively influences their intention to share tacit knowledge.	.906^
	Perceived Norms about Tacit Knowledge Sharing	14. An individual's perceived norms about tacit knowledge sharing positively influences their intention to share tacit knowledge.	-.09
	Norms about Tacit Knowledge Sharing	15. An individual's perceived norms about tacit knowledge sharing positively influence their attitude towards tacit knowledge sharing.	.346*

* Statistically significant at α = 0.01

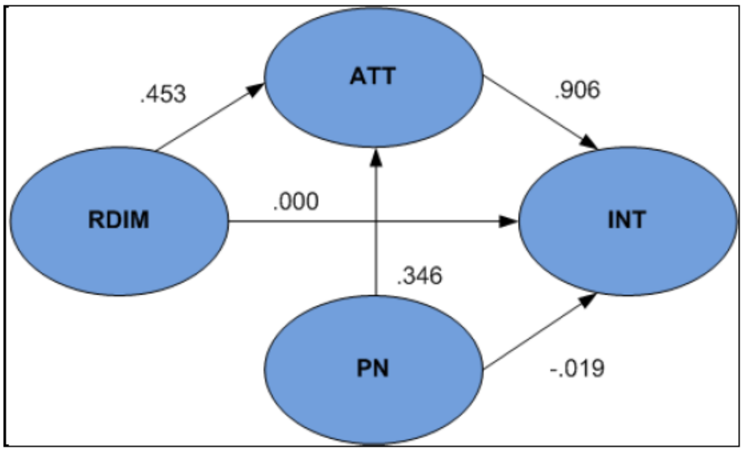

Figure 6.22 Relational dimension - Direct causal effects

Figure 6.22 represents the estimated, standardized direct effects for the relational dimension of social capital.

6.10 Trust - SEM results for structural model

The trust structural model was re-specified by inserting a double headed arrow from PN to TRST.

6.10.1 Trust - Path diagram

The path diagram for trust with standardized coefficients is presented in Figure 6.23.

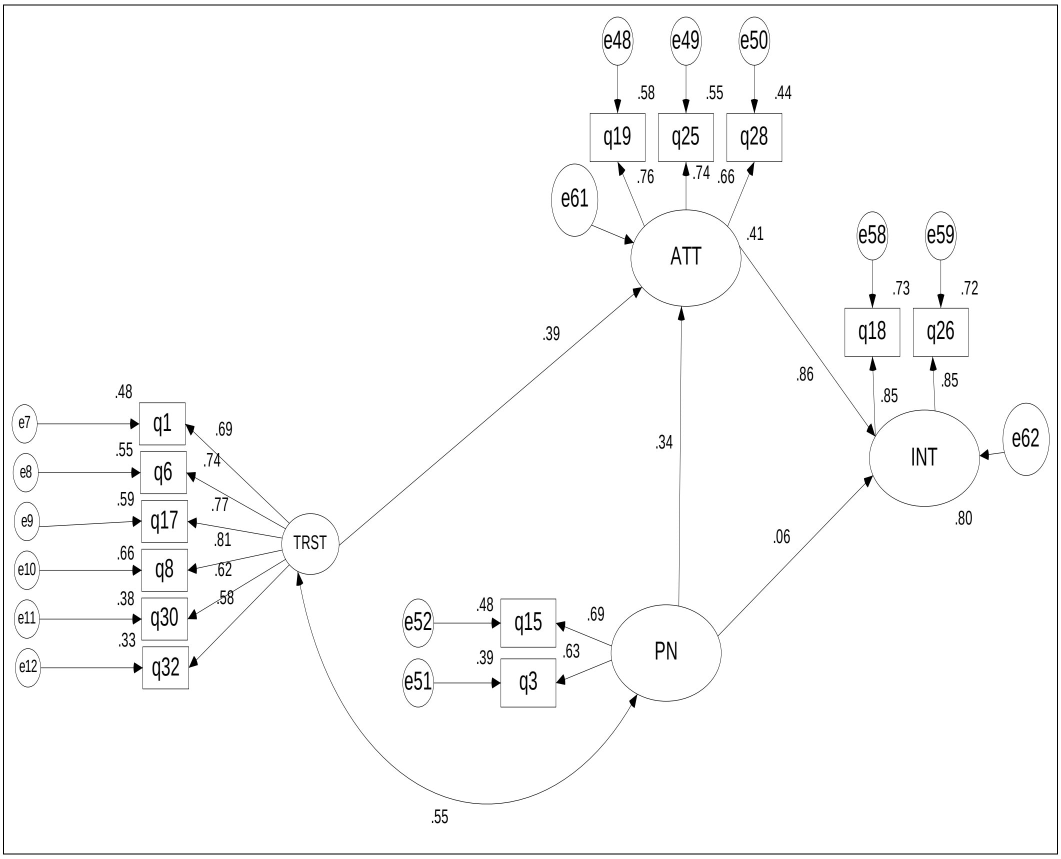

Figure 6.23 Trust - Path diagram

6.10.2 Trust - Structural model fit indices

The model fit indices for the trust model are provided in tabular form below:

CMIN

CMIN/DF should be between 2 and 3 for an acceptable fit and <2 for a good fit.

CMIN-the ratio of χ^2 (234.0) to the degrees of freedom (60) was 3.901. Since this value is >3, it indicates that the data does not fit the model globally.

However, this statistic does suffer from limitations and a non-significant value may be unlikely even though the model may be a close fit to the data (Weston and Gore 2006: 742).

Table 6.25 Trust - CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	44	234.075	60	.000	3.901

CFI

CFI should be>.9 for an acceptable fit and >.95 for a good fit.

The comparative fit index (CFI) was 0.943

Table 6.26 Trust - CFI

Model	NFI	RFI	IFI	TLI	CFI
Default model	.925	.903	.943	.926	.943

RMSEA

RMSEA should be <.10 for a good fit and <.05 for a very good fit.

The root mean square residual of approximation (RMSEA) was 0.072 (.063; .082. p = .005).

Table 6.27 Trust - RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.072	.063	.082	.000

These fit indices indicate that there is an acceptable fit for the trust model.

6.10.3 Trust - Reliability

Table 6.28 reflects the estimated standardized factor loadings and reliability for the trust structural model (Appendix D6 - Table D6.26).

The estimated standardised regression weights reflect the validity of each observed variable as a measure of the latent variable. Ideally, these should be at least 0.5. The figures listed above are all good. These loadings are all significantly different from zero at the 0.001 level.

The estimated correlations between latent variables are all positive.

Reliability is calculated as estimate. The reliability of each observed variable, as a measure of the latent variable, ranged from .33 to .73.

Table 6.28 Trust - Reliability

Factor/Variable		Standardized Loading	Reliability
TRST	q1	.689*	.48
	q6_recoded	.742*	.55
	q17	.766*	.59
	q8	.813*	.66
	q30_recoded	.620*	.38
	q32	.578*	.33
ATT	q19	.759*	.58
	q25	.742*	.55

	q28	.663*	.44
PN	q15	.691*	.48
	q3	.628*	.39
INT	q18	.854*	.73
	q26	.848*	.72

* Statistically significant at α = 0.01

6.10.4 Trust - Factor correlations

Table 6.29 represents that factor correlations for the relational dimension of social capital (Appendix D6 - Table D6.35).

All of the measurement constructs significantly correlated with the highest correlation being between the individual's attitude towards tacit knowledge sharing and their intention to share tacit knowledge (.895).

Table 6.29 Trust - Factor correlations

	TRST	PN	ATT	INT
TRST	1.000			
PN	.545	1.000		
ATT	.571	.552	1.000	
INT	.525	.535	.895	1.000

6.10.5 Trust - Causal effects

Table 6.30 represents the estimated, standardized causal effects for trust.

TRST had a total causal effect on ATT (.385) and PN had a total causal effect on ATT (.342). This, in both cases, was entirely a direct effect.

TRST had no direct effect on INT (.000) but there was an indirect effect of (.332).

PN had a non-significant (.059) direct effect on INT. Most of the total effect of PN on INT was contributed to an indirect effect (.295).

ATT (.863) had the largest total causal effect on INT which was due to an entirely direct effect.

Table 6.30 Trust - Causal effects

Outcome	Determinant	Causal Effects		
		Direct	Indirect	Total
ATT	TRST	.385*	.000	.385*
	PN	.342*	.000	.342*
INT	TRST	.000	.332*	.332*
	PN	.059	.295*	.354*
	ATT	.863*	.000	.863*

* Statistically significant at $\alpha = 0.01$

A total of four hypotheses were developed in order to test the relationship between trust and the individual's intention to share tacit knowledge.

Table 6.31 presents the hypotheses with their causal effect.

Hypothesis 6, 13, 14 and 15 were confirmed/accepted in the structural dimension SEM analysis.

Table 6.31 Trust - Hypotheses and causal effects

Dimension	Measurement Construct	Hypothesis	Causal Effect
Social Capital Relational Dimension	Trust	6. Individuals who report trust towards their co-workers will display a positive attitude towards tacit knowledge sharing.	.385*
'Reasoned Action' Mediating Variables	Attitude towards Tacit Knowledge Sharing	13. An individual's positive attitude towards tacit knowledge sharing positively influences their intention to share tacit knowledge.	.863*
	Perceived Norms about Tacit Knowledge Sharing	14. An individual's perceived norm's about tacit knowledge sharing positively influences their intention to share tacit knowledge.	.344*

	Norms about Tacit Knowledge Sharing	15. An individual's perceived norms about tacit knowledge sharing positively influence their attitude towards tacit knowledge sharing.	.342*

Figure 6.24 represents the estimated, standardized direct causal effects for trust.

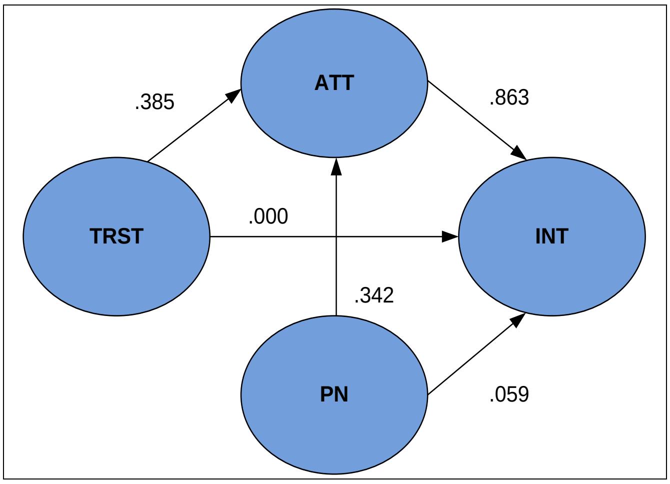

Figure 6.24 Trust - Direct causal effects

6.11 Shared norms and values - SEM results for structural model

6.11.1 Shared norms and values - Path diagram

The path diagram for shared norms and values with standardized coefficients is presented in Figure 6.25.

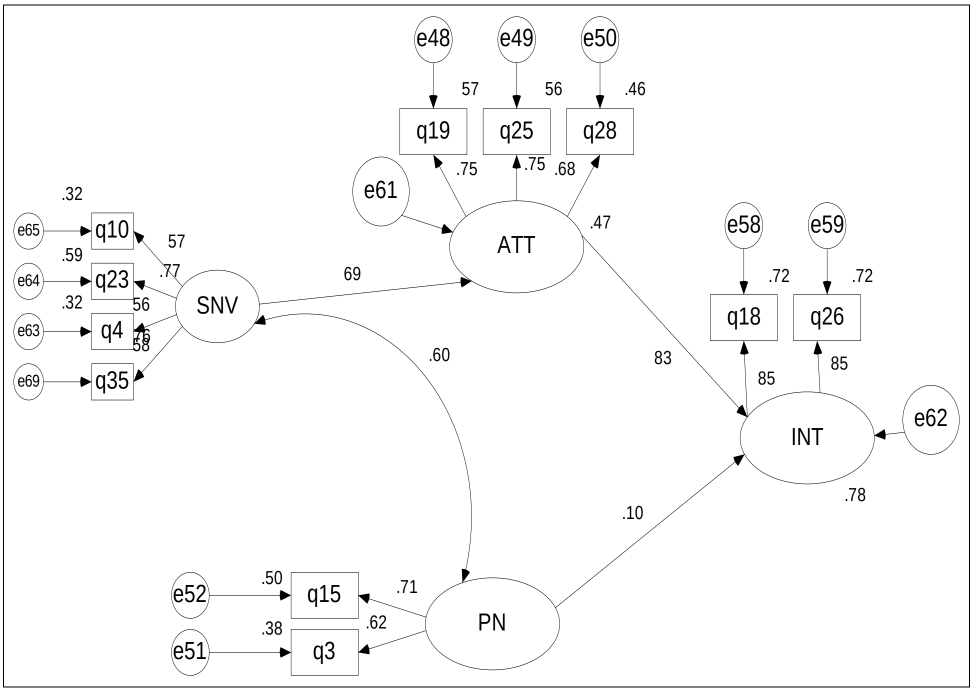

Figure 6.25 Shared Norms and Values - Path Diagram

6.11.2 Shared norms and values - Structural model fit indices

The model fit indices for the ‘shared norms and values’ model are provided in tabular form below:

CMIN

CMIN/DF should be between 2 and 3 for an acceptable fit and <2 for a good fit.

The ratio of χ^2 (173.5) to the degrees of freedom (40) was 4.340. Since this value is >3, it indicates that the data does not fit the model globally (Table 6.32).

However, this statistic does suffer from limitations and a non-significant value may be unlikely even though the model may be a close fit to the data (Weston and Gore 2006: 742).

Table 6.32 Shared Norms and Values - CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	37	173.593	40	.000	4.340

CFI

CFI should be>.9 for an acceptable fit and >.95 for a good fit.

The comparative fit index (CFI) was 0.943 (Table 6.33).

Table 6.33 Shared Norms and Values - CFI

Model	NFI	RFI	IFI	TLI	CFI
Default model	.928	.901	.943	.922	.943

RMSEA

RMSEA should be <.10 for a good fit and <.05 for a very good fit.

The root mean square residual of approximation (RMSEA) was 0.78 (.066; 090 p = .005), (Table 6.34).

Table 6.34 Shared norms and values - RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.078	.066	.090	.000

These fit indices indicated that there was an acceptable fit for the 'shared norms and values' model.

6.11.3 Shared norms and values - Reliability

The estimated standardised regression weights reflect the validity of each observed variable as a measure of the latent variable. Ideally, these should be at least 0.5. The figures listed above are all good. These loadings are all significantly different from zero at the 0.001 level.

The estimated correlations between latent variables are all positive.

Reliability is calculated as estimate. The reliability of each observed variable, as a measure of the latent variable, ranged from .32 to .72.

Table 6.35 Shared norms and values - Reliability

Factor/Variable		Standardized Regression Weights	Reliability
SNV	q10	.569	.32
	q23	.771	.59
	q4	.563	.32
	q35	.759	.58
ATT	q19	.753	.57
	q25	.752	.56
	q28	.679	.46
PN	q15	.710	.50
	q3	.616	.38
INT	q18	.850	.72
	q26	.851	.72

* Statistically significant at α =.01

6.11.4 Shared norms and values - Factor correlations

Table 6.36 represents that factor correlations for the relational dimension of social capital (Appendix D7 - Table D7.40).

All of the measurement constructs significantly correlated with the highest correlation being between the individual's attitude towards tacit knowledge sharing and their intention to share tacit knowledge (.686).

Table 6.36 Shared norms and values - Factor correlations

	PN	SNV	ATT	INT
PN	1.000			

SNV	.600	1.000		
ATT	.412	.686	1.000	
INT	.446	.634	.877	1.000

6.11.5 Shared norms and values - Causal effects

Table 6.37 represents the estimated, standardized causal effects for shared norms and values.

SNV had a total causal effect on ATT (.686). This was entirely a direct effect.

PN had no effect on ATT (.000) but had a small direct effect on INT (.103).

SNV had causal effect on INT (.572). This was an entirely indirect effect (.572).

ATT (.835) had the largest total causal effect on INT which was due to an entirely direct effect.

Table 6.37 Shared norms and values - Causal effects

Outcome	Determinant	Causal Effects		
		Direct	Indirect	Total
ATT	SNV	.686*	.000	.686*
	PN	.000*	.000	.000
INT	SNV	.000	.572*	.572*
	PN	.103	.000*	.103*
	ATT	.835*	.000	.835*

* Statistically significant at α = 0.01

Table 6.38 presents the hypotheses with their causal effects.

A total of four hypotheses developed in order to test the relationship between trust and the individual's intention to share tacit knowledge.

Hypothesis 7 and 13 were confirmed/accepted in the structural dimension SEM analysis.

Hypothesis 14 and 15 were not confirmed/accepted in the structural dimension, SEM analysis.

Table 6.38 Shared norms and values - Hypotheses and causal effects

Dimension	Measurement Construct	Hypothesis	Causal Effect
Social Capital	Shared Norms and Values	7. Individuals who report shared norms and values between themselves and their co-workers will display a positive attitude towards tacit knowledge sharing.	.686*
'Reasoned Action' Mediating Variables	Attitude towards Tacit Knowledge Sharing	13. An individual's positive attitude towards tacit knowledge sharing positively influences their intention to share tacit knowledge.	.835*
	Perceived Norms about Tacit Knowledge Sharing	14. An individual's perceived norms about tacit knowledge sharing positively influences their intention to share tacit knowledge.	.103
	Norms about Tacit Knowledge Sharing	15. An individual's perceived norms about tacit knowledge sharing positively influence their attitude towards tacit knowledge sharing.	.000

Figure 6.26 represents the estimated, standardized direct effects for shared norms and values (Table 6.37).

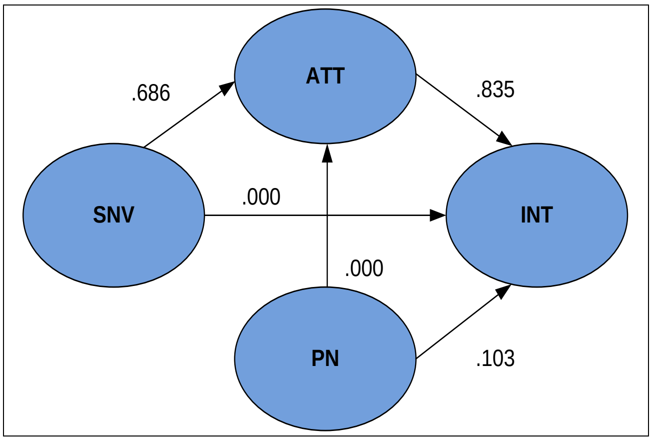

Figure 6.26 Shared norms and values - Direct causal effects

6.12 Cognitive dimension - SEM results for structural model

Below follows the SEM results for the cognitive dimension. This structural model was re-specified by adding a path from CDIM to PN and question 28 to question 25. As a result there was a significant improvement in the cognitive dimension structural model: CMIN went from 5.719 to 3.507, CFI went from .924 to .961 and RMSEA went from .092 to .067.

6.12.1 Cognitive dimension - Path diagram

Figure 6.27 represents the final structural model of the cognitive dimension of social capital.

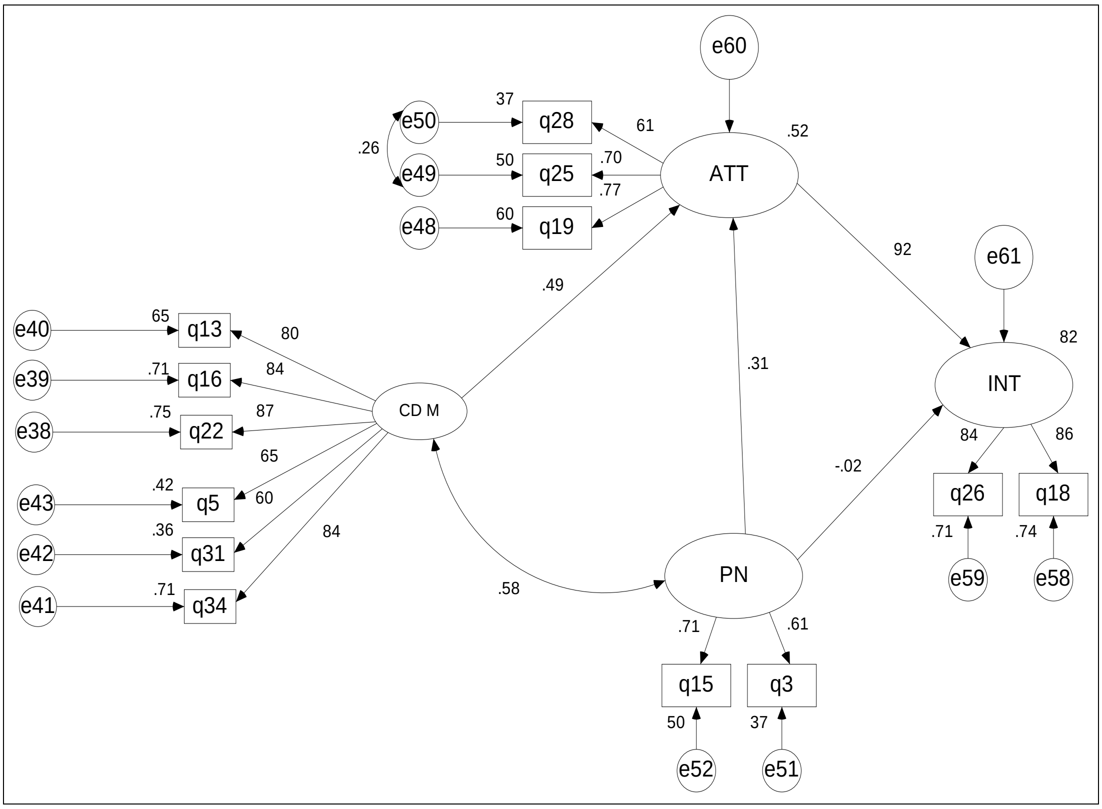

Figure 6.27 Cognitive dimension - Path diagram

6.12.2 Cognitive dimension - Structural model fit indices

The model fit indices for the cognitive dimension model are provided in tabular form below:

CMIN

CMIN/DF should be between 2 and 3 for an acceptable fit and <2 for a good fit.

The ratio of χ^2 (206.9) to the degrees of freedom (59) was 3.507. Since this value is >3, it indicates that the data does not fit the model globally.

However, this statistic does suffer from limitations and a non-significant value may be unlikely even though the model may be a close fit to the data (Weston and Gore 2006: 742).

Table 6.39 Cognitive dimension - CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	45	206.936	59	.000	3.507

CFI

CFI should be>.9 for an acceptable fit and >.95 for a good fit.

The comparative fit index (CFI) was 0.961.

Table 6.40 Cognitive dimension - CFI

Model	NFI	RFI	IFI	TLI	CFI
Default model	.946	.929	.961	.948	.961

RMSEA

RMSEA should be <.10 for a good fit and <.05 for a very good fit.

The root mean square residual of approximation (RMSEA) was 0.067 (.057; .077. p = .005).

Table 6.41 Cognitive dimension - RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.067	.057	.077	.002

These fit indices indicate that there is a good fit for the cognitive dimension model.

6.12.3 Cognitive dimension - Reliability

The estimated standardized factor loadings and the reliability of each measured variable is summarized in the Table 6.42.

The estimated standardised regression weights, reflect the validity of each observed variable as a measure of the latent variable. Ideally, these should be at least 0.5. The figures listed above are all good. These loadings are all significantly different from zero at the 0.001 level.

The estimated correlations between latent variables are all positive.

Reliability is calculated as estimate. The reliability of each observed variable, as a measure of the latent variable, ranged from .36 to .74.

Table 6.42 Cognitive dimension - Reliability

Factor/Variable		Standardized Regression Weights	Reliability
CDIM	q13	.805*	.65
	q16	.843*	.71
	q22	.866*	.75
	q5	.649*	.42
	q31_recoded	.599*	.36
	q34	.845*	.71
ATT	q28	.609*	.37
	q25	.704*	.50
	q19	.774*	.60
INT	q26	.840*	.71
I	q18	.863*	.74
PN	q15	.708*	.50
	q3	.612*	.37
	q3	.612*	.37

* Statistically significant at α = 0.01

6.12.4 Cognitive dimension - Factor correlations

The following table provides the factor correlations for the cognitive dimension.

Table 6.43 represents that factor correlations for the cognitive dimension of social capital (Appendix D8 - Table D8.35).

All of the measurement constructs significantly correlated with the highest correlation being between the individual's attitude towards tacit knowledge sharing and their intention to share tacit knowledge (.906).

Table 6.43 Cognitive dimension - Factor correlations

	CDIM	PN	ATT	INT
CDIM	1.000			
PN	.581	1.000		
ATT	.672	.596	1.000	
INT	.606	.528	.906	1.000

6.12.5 Cognitive dimension - Causal effects

Table 6.44 represents the estimated, standardized causal effects for the cognitive dimension of social capital.

CDIM had a total causal effect on ATT (.492). This was entirely a direct effect.

PN had a total effect on INT (.265) and it had direct effect on ATT (.311).

CDIM had indirect effect on INT (.451).

ATT (.918) had the largest total causal effect on INT which was due to an entirely direct effect.

Table 6.44 Cognitive dimension - Causal effects

Outcome	Determinant	Causal Effects		
		Direct	Indirect	Total
ATT	CDIM	.492*	.000	.492*
	PN	.311*	.000	.311

INT	CDIM	.000	.451*	.451*
	PN	-.020	.285*	.265*
	ATT	.918*	.000	.918*

* Statistically significant at α = 0.01

Table 6.45 represents the cognitive dimension measurement constructs, hypotheses and corresponding causal effects (Appendix D8 - Table D8.31, D8.32 and D8.33).

A total of four hypotheses were developed in order to test the relationship between the cognitive dimension of social capital and the individual's intention to share tacit knowledge.

Hypothesis 11, 13, 14 and 15 were confirmed in the cognitive dimension, SEM analysis.

Table 6.45 Cognitive dimension - Hypotheses and causal effects

Dimension	Measurement Construct	Hypothesis	Causal Effect
Social Capital	Cognitive dimension	11. Individuals who report a high level of cognitive social capital (shared vision and goals) will display a positive attitude towards tacit knowledge sharing	.492*
'Reasoned Action' Mediating Variables	Attitude towards Tacit Knowledge Sharing	13. An individual's positive attitude towards tacit knowledge sharing positively influences their intention to share tacit knowledge.	.918*
	Perceived Norms about Tacit Knowledge Sharing	14. An individual's perceived norms about tacit knowledge sharing positively influences their intention to share tacit knowledge.	.264*
	Norms about Tacit Knowledge Sharing	15. An individual's perceived norms about tacit knowledge sharing positively influence their attitude towards tacit knowledge sharing.	.311*

* Statistically significant at α = 0.01

Figure 6.28 represents the estimated, standardized direct causal effects for shared norms and values.

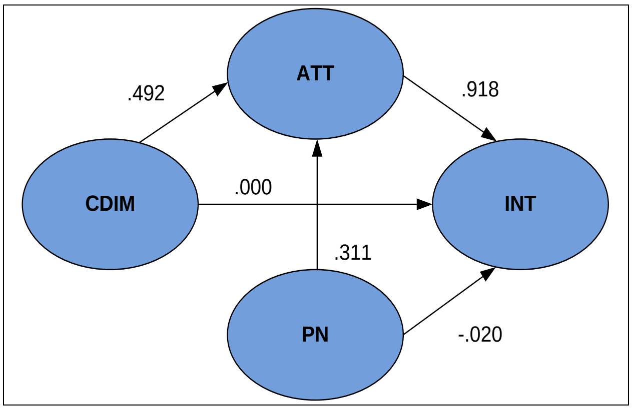

Figure 6.28 Cognitive dimension - Direct causal effects

6.13 Social capital - SEM results for structural model

6.13.1 Social capital - Path diagram

Figure 6.29 represents the path diagram for the structural model of social capital.

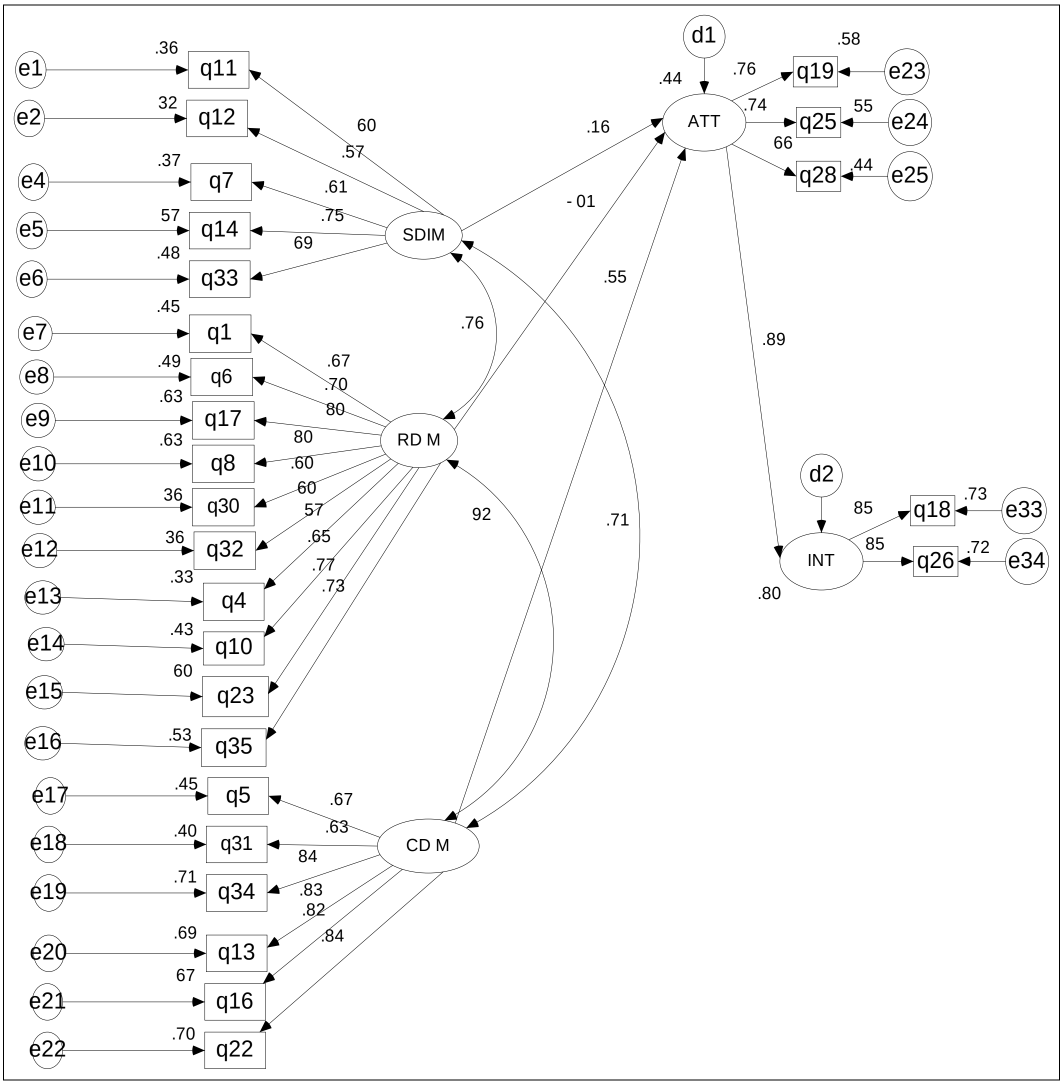

Figure 6.29 Social capital - Path diagram

6.13.2 Social capital - Structural model fit indices

The model fit indices for the social capital model are provided in tabular form below.

CMIN

CMIN/DF should be between 2 and 3 for an acceptable fit and <2 for a good fit.

The ratio of χ^2 (1024.3) to the degrees of freedom (292) is 3.508. Since this value is >3, it indicates that the data does not fit the model globally.

However, this statistic does suffer from limitations and a non-significant value may be unlikely even though the model may be a close fit to the data (Weston and Gore 2006: 742).

Table 6.46 Social Capital - CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	59	1024.312	292	.000	3.508

CFI

CFI should be>.9 for an acceptable fit and >.95 for a good fit.

The comparative fit index (CFI) was 0.910.

Table 6.47 Social Capital - CFI

Model	NFI	RFI	IFI	TLI	CFI
Default model	.879	.865	.910	.900	.910

RMSEA

RMSEA should be <.10 for a good fit and <.05 for a very good fit.

The root mean square residual of approximation (RMSEA) was 0.067 (.063; .072. p = .005).

Table 6.48 Social Capital - RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.067	.063	.072	.000

These fit indices indicate that there is an acceptable fit for the social capital model.

6.13.3 Social capital - Causal effects

Table 6.49 represents the estimated, standardized causal effects for social capital.

RDIM had a total causal effect on ATT (-.015). This was entirely a direct effect. In addition, RDIM had an indirect effect on intention

(-.013).

CDIM had a direct effect on ATT (.551) and had an indirect effect on INT (.451).

SDIM had a direct effect on ATT (.165).

ATT had a direct effect on intention (.894).

Table 6.49 Social capital - Causal effects

Outcome	Determinant	Causal Effects		
		Direct	Indirect	Total
ATT	RDIM	-.015	.000	-.015
	CDIM	.551*	.000	.551*
	SDIM	.165*	.000	.165*
INT	RDIM	.000	-.013	-.013*
	CDIM	.000	.493*	.493*
	SDIM	.000	.147*	.147*
	ATT	.894*	.000	.894*

* Statistically significant at α = 0.01

Table 6.50 represents the social capital measurement constructs, hypotheses and corresponding causal effects.

With regard to the social capital model, Hypothesis 3, 11 and 13 were confirmed/accepted. Hypothesis 15 was not confirmed/accepted.

Table 6.50 Social capital - Hypotheses and causal effects

Dimension	Measurement Construct	Hypothesis	Causal Effect
Social Capital	Structural Dimension	3. Individuals who report a high level of structural social capital (strong social interaction network ties and a high level of network resources), will display a positive attitude towards tacit knowledge sharing.	.165*
	Relational Dimension	15. Individuals who report a high level of relational social capital (trust, shared values and norms) will display a	-.015

		positive attitude towards tacit knowledge sharing.	
	Cognitive dimension	11. Individuals who report a high level of cognitive social capital (shared vision and goals) will display a positive attitude towards tacit knowledge sharing	.551*
'Reasoned Action' Mediating Variables	Attitude towards Tacit Knowledge Sharing	13. An individual's positive attitude towards tacit knowledge sharing positively influences their intention to share tacit knowledge.	.894*

Figure 6.30 represents the estimated, standardized direct causal effects for social capital.

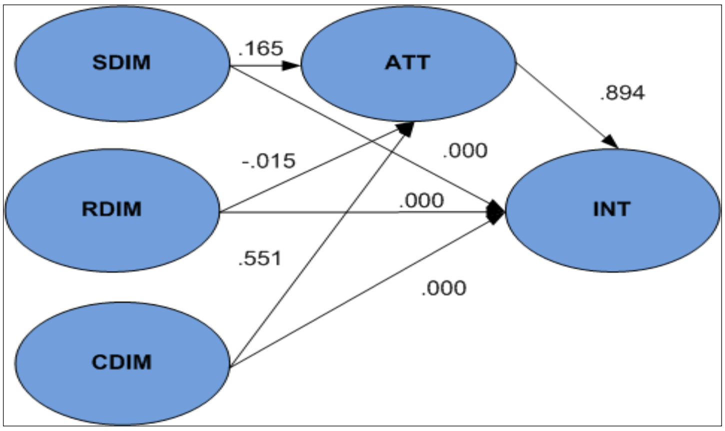

Figure 6.30 Social capital - Direct causal effects

6.14 Conclusion

This chapter presented the findings of the study. It began with a demographic analysis of the participants. This was followed by presentation of the statistics for reliability and validity i.e., the Cronbach, Alpha test, the one-sample t-test, the Sign test, the Wilcoxon Signed - Rank test and the Pearson Product Moment Correlation Coefficient test. The chapter proceeded by providing the thematic analysis of the qualitative study. Then, the results of SEM confirmatory factor analysis were presented. The chapter continued by providing the SEM results for each model. These included the results for the hypothesized study model, the structural dimension of social capital, the relational dimension of social capital (included within this dimension, the ‘trust’ model and the ‘shared norms and values’ model), the cognitive dimension of social capital and finally the social capital model. The following chapter provides a discussion of the results, recommendation and conclusions.

CHAPTER 7

DISCUSSION OF RESULTS, RECOMMENDATIONS AND CONCLUSION

7.1 Introduction

The preceding chapter presented the results of the study. This chapter discusses the results and makes recommendations for future research and practice.

The chapter begins with an overview of the study with a brief summary of the main findings. The model fit results and the direct and indirect causal effects are highlighted. The chapter proceeds to discuss the significance of the study from an academic and business point of view and ends with a conclusion.

7.2 Overview of study

This study was a case study of a South African, University of Technology.

The aim of this study was to examine and understand the relationship between social capital (the structural, relational and cognitive dimensions of social capital), 'reasoned action' and the individual's intention to share tacit knowledge, in a business environment of a University of Technology.

In order to do this, a theoretical model of an individual's intention to share tacit knowledge was developed and tested using structural equation modeling. In this model, the structural dimension incorporated social interaction network ties and resources, the relational dimension incorporated trust and shared values and norms and the cognitive dimension incorporated shared vision and goals.

The social capital dimensions were integrated with the ‘reasoned action, dimensions (Fishbein and Ajzen 2010: 1). The ‘reasoned action’ (Fishbein and Ajzen 2010: 1) variables of the individual’s attitude towards tacit knowledge sharing, their perceived norms about tacit knowledge sharing and their perceived behavioural control over the sharing of tacit knowledge (i.e., beliefs about the presence of factors that may facilitate or inhibit the performance of tacit knowledge sharing and the perceived power of these factors) were postulated to be mediating variables between the dimensions of social capital (independent variable) and the individual’s intention to share tacit knowledge (dependent variable).

With regard to the proposed study model, the primary research question that was explored is “how does social capital predict an individual’s intention to share tacit knowledge?”

In order to determine how well the proposed study model and the revised set of theoretical models, explained the individual’s intention to share tacit knowledge, the following questions were investigated:

- Is the study model consistent with the data? Is it a good fit?
- Are the six identified social capital predictor variables (structural dimension of social capital - network ties and resources; relational dimension of social capital - trust, shared values and norms; cognitive dimension of social capital - shared vision and goals) significant for predicting the criterion variable ‘attitude towards tacit knowledge sharing’?
- What are the direct, indirect and total effects of the identified predictor and mediating variables on the individual’s intention to share tacit knowledge?
- Are the identified three ‘reasoned action’ variables (attitude towards tacit knowledge sharing, perceived norms about tacit knowledge sharing and perceived behavioural control over tacit

knowledge sharing) significant for predicting the criterion variable 'intention to share tacit knowledge'?

In the context of the research questions, seventeen research objectives and hypotheses were developed for each measurement construct in the model (Table 4.1).

The core hypothesis for the study was the following:

> It is proposed that network ties (structural dimension of social capital), trust, shared norms and values (relational dimension of social capital) and shared vision and goals (cognitive dimension of social capital) act as determinants for the "individual's attitude towards the sharing of tacit knowledge" and that the "individual's attitude towards tacit knowledge sharing", "perceived norms about knowledge sharing" and their "perceived behavioural control over tacit knowledge sharing," act as determinants for the individual's "intention to share tacit knowledge".

The hypotheses for each research objective are listed in Table 4.1.

The research design was a case study which consisted of a mixed methods research design. The research reported in this thesis consisted of three phases, namely a comprehensive survey of the literature, interpretative qualitative research interviews and a quantitative, empirical survey.

The target population for this study was all salaried staff at a University of Technology (i.e., two thousand five hundred and twenty nine) salaried staff). The sample size for the qualitative research consisted of nine respondents from different departments and levels in the organisation. Random sampling was used to obtain the five hundred and ninety (twenty three percent return rate) respondents who completed the research questionnaire.

The research instrument for this study was a self-report questionnaire

The analysis methods employed in this study consisted of:

a) thematic analysis of the in-depth, exploratory interviews.

b) descriptive statistics in the form of frequencies means, standard deviations and percentages and

c) inferential statistics in the form of structural equation modeling (SEM) in order to test the proposed study model.

With regard to reliability and validity, the data was triangulated with two sources of evidence (qualitative and qualitative) to ensure validity. For the quantitative data, Cronbach's Alpha Coefficients, the One-Sample t-test, the Sign Test, the Spearman Rank-Order Correlation Coefficient Test and SEM reliability analyis was applied to the data.

SEM analysis was performed on the study model and it was found that it did not fit the data. Based upon this finding, a decision was taken to revise the model based upon theoretical credibility. The results of this revision are discussed in the following section.

7.3 Discussion of results

Demographics

In terms of the demographic analysis, there was an even spread of respondents across all of the faculties in the University of Technology with forty four percent of staff being administrative or support staff and the balance being academic staff.

The majority of respondents were permanent staff. The highest percentage of staff in terms of their job position was 'administrative function' (thirty three percent) and 'lecturer' (thirty three percent). In terms of age the majority of respondents were between the ages of thirty and fifty nine. Respondents came from the Asian (thirty seven percent), Black (thirty five percent), White (twenty four percent) and Coloured (four percent) race groups. Fifty five percent of respondents were female and forty five percent were male. The majority of respondents held post graduate qualifications. Differences in the responses of demographic categories were obtained via the Kruskal Wallis test. These are reported in detail in Chapter 6.

Reliability and Validity

Reliability and validity statistics generally confirmed the reliability and validity of the measurement questions. The measurement questions had high internal consistency. Cronbach's Alpha were acceptable/high for all questions except for question twenty one, twenty four, two, nine and twenty nine which were eliminated prior to conducting structural equation modeling.

The one sample t-test revealed a significant respondent agreement to all questions except for question five - (There is total agreement on my department's vision across all levels and functions), question ten - (in general, my norms and values and the norms and values held by my co-workers are very similar) and question twelve - (Many of my co-workers are close friends, i.e., people that I feel at ease with or can talk to about private matters). This was confirmed with the sign test. In addition, SEM analysis confirmed the reliability of the variables utilized in the revised models.

The Pearsons Product Moment Correlation Coefficient test revealed that there was a significant, positive correlation between the measurement constructs related to:

- Hypothesis 1 - (strong network ties and attitude, r = 0.460 for questions 11,12 and 13), (r = 0.548 for question 11 and 12),

- Hypothesis 2 - (network resources and attitude, r = 0.401),
- Hypothesis 3 - (structural dimension of social capital, r = 0.418)'
- Hypothesis 4 - (affect-based trust and attitude, r = 0.450),
- Hypothesis 5 - (cognitive based trust and attitude, r = 0.410),
- Hypothesis 6 - (affect-based trust and cognitive-based trust, r = 0.462),
- Hypothesis 7 - (shared norms and values and attitude, r = 0.537),
- Hypothesis 8 - (relational social capital, r = 0.514),
- Hypothesis 9 - (shared vision and attitude, r = 0.496),
- Hypothesis 10- (shared goals and attitude, r = 0.525),
- Hypothesis 11 - (cognitive social capital, r = 0.538),
- Hypothesis 12 - (structural, relational and cognitive social capital and attitude, r = -0.559),
- Hypothesis 13 - (attitude and intention to share tacit knowledge, r = 0.767),
- Hypothesis 14 - (perceived norms and intention to share tacit knowledge, r = 0.459 for questions 3, 15 and 24), (r = 0.384 for question 3 and 15),
- Hypothesis 15 - (perceived norms and attitude, r = 0.469 for question 3,15 and 24), (r = 0,370 for question 3 and 15),

- Hypothesis 16 - (perceived behavioural control and intention to share tacit knowledge, r = 0.570) and

- Hypothesis 17 - (‘reasoned action’, r = 0.723).

The SEM test results revealed that there was a significant, positive correlation for hypothesis 6 (trust and attitude, 0.571), hypothesis 3 (structural dimension of social capital and attitude, 0.525), hypothesis 8 (relational dimension of social capital and attitude, 0.649) and hypothesis 11 (cognitive dimension of social capital and attitude, 0.672).

Generally, the SEM correlation test results confirmed the Pearsons Product Moment Correlation Coefficient test results for all of the hypotheses except for hypothesis16, perceived behavioural control. The correlation between perceived behavioural control and intention in the SEM test results was lower, 0.282 as opposed to 0.570 in the Pearsons Product Moment Correlation Coefficient test results.

7.4 Study model fit results

The following research question was posed for the assessment of the proposed study models fit to the data:

Research question (1) - Is the proposed study model consistent with the data? Is it a good fit?

Question one was proposed to examine whether the proposed study model was consistent with the data. According to the global model fit indices and the detailed model fit indicators, the study model was not consistent with the data. It was a poor fit to the data. It should be noted that Weston and Gore (2006: 744) make the point that “rarely is an initial proposed model the best fitting model”.

The results and possible reasons for the poor fit of the study model are discussed in Chapter 6 - Section 6.7.

7.5 Revised models fit results

Research question 1 was applied to the revised models and all of the revised models were consistent with the data and were a good fit to the data. The individual 'model fit' results of the revised models are discussed below.

Structural dimension of social capital

The structural dimension of social capital had a comparative fit index (CFI) of 0.95 and the root mean square residual of approximation (RMSEA) was .067 (.056; .078. p = .005) indicating that there was a good fit to the data. This finding confirmed that social capital is derived from both the network structure which facilitates or impedes access to social resources and the nature of the social resources embedded in the network and this contributes towards tacit knowledge sharing behaviour.

Relational dimension of social capital

The relational dimension of social capital had a comparative fit index (CFI) of 0.950 and the root mean square residual of approximation (RMSEA) was 0.059 (.052; .067. p = .005) indicating that there was a good fit to the data.

This finding confirmed that there is a positive correlation between affect and cognitive based trust, social norms, shared norms and values, norms of social support, norms of reciprocity and the individual's attitude towards tacit knowledge sharing.

Due to the contradictory findings in the literature, especially with regard to trust, a SEM analysis was conducted on two of the individual components of the relational dimension, i.e., ‘trust’, ‘shared norms and values’.

Trust had comparative fit index (CFI) of 0.943 and the root mean square residual of approximation (RMSEA) was 0.072 (.063; .082. p = .005) indicating that there was an acceptable fit to the data. This finding concurs with the many studies that have suggested that trusting relationships evolve from social interactions and are critical for the transfer of knowledge because it increases information exchange (Chow and Chan 2008: 464; Gabbay and Leenders 2003: 509; Inkpen and Tsang 2005:153; Fukuyama 1995: 26; Levin et al. 2002: 2; Mayer, Davis and Schoorman 1995: 712; Tsai and Ghoshal 1998: 467).

Shared norms and values

Shared norms and values had a comparative fit index (CFI) of 0.943 and the root mean square residual of approximation (RMSEA) was 0.78 (.066; 090 p = .005) indicating that there was an acceptable fit to the data. This finding concurred with the findings of the following researchers: Bock et al (2005: 7), Iqbal et al. (2011: 11053), Svendson and Svendson (2005: 28) and Tsai and Ghoshal (1998: 467).

Cognitive dimension of social capital

The cognitive dimension of social capital had a comparative fit index (CFI) of 0.961 and the root mean square residual of approximation (RMSEA) was 0.067 (.057; .077. p = .005) indicating that there was a good fit to the data. This finding confirmed that there is a positive correlation between shared vision and goals which is mediated by the individual’s attitude toward tacit knowledge sharing. This finding replicated results produced by Cicourel (1973: 1), Hazelton and Kennan (200: 81) and Levin et al (2002: 25).

In each of the social capital dimension models there was a strong correlation between the individual’s attitude toward tacit knowledge sharing and their intention to share tacit knowledge.

7.6 Direct and indirect causal effect - Social capital dimensions

The following research question was posed for the assessment of the effects of the social capital variables and dimensions:

Research question (2) - Are the six identified social capital predictor variables (structural dimension of social capital - network ties and resources; relational dimension of social capital - trust, shared values and norms; cognitive dimension of social capital - shared vision and goals) significant for predicting the criterion variable ‘attitude towards tacit knowledge sharing’?

With regard to question two, the six identified social capital predictor variables (structural dimension of social capital - network ties and resources; relational dimension of social capital - trust, shared values and norms; cognitive dimension of social capital - shared vision and goals) were all significant for predicting the criterion variable attitude towards tacit knowledge sharing, with the cognitive dimension of social capital (shared vision and goals) having the strongest predictive effect.

The following research question was posed to assess the direct, indirect and total effects of the predictor and mediating variables on the individual’s intention to share tacit knowledge:

Research question (3) - What are the direct, indirect and total effects of the identified predictor and mediating variables on the individual’s intention to share tacit knowledge?

With regard to research question three, the six identified social capital predictor variables (structural dimension of social capital - network ties and resources; relational dimension of social capital - trust, shared values and norms; cognitive dimension of social capital - shared vision and goals) had a direct causal effect on the individual's attitude towards tacit knowledge sharing and in each case the individual's attitude had a strong direct causal effect on their intention to share tacit knowledge.

For each dimension of social capital, there was an indirect causal effect of each dimension of social capital on the individual's intention to share tacit knowledge and an indirect effect of perceived norms on the individual's intention to share tacit knowledge. In contrast to Fishbein and Ajzens (2010: 220) findings there was not a direct effect of perceived norms on the individual's intention to share tacit knowledge for any of the dimensions. Perceived norms had a direct effect on the individual's attitude towards tacit knowledge sharing. The individual's perceived norms were thus mediated by their attitude towards tacit knowledge sharing. The results of the SEM analysis for trust mirrored the results for the dimensions discussed above.

Shared norms and values had a stronger direct causal effect on the individual's intention to share tacit knowledge than trust. With regard to shared values and norms there was no direct or indirect causal effect of perceived norms on attitude or on intention again suggesting that with regard to the individual's intention to share tacit knowledge, shared values and norms are strongly mediated by the individual's attitude toward tacit knowledge sharing.

In all of the models there was a strong, significant direct effect of the individual's attitude towards tacit knowledge sharing on the individual's intention to share tacit knowledge.

For each dimension of social capital (the structural, relational and cognitive) the individual's attitude towards tacit knowledge sharing acted as a mediating variable for the individual's intention to share tacit knowledge.

7.7 Direct and indirect causal effects - 'Reasoned action' dimensions

The following research question was posed to assess the effects of the 'reasoned action' measurement constructs.

Research question (4) - Are the identified three 'reasoned action' variables (attitude towards tacit knowledge sharing, perceived norms about tacit knowledge sharing and perceived behavioural control over tacit knowledge sharing) significant for predicting the criterion variable 'intention to share tacit knowledge'?

The results of the study proved the core hypothesis which was that an individual's tacit knowledge sharing intentions can be analysed within a social capital and a 'reasoned action' framework and that social capital positively affects an individual's attitude towards the sharing of tacit knowledge, which in turn, positively affects an individual's intention to share tacit knowledge (Fishbein and Ajzen 2010: 1) within certain limitations (for example, the poor results for 'perceived behavioural control').

When the 'reasoned action' variables were tested with the social capital variables, some of the 'reasoned action' variables (perceived norms and attitude) were significant for predicting the individual's intention to share tacit knowledge.

When the 'reasoned action' variables were tested independently from the social capital variables, they were not significant for predicting an individual's intention to share tacit knowledge.

The SEM analysis for the study model revealed the following correlations for the 'reasoned action' measurement constructs; correlation between attitude towards tacit knowledge sharing and intention to share tacit knowledge (0.775), correlation between perceived norms about tacit knowledge sharing and intention to share tacit knowledge (0.568) and correlation between perceived behavioural control over tacit knowledge sharing and intention intention to share tacit knowledge (0.282). Thus, perceived behavioural control was not significant for predicting the individual's intention to share tacit knowledge in the study model, nor was it significant in any of the revised models.

In addition, perceived norms loaded more strongly onto attitude towards the sharing of tacit knowledge that it did onto the individual's intention to share tacit knowledge.

Furthermore, when the 'reasoned action' - latent variables, were tested independently of the social capital - latent variables, the 'reasoned action', SEM model did not fit the data.

Some aspects of the findings in this study were contradictory to Fishbein and Ajzens (2010: 1) findings and highlight specific problems with their theory.

Hankins, French and Horne (1999: 151) comment that although the theories of reasoned action are in general supported by the evidence, Van den Putte (1993: 1) conducted a meta-analysis of one hundred and thirteen studies and Godin and Kok (1996: 87) reviewed fifty six studies and found that the extent to which the models are supported are dependent on the appropriate use of statistical methods. Van den Putte and Hoogstraten (1997: 321) found only one fitting model in a meta-analysis of two hundred articles published between 1991 and 1995. As discussed previously, the majority of articles that have found success with the theory of reasoned action have used regressional analysis; few studies have used SEM to assess the theory of reasoned action.

A major assumption of the theory of reasoned action is that it proposes that their constructs are uni-dimensional, i.e., each construct is a single, homogenous entity (Fishbein and Ajzen 1975:1) The findings of this study tend to agree with Bagozzi (1981: 607, 1982: 459) that the assumption that every attitude will always be uni-dimensional is untenable and concur with Hankins, French and Horne (2007: 159) statement that "there is frequently no attempt to assess the extent to which attitude as thus conceptualized is being measured adequately, let alone whether the assumption of unidimensionality is reasonable".

According to Anderson and Gerbing (1988: 414) achieving unidimensional measurement is a crucial undertaking in theory testing and development. A necessary condition for assigning meaning to estimated constructs is that the measures that are posited as alternate indicators of each construct must be acceptably unidimensional (Anderson and Gerbing 1988: 414). Two criteria are used to assess unidimensionality- internal and external consistency.

In Anderson and Gerbing's (1988: 414) opinion in building measurement models, multi-indicator measurement models are prefered because they allow the most unambiguous assignment of meaning to the estimated constructs.

Measurement models that load on more than one estimated construct do not represent unidimensional construct measurement. As a result assignment of meaning to such estimated constructs can be problematic.

In this study 'perceived behavioural control' did not load onto 'intentions to share tacit knowledge'.

Furthermore, dissent exists about the application of confirmatory factor analysis for assessing unidimensionality. Cattell (1973: 382) has argued that real life behaviours tend to be factorially complex. In other words, to show that a given matrix is ranked one is not to prove that the items are measuring a pure unitary trait factor in common; it may be a mixture of unitary traits.

7.8 Significance of study

Researchers are interested in finding a solution to two types of problems: "those whose aim is to increase our knowledge and those whose aim is to make our life better" (Nenty 2009: 19). This study covered both of these aspects and its research and business contributions are outlined in the next section.

7.8.1 Academic contribution

The following theoretical and business implications may be drawn from this study.

This research is important because due to the difficulties in understanding and measuring tacit knowledge, researchers are reluctant to conduct research into tacit knowledge. To date there has been little enquiry into the various predictors of an individual's intention to share tacit knowledge (Andrews and Delahay 2000: 797; Levin, Cross and Abrahms 2002: 1).

In addition, few studies have dealt with the possibility that there may be mediating effects on the individual's intention to share tacit knowledge. The findings of this study provide evidence of important predictors and mediators of tacit knowledge sharing behavour which will inform scholarly models of the sharing of tacit knowledge (Penley and Hawkins 1985: 309). .

With regard to the social capital dimensions, this is the first study that completely follows Nahapiet and Ghoshal's (1998: 242) three dimensions of social capital (i.e., the structural, relational and cognitive dimensions) and applies them to the study of tacit knowledge sharing in a business environment of an academic institution.

This study contributes to expanding the research base by providing a new set of theoretical models (specifically for the structural, relational and cognitive dimensions of social capital) which are applicable to the sharing of tacit knowledge in a University of Technology.

The major contribution of this study has been the application of social capital theory to the sharing of tacit knowledge. It contributes to social capital theory by expanding Nahapiet and Ghoshal (1998: 243) classification of social capital dimensions to tacit knowledge sharing behaviour. It further confirms that social capital analysed through its dimensions is a way of analysing the sharing of tacit knowledge as a social construct. It also verifies the findings of the following researchers: Nahapiet and Ghoshal (1998: 243), Pan, Newell, Huang and Galliers (2007: 405), Tsai and Ghoshal (1998: 465) and Widén-Wulff and Ginman (2004: 448).

In addition, this is one of the first studies to integrate the constructs of the theory of social capital with the constructs of the theory of reasoned action (Fishbein and Ajzen 2010: 1) in investigating an individual's intention to share tacit knowledge.

It provides additional evidence of the importance of each dimension of social capital as a predictor of the individual's attitude towards and intention to share tacit knowledge. It further contributes to clarifying the specific pattern of relationships and pathways among the tacit knowledge sharing intention antecedents, including the social capital structural, relational and cognitive antecedents and the 'reasoned action' antecedents in the model.

There are also few studies that have successfully applied SEM analysis to the theory of reasoned action. Dutta-Bergman (2005: 103) point out that most of the theory of reasoned action research is correlational, and evidence based on experimental studies is less convincing. The detailed statistical results (Appendix D) that have been provided for this study, on examination, will provide additional insight into resolving some of the problems that occur when SEM analysis is attempted using the theory of reasoned action (Fishbein and Ajzen 2011: 20). In addition, the provision of detailed SEM statistics makes provision for this study to be repeated and adapted in order to further the theoretical base of tacit knowledge sharing behaviour. Researchers may use or rework the statistics in terms of their own particular research paradigm or need. A major problem with published research is that findings may not be verified due to the provision of inadequate statistical results (not sufficiently comprehensive). Thus, casting doubts on the validity of the research findings.

Moreover, this study confirms the applicability and relevance of SEM analysis in the study of tacit knowledge sharing behaviour.

In addition, new insights have been provided with regard to the theory of reasoned action. There are very few studies integrating the theory of social capital with the theory of reasoned action (Fishbein and Ajzen 2010: 1). To the researchers knowledge there are no studies testing the predicative capability of all the dimensions of social capital on the individual’s attitude towards knowledge sharing and, in turn, using the individual’s attitude towards knowledge to predict the individual’s intention to share knowledge.

Furthermore, this study provided new insights with regard to the individual’s attitude towards tacit knowledge sharing. The ‘reasoned action’ findings of this study were contradictory to some aspects of Fishbein and Ajzen’s (2010: 1) findings and highlight problem areas in specific sections of their theory in relation to tacit knowledge sharing behavior. Specifically, with regard to the application of SEM analysis and the role of 'perceived behavioural control' in tacit knowledge sharing behaviour.

In this study, there was a strong indication that attitude towards tacit knowledge sharing was a mediating variable for the individual's intention to share tacit knowledge. This is contrary to Fishbein and Ajzen's (2010: 22) findings. Also, perceived norms loaded more strongly onto attitude than onto intention. In addition, perceived behaviour control did not predict the individual's intention to share tacit knowledge. Thus, additional scholarly work is required to understand the role of the variables in the theory of reasoned action (particularly, the individual's attitude towards the behaviour in question) and specifically, the role of perceived behavioral control in tacit knowledge sharing behaviour.

In conclusion, this study brings fresh evidence for the theory of tacit knowledge sharing behaviour in a University of Technology by expanding it in new directions. It demonstrates the value of using social capital and its usefulness for furthering understanding tacit knowledge sharing behaviour in a University of Technology. In addition, it makes an important theoretical /empirical contribution to the rapidly progressing field of social capital and tacit knowledge sharing behaviour and the development of a stronger theoretical base.

With regard to the theory of reasoned action (Fishbein and Ajzen 2010: 1) it highlights problem areas in its application to tacit knowledge sharing behaviour and suggests new theoretical directions.

The models which have been developed in this study, pertaining to the structural, relational and cognitive dimensions of social capital and the individual's intention to share tacit knowledge, will be of great use to Universities of Technology and business generally.

7.8.2 Business contribution

Du Pré (2009: 3) states that:

> higher education institutions worldwide have realized the importance not only of generating new knowledge through research and development programmes, but also actively participating in applying and utilizing their knowledge and technology for new products, processes and services.

Individual tacit knowledge sharing is critical for new product development and innovation which are fundamental prerequisites for achieving and maintaining competitiveness and sustained growth. In an increasingly global world, the ability to design the services and products that people want is more vital to our future prosperity than ever before.

Grant and Baden-Fuller (1995: 18) comment that "knowledge has supplanted land, labor and capital and become the primary source of strategic competitive advantage in the market-place". Developing the capacity to manage the individual sharing of tacit knowledge within academia is seen as an important strategic advantage for Universities of Technology (Nonaka 1994: 14). Implementation of the findings of this study will provide a strategic advantage for the university.

As Universities of Technology are in the business of creating and sharing knowledge, the improved understanding of the reasons why tacit knowledge is or is not shared at the individual level provided by this study enables action to be taken to improve business and managerial strategic practices, innovation and competitive advantage. This study indicates that the sharing of tacit knowledge requires individual behaviour that encourages the exchange of personal acquired knowledge between individuals. It requires an awareness of the information and knowledge needs of others and the ability to share this with others. Technical and systematic infrastructure is needed in a

University of Technology to facilitate effective tacit knowledge sharing with other staff members. Knowledge "is primarily gained through activity by attempting to change our environment (through work) and through interaction with other people" (Sayer 1992: 13). The process of tacit knowledge sharing engagement requires that staff engage in close interactions that allow them to observe and learn from each other. The findings in this study indicate that management should group persons who have similar professional similarities such as work interests and similar norms and values. A University of Technology's corporate culture has the potential to positively or negatively impact the ability of the university to create and sustain the production of its intellectual and social capital. This study suggest that in order to establish a university knowledge-based culture that constantly generates new knowledge, it is important to a) uncover and understand the beliefs, motivations and attitudes of individual staff members towards tacit knowledge sharing and b) understand the relationships and processes involved in individual tacit knowledge sharing behaviour within the university (Du Pré 2009: 3). This study examines these important factors and provides a better understanding of the individual's sharing of tacit knowledge within a University of Technology which will ultimately improve the university's ability to effectively develop, share and assimilate tacit knowledge.

Furthermore, this study increases our understanding of how the sharing of tacit knowledge advances the development of intellectual capital. This understanding will enable the individual knowledge sharing process to be institutionalized in the university which will lead to a culture of knowledge sharing. A culture of knowledge sharing will lead to the development of intellectual capital within the university which will facilitate technological innovation and improve the long term prosperity and sustainability of the university. It is economically important for Universities of Technology to understand the great benefits of tacit knowledge exchanges and to capitalize on the great benefits that may be achieved by value-creating tacit knowledge exchanges.

As Universities of Technology are in the business of sharing and growing knowledge, this study is highly relevant to the academic community. Universities of Technology in part, because of their dedication to academic freedom and individual learning are not always prime sites for the production of trust, shared norms and networks that are the hallmark of social capital. By making social capital predication a more overt mission and actively promoting the dimensions of social capital and tacit knowledge sharing behaviour, Universities of Technology can become more relevant and better able to prepare their students for a highly complex and interdependent world.

Thus, there are clear applications for the findings of this study in the academic world. In the end, the location of the new knowledge-based economy in the global environment resides in the social and intellectual capital that exists in Universities of Technology. It is in the human mind and the individual sharing of tacit knowledge within social network relations.

To conclude this section, this study provides a better understanding of how to leverage social capital, in order to facilitate the individual sharing of tacit knowledge in a University of Technology, which ultimately increases social capital and the strategic competitiveness of the university.

7.9 Recommendations

7.9.1 Recommendations for Future Research

Social capital is a relatively young topic in the social sciences and our conceptual and theoretical understanding continues to develop. In parallel, our ability to measure social capital also continues to increase.

Each time another tool for measuring social capital is applied in the field, lessons will be learned that can improve the tool. It is important that these lessons be shared among researchers and practitioners. Thus, the following recommendations are made for future research.

Social capital should be thoroughly researched so that issues of definition and meaning can be clarified before measurement tools are developed and programmes and policies are implemented. Its measurement tools need continual improvement, ongoing evaluation, measurement refinement, and validation. In addition, researchers should make it clear what level of social capital they are working on, as many researchers confuse the different levels of social capital

As the research was confined to a University of Technology, it is recommended that other researchers examine these findings through more rigorous research designs, longitudinal or experimental research and across different settings and national cultures. Furthermore, there is a need for contextualizing of academic and organistional research (Rousseau and Fried 2001: 1; Inkpen and Tsang 2005: 156). Contextualization makes theoretical models more accurate and interpretation of empirical results more robust.

This study revealed interrelationship between the social capitals latent constructs. Future research, therefore, should consider the interrelationships of these facets as intervening explanatory factors that could further uncover the mechanisms and dynamics of why and how tacit knowledge sharing takes place.

Finally, as the model was modified, it is recommended that it is cautiously interpreted. As a model modification was performed, post-doctoral work should be carried out to test the modified model on a separate (cross-validation) sample and work towards achieving an acceptable fit for the full model. Replication of the model is required to advance the literature. A statement of Steiger (1990: 176) reflects the importance of replication and cross-validation most forcefully: “an ounce of replication is worth a ton of inferential statistics”.

Furthermore, the introduction of social capital variables into the analysis of networks and knowledge sharing adds a level of complexity that has not yet been examined empirically. All networks are, at their core, about social relationships, and, therefore, social capital dimensions have applicability. When studying network behaviors, it is important to first examine the nature of the network type concerned and how it differs from other types. The majority of existing theoretical and empirical studies of individual knowledge sharing behaviour are based on a single network type. Researchers should move beyond one-size-fits-all analyses of networks. The question of how far the results of these studies can be generalized from one network type to another rarely has been examined.

7.9.2 Recommendations for practice

The recognition of knowledge as a key resource of today’s organisations affirms the need for universities to institute business processes and managerial tools that facilitate the creation, sharing, and leveraging of individual and collective tacit knowledge (Becerra-Fernandez and Sabherwal 2001: 25; Ichijo 2006: 121).

Knowledge management practices should be used to harness individual tacit knowledge within the university. The practice of knowledge management calls for managing individual knowledge as a corporate asset and harnessing knowledge creation and sharing as key organisational capabilities (Nonaka and Takeuchi 1995: 50).

An enabling and tacit knowledge sharing environment must be nurtured in the workplace for employees carrying out tacit knowledge sharing. All employees should be encouraged to share their tacit knowledge.
The findings of this study suggest that Universities of Technology which engage in knowledge intensive and knowledge generating activities need to institute an environment conducive to the development of all three dimensions of social capital in order for effective knowledge sharing to take place. Management must consciously cultivate social relationships and interpersonal interactions of employees, rather than expecting them to arise organically from day-to-day work. In particular, fostering a work context characterized by high levels of trust is likely to nurture the mutual social exchange relationships that are important in driving knowledge sharing intentions. In order for organisational members to share tacit knowledge they must have opportunities to do so. Formal opportunities may include training programmes, structured work teams, and technology - based systems that facilitate the sharing of tacit knowledge. Informal opportunities include personal relationships and social networks (e.g. communities of interest) that facilitate the sharing of tacit knowledge. As Levin and Cross (2004: 1487) point out, tacit knowledge may often be shared in an informal context.

Universities of Technology should a) develop a knowledge - intensive culture by encouraging and aggregating behaviors such as knowledge sharing (as opposed to hoarding) and proactively seeking and offering knowledge; b) build a knowledge infrastructure - not only a technical system, but a web of connections among people which includes space, time, tools, and encouragement to interact and collaborate and c) develop an IT system which focuses on the creation, sharing and distribution of knowledge. It should provide retrieval mechanisms for locating relevant information and knowledge. IT can increase knowledge transfer by extending the individuals reach beyond the formal communication lines. Expanding the individual's network to more extended, although perhaps weaker, connections is central to the knowledge diffusion process because such networks expose individuals to more new ideas. The mere existence of knowledge somewhere in the university is of little benefit; it becomes a valuable corporate asset only if it is accessible, and its value increases with the level of accessibility. Through e-mail, groupware, the Internet, and Intranets, computers and networks can point to people with knowledge and connect people who need to share knowledge over a distance. Computer networks and electronic bulletin boards and discussion groups create a forum that facilitates contact between the person seeking knowledge and those who may have access to the knowledge. In addition, providing taxonomies or organisational knowledge maps enables individuals to rapidly locate either the knowledge or the individual who has the needed knowledge, more rapidly than would be normally possible.

Desktop video conferencing and multimedia computing that transmits sound and video as well as text make it possible to communicate some of the richness and subtlety of one person's knowledge to another.

What must be remembered is that information technology is only the pipeline and storage system for knowledge exchange. It does not create knowledge and cannot guarantee or even promote knowledge generation or knowledge sharing in a corporate culture that doesn't favor those activities. Universities of Technology must create a knowledge sharing culture. Steps to achieving a knowledge sharing culture include setting knowledge sharing priorities, strong knowledge sharing leadership, knowledge sharing investment support, and modeling by senior leadership (i.e., visible advocacy of knowledge sharing behavior).

A cultural shift is required to change employee’s attitudes and behaviour. For example, a University of Technology by developing a community of skilled graduates with relevant and specialized knowledge and skills can contribute to a modernizing economy through technological innovation and technological transfer, entrepreneurial development and the application of tacit knowledge and technology. Technological innovation is the process that transforms new knowledge into wealth. Social capital and the sharing of tacit knowledge can lead to the creation of new ideas and the development of technology in the form of products, processes and services up to their ultimate successful commercialization. Through successful tacit knowledge sharing a University of Technology's intellectual assets can be developed and identified for transfer. The organisational design should facilitate knowledge sharing and individual knowledge sharing should be rewarded and supported. A system of three-level organisational support, work group support, immediate supervisor and faculty support, should be implemented. Knowledge processes need to be built into the daily work process, and well-defined knowledge capture processes should exist. Knowledge processes should depend on the type and level of knowledge.

Human performance measurement is becoming increasingly more important as knowledge-based organisations begin to recognize that the organisation's greatest resource is comprised of its people. A knowledge sharing proficiency should be established and measured. Knowledge sharing expectations must be communicated and translated into actions that can be documented in a performance review. Individual and team knowledge sharing metrics should provide definition to knowledge sharing behavior and communicate that the university places a value on it.

Collaboration and trust must be incorporated into the organisational culture for successful knowledge management practices.

Other activities should include encouraging tacit knowledge sharing in action, not only in words, promoting the collection of new knowledge into the organisation and the development of innovative insights and ideas for future success, stimulating employees to say what they think, and building open communication channels throughout the organisation. Employees with similar norms and values should be encouraged to work together on projects.

In order to promote a shared vision, managers should develop clearer and more integrated faculty visions and goals, which would facilitate the beneficial effects of social capital. Recruiting employees who share common interests and goals is a critical task for human resources departments.

7.10 Conclusion

This study analyzed tacit knowledge sharing behaviour within a social capital framework, in a business environment of a South African University of Technology.

It has provided theoretical and empirical insights into the factors which predict an individual's intention to share tacit knowledge.

Given the importance of tacit knowledge sharing in today's world - and even more so in tomorrow's world - it is hoped that these findings will be useful to others engaged in scholarship aimed at enriching our collective understanding regarding tacit knowledge sharing within academia and across organisational communities.

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An Analysis of Tacit Knowledge Sharing Behaviour, within a Social Capital Framework, in a Business Environment of a South African, University of Technology

Submitted in Fulfillment of the Requirements of the

Degree of Doctor of Technology: Business Administration

in the Faculty of Management Sciences

at the Durban University of Technology

Carol Smith

March 2014

APPENDICES

APPENDIX A

RESEARCH LETTERS

APPENDIX A

APPENDIX A1 LETTER OF INFORMATION AND CONSENT-ON-LINE SURVEY

DURBAN UNIVERSITY of TECHNOLOGY

Dear Participant,

Thank you for taking time to complete this survey. My study is being undertaken in order to understand tacit knowledge sharing behavior (in the form of work experience and “know-how”) at the Durban University of Technology. Your input is greatly appreciated. This survey will take approximately 10 minutes to complete.

Title of the Research Study: An Analysis of Tacit Knowledge Sharing Behaviour, within a Social Capital Framework, in a Business Environment of a South African University of Technology. (D.Tech. Research Project).

Researcher: Carol Smith-0828575044 / 031 373 5270.

Supervisor: Dr De Beer-031 373 6746.

Brief Introduction and Purpose of the Study: The purpose of this survey is to gather information from staff at DUT with the view to assessing tacit knowledge sharing behaviour and social capital. The results from this study will be used for research and publications purposes only and will be made available in the Durban University of Technology library, in the form of a Doctoral dissertation.

Confidentiality: This study involves an anonymous online survey. We would l ke to assure you that the information that you offer in this survey is strictly confidential and that no personal details are required of you. Your name will not appear on the survey and the individual answers you give will be treated as strictly confidential. Answers on the survey will be coded to ensure anonymity. You cannot be identified in person based on the answers you give.

Persons to contact in the Event of any Problems or Queries: Please feel free to contact the researcher, Carol Smith (0828575044 / 031 373 5270) or Supervisor, Dr De Beer (031 373 6746) or the Durban University of Technology, Institutional Research Ethics Administrator (031 373 2900).

Kindly proceed with this survey if you have read this letter in its entirety, understand its contents and agree to voluntarily participate in this study.

Please answer the questions in the following questionnaire as completely and honestly as possible.

Please don't forget to click on "submit" at the end when you have filled in the questionnaire.

Thank you for your kind assistance.

Carol Smith.

Department of Human Resource Management,

M.L. Sultan Campus (Marium Bee Building),

41 M.L. Sultan Road,

Durban

APPENDIX A2 LETTER OF INFORMATION AND CONSENT - POSTAL SURVEY

DURBAN UNIVERSITY of TECHNOLOGY

Dear Participant,

Thank you for taking time to complete this survey. My study is being undertaken in order to understand tacit knowledge sharing behavior (in the form of work experience and "know-how") at the Durban University of Technology. Your input is greatly appreciated. This survey will take approximately 10 minutes to complete.

Title of the Research Study: An Analysis of Tacit Knowledge Sharing Behaviour, within a Social Capital Framework, in a Business Environment of a South African University of Technology.**(**D.Tech. Business Administration Research Project).

Researcher: Carol Smith-0828575044 / 031 373 5270.

Supervisor: Dr De Beer-031 373 6746.

Brief Introduction and Purpose of the Study: The purpose of this survey is to gather information from staff at DUT with the view to assessing tacit knowledge sharing behaviour and social capital. The results from this study will be used for research and publications purposes only and will be made available in the Durban University of Technology library, in the form of a Doctoral dissertation.

Confidentiality: We would like to assure you that the information that you offer in this survey is strictly confidential and that no personal details are required of you. Your name will not appear on the survey and the individual answers you give will be treated as strictly confidential. Answers on the survey will be coded to ensure anonymity. You cannot be identified in person based on the answers you give.

Persons to contact in the Event of any Problems or Queries: Please feel free to contact the researcher, **Carol Smith** (0828575044 / 031 373 5270) or Supervisor, **Dr De Beer** (031 373 6746) or the Durban University of Technology, Institutional Research Ethics Administrator (031 373 2900).

Kindly proceed with this survey if you have read this letter in its entirety, understand its contents and agree to voluntarily participate in this study.

Please answer the questions in the following questionnaire as completely and honestly as possible. Please **do not** answer this questionnaire if you have already completed it on line. Thank you for your kind assistance.

Carol Smith. Department of Human Resource Management, M.L. Sultan Campus (Marium Bee Building), 41 M.L. Sultan Road, Durban University of Technology.

APPENDIX A3 ETHICAL CLEARANCE CERTIFICATE

[redacted]

APPENDIX B

MEASUREMENT INSTRUMENTS

APPENDIX B 1 – QUESTIONNAIRE

Durban University of Technology

D.Tech Research Project: An Analysis of Tacit Knowledge Sharing Behaviour, within a Social Capital Framework, in a business environment of a South African University of Technology.
Researcher: Carol Smith (0828575044) / (031 373 5270) Supervisor: Dr De Beer (031 373 6746).

The purpose of this survey is to gather information from DUT staff with the view to assessing tacit knowledge sharing behaviour and social capital. For the purpose of this survey **"know-how" refers to procedural knowledge about a business process.**

Please complete this questionnaire and send it via the self addressed envelope to **Carol Smith, Durban University of Technology, Department of Human Resource Management, M.L. Sultan Campus, Marium Bee Building, 41 M.L. Sultan Rd, Durban 4001.**Fax: 031-373 5144.**E-mail: carol@dut.ac.za.**

IF YOU HAVE COMPLETED THIS QUESTIONNAIRE ON-LINE, PLEASE DO NOT COMPLETE THIS PAPER COPY OF THE QUESTIONNAIRE.

THIS QUESTIONNAIRE IS COMPLETELY CONFIDENTIAL. PLEASE PLACE AN (X) IN THE BOX THAT YOU FEEL IS TRUE FOR YOU. THERE ARE NO "RIGHT" OR "WRONG" ANSWERS. PLEASE ANSWER ALL QUESTIONS.

	Statements	***Strongly agree***	***Agree***	***Neither agree nor disagree (Neutral)***	***Disagree***	***Strongly disagree***
1	*My co-workers will always keep the promises they make to me.*	☐	☐	☐	☐	☐
2	*I have a great deal of personal control over the amount of work experience and know-how that I share with my co-workers.*	☐	☐	☐	☐	☐
3	*My boss thinks that I should share my work experience and know-how with my co-workers.*	☐	☐	☐	☐	☐
4	*There are people among my co-workers who give me help, support and encouragement.*	☐	☐	☐	☐	☐
5	*There is total agreement on my department's vision across all levels and functions.*	☐	☐	☐	☐	☐

	Statements	*Strongly agree*	*Agree*	*Neither agree nor disagree (Neutral)*	*Disagree*	*Strongly disagree*
6	*I do not trust my co-workers.*	☐	☐	☐	☐	☐
7	*I have gained resources through my social relationships at work.*	☐	☐	☐	☐	☐
8	*My co-workers are reliable.*	☐	☐	☐	☐	☐
9	*Whether I share my work experience or know-how with my co-workers is entirely up to me.*	☐	☐	☐	☐	☐
10	*In general, my norms and values and the norms and values held by my co-workers are very similar.*	☐	☐	☐	☐	☐
11	*I have a network of close co-workers from similar social and work groups with whom I can share my work experience and know-how.*	☐	☐	☐	☐	☐
12	*Many of my co-workers are close friends, i.e., people that I feel at ease with or can talk to about private matters.*	☐	☐	☐	☐	☐
13	*My co-workers and I, agree on what is important at work. We share the same collective work goals.*	☐	☐	☐	☐	☐
14	*I have gained information and knowledge through my work social network.*	☐	☐	☐	☐	☐
15	*My co-workers think that I should share my work experience and know-how with other staff members.*	☐	☐	☐	☐	☐
16	*My co-workers and I are enthusiastic about pursuing the collective goals and mission of the university.*	☐	☐	☐	☐	☐

	Statements	*Strongly agree*	*Agree*	*Neither agree nor disagree (Neutral)*	*Disagree*	*Strongly disagree*
17	*My co-workers and I have a sharing relationship. We can freely share our ideas, feelings and hopes.*	☐	☐	☐	☐	☐
18	*I intend to share my work experience and know-how with my co-workers more frequently in the future.*	☐	☐	☐	☐	☐
19	*Sharing my work experience and know-how with my co-workers is and enjoyable experience.*	☐	☐	☐	☐	☐
20	*I have the confidence to share my work experience and know-how with my co-workers.*	☐	☐	☐	☐	☐
21	*In general, I have a very good, close working relationship with my co-workers.*	☐	☐	☐	☐	☐
22	*My co-workers and I are committed to the goals of this university.*	☐	☐	☐	☐	☐
23	*If I shared my problems with my co-workers, I know that they will respond constructively and caringly.*	☐	☐	☐	☐	☐
24	*Most people, whose opinion I value, would approve of my sharing my work experience and know-how with my co-workers.*	☐	☐	☐	☐	☐
25	*Sharing my work experience and know-how with my co-workers is valuable to me.*	☐	☐	☐	☐	☐
26	*I intend to share expertise from my education and training with my co-workers more frequently in the future.*	☐	☐	☐	☐	☐
27	*I have the ability to share my work experience and know-how with my co-workers.*	☐	☐	☐	☐	☐
28	*Sharing my work experience and know-how with my co-workers is good.*	☐	☐	☐	☐	☐
29	*I will always share my know-where and know-whom with my co-workers at their request.*	☐	☐	☐	☐	☐
30	*My co-workers are generally not competent in what they do at work.*	☐	☐	☐	☐	☐
31	*My co-workers and I do not share the same vision and ambitions at work.*	☐	☐	☐	☐	☐
32	*My co-workers are generally knowledgeable about their job.*	☐	☐	☐	☐	☐
33	*My social relationships at work provide me with access to my co-workers work experience and know-how.*	☐	☐	☐	☐	☐
34	*My co-workers and I share a commitment to a common purpose.*	☐	☐	☐	☐	☐

35	*If I shared my work experience and know-how with my co-workers, they will be willing to share their work experience and know-how with me.*	☐	☐	☐	☐	☐

SECTION B: GENERAL INFORMATION

SpecifyDepartment: ________________________________Permanent Staff Member ☐ Non Permanent Staff Member

Job Position:

Management:

Senior Management ☐ Middle Management ☐ Junior Management ☐

Academic:
Full Professor/Associate ☐ Senior Lecturer ☐ Lecturer ☐ JuniorLecturer ☐

Administrative:☐**Technicians:** ☐

Age: 18-29 ☐ 30-39 ☐ 40-49 ☐ 50-59 60-69 ☐0+ ☐

Race: White ☐ Black ☐ Asian ☐ Coloured ☐

Gender: Male ☐ Female ☐

Highest Education Obtained: High School ☐ College ☐ Diploma ☐

Degree ☐ Honours ☐ Masters ☐ Doctorate ☐

Length of Service: 1-5 years ☐ 6-10 years ☐ 11-15 years ☐ 16-20 years ☐

21-25 ☐ 26-30 ☐ 31-35 ☐ 36-40 ☐ 41+ ☐

APPENDIX B2 - INTERVIEW GUIDE

I am interested in whether you have contact with people in your department and in other departments, in order to share information and knowledge, such as practical experience and know-how. Can you tell me about the last time that you shared information or knowledge with another member of staff or when someone shared their knowledge with you? Was this experience beneficial to you? Did it change your attitude? Did it change your behavior? Did it lead to specific actions?

- Are you willing to share your knowledge with your co-workers in the future?
- What do you believe are the advantages of sharing knowledge with your co-workers?
- What do you believe are the disadvantages of sharing knowledge with your co-workers?
- Do your co-workers believe that you should share your knowledge with them and others?
- When it comes to sharing knowledge, there might be individuals (other people) who think that you should share your knowledge with your co-workers. Tell me about the individual's who would approve or think that you should share your knowledge. Tell me about the individual's who would disapprove of or think that you should not share your knowledge.
- Please tell me about any factors that would make it easy or enable you to share your knowledge with your co-workers. What factors would make it difficult or prevent you from sharing your knowledge with your co-workers?
- How likely are you to share your knowledge in the future?
- Do you believe that people in this university find it easy to share knowledge with others in the university?
- What consequences occur for not sharing knowledge?
- Do the people that you share information with, have the same shared vision?(i.e., values, beliefs, attitudes, work ethics and goals). How does this affect your information sharing?
- Do you have strong network ties (i.e., relationships) in your department?
- Do you use your social networks (i.e., relationships) to gain knowledge? How do you use them and for what purpose?
- Do you obtain knowledge more from formal or informal relationships?
- Do you trust the people in your university?
- What do you think about the university's capacity in terms of transferring knowledge about work activities? (i.e., how to do your job).
- In this university, is there a proper way of acting in the social system and in terms of your beliefs, what is that proper way?

APPENDIX B3 - MEASUREMENT CONSTRUCTS WITH PRIOR STUDIES

Measurement Construct	H. and Q.	Measurement Items	Prior Studies that have used the Measurement Item
Structural Dimension			
Network ties.	H.1+3 Q.11	I have a network of close co-workers from similar social and work groups, with whom I can share my work experience and 'know-how'.	
	H.1+3 Q.21	In general, I have a very good, close working relationship with my co-workers.	Chow and Chan 2008: 464; Fishbein and Ajzen 1975: 1; Levin et al., 2002: 38; Price and Mueller 1986: 1.
	H.1+3 Q.12	Many of my co-workers are close friends, i.e., people that I feel at ease with or can talk to about private matters.	Robinson and Shaver 1973: 1.
Network resources.	H.2+3 Q.14	I have gained information and knowledge through my work social network.	
	H.2+3 Q.33	My social relationships, at work, provide me with access to my co-workers work experience and 'know-how'.	
	H.2+3 Q.7	I have gained resources through my social relationships at work.	
Relational Dimension			
Affect-based trust.	H.4+6+8 Q.6	I do not trust my co-workers.	Butler 1991: 643; Cook and Wall 1980: 39; Kim and Ju 2008: 288; Levin et al. 2002: 38; Madhavan and Grover 1998: 1; Moran 2005: 1129; McAllister, 1995: 24; Nelson and Cooprider,1996: 409; Ross and Weiland 1996: 228.

	H.4+6+8 Q.17	My co-workers and I have a sharing relationship. We can freely share our ideas, feelings and hopes.	Mc Allister 1995: 24; Yang and Far, 2009: 216.
	H.4+6+8 Q.1	My co-workers will always keep the promises they make to me.	Chiu, Hsu and Wang 2006: 1879.
Cognitive-based trust.	H.5+6+8 Q.30	My co-workers are generally not competent in what they do at work.	Chay et al. 2007: 6; Gefen 2000: 725; Levin et al. 2002: 38.
	H.5+6+8 Q.8	My co-workers are reliable.	
	H.5+6+8 Q.32	My co-workers are generally knowledgeable about their job.	Chay et al. 2007: 6.
Shared norms and values.	H.7+8 Q.10	In general, my norms and values and the norms and values held by my co-workers are very similar.	Brashear, Boles, Bellenger and Brooks 2003: 189; Yang and Farn 2009: 217.
Norms of social support.	H.7+8 Q.23	If I shared my problems with my co-workers, I know that they will respond constructively and caringly.	Mc Allister, 1995 Rioux and Penner 2001: 1306; Chay et al. 2007: 5; Yang and Farn 2009: 210.
	H.7+8 Q.4	There are people among my co-workers who give me help, support and encouragement.	Chay et al. 2007: 5; Rioux and Penner 2001: 1306.
Norms of reciprocity.	H.7+8 Q.35	If I shared my work experience and ‘know-how’ with my co-workers, they will be willing to share their work experience and ‘know-how’ with me.	
Cognitive Dimension			
Shared vision.	H.9+11 Q.31	My co-workers and I do not share the same vision and ambitions at work.	Chow and Chan 2008: 464; Tsai and Ghoshal 1998: 470.
	H.9+11 Q.5	There is total agreement on my department’s vision across all levels and functions.	Hoe and McShane 2010: 374; Sinkula, Baker and Noordewier 1997: 305.
	H.9+11 Q.34	My co-workers and I share a commitment to a common purpose.	Levin et al. 2002: 38.
Shared goals.	H.10+11 Q.13	My co-workers and I, agree on what is important at work. We share the same collective work goals.	Chow and Chan, 2008: 464; Moran 2005: 1129.
	H.10+11	My co-workers and I are	Chow and Chan

	Q.16	enthusiastic about pursuing the collective goals and mission of the university.	2008: 464; Hoe and McShane 2010; 374; Sinkula, Baker and Noordewier 1997: 305; Tsai and Ghoshal, 1998: 470.
	H.10+11 Q.22	My co-workers and I are committed to the goals of this university.	Hoe and McShane 2010: 374; Sinkula, Baker and Noordewier 1997: 305.
'Reasoned Action'			
Attitude towards tacit knowledge sharing/ Positive attitude.	H.13+17 Q.28	Sharing my work experience and 'know-how' with my co-workers is good.	Ajzen and Fishbein 1980: 1; Fishbein and Ajzen 2010:79; Yang et al. 2006: 18.
	H.13+17 Q.19	Sharing my work experience and 'know-how' with my co-workers is an enjoyable experience.	Bock et al. 2005: 34.
	H.13+17 Q.25	Sharing my work experience and 'know-how' with my co-workers is valuable to me.	Ajzen and Fishbein 1980: 1; Bock et al., 2005: 34; Yang et al. 2006: 18.
Perceived norms about tacit knowledge sharing.	H.14+15+ 17 Q.3	My boss thinks that I should share my work experience and 'know-how' with my co-workers.	Bock et al. 2005: 34; Fishbein and Ajzen 1975: 1.
	H.14+15+ 17 Q.15	My co-workers think that I should share my work experience and 'know-how' with other staff members.	Bock et al., 2005: 34; Fishbein and Ajzen 1975: 1.
	H.14+15+ 17 Q.24	Most people, whose opinion I value, would approve of my sharing my work experience and 'know-how' with my co-workers.	
Perceived behavioural control over the sharing of tacit knowledge.			
Perceived capacity/Ability.	H.16+17 Q.27	I have the ability to share my work experience and 'know-how' with my co-workers.	Armitage et al. 1999: 301; Fishbein and Ajzen 2010: 155; Lin and Lee 2007: 125; Yang and Farn 2009: 217.
Perceived capacity/Confidence.	H.16+17 Q.20	I have the confidence to share my work experience	Armitage et al. 1999: 301;

		and 'know-how' with my co-workers.	Armitage and Conner 2001: 479; Lin and Lee2007: 125; Yang and Farn 2009: 217.
Perceived autonomy.	H.16+17 Q.9	Whether I share my work experience or 'know-how', with my co-workers, is entirely up to me.	Armitage et al., 1999: 301; Armitage and Conner 2001: 480; Fishbein and Ajzen 2010; 155; Yang and Farn 2009: 217.
Perceived autonomy.	H.16+17 Q.2	I have a great deal of personal control over the amount of work experience and 'know-how' that I share with my co-workers.	Armitage and Conner 2001: 480; Fishbein and Ajzen 2010: 155.
Intention to share tacit knowledge.	Q.18	I intend to share my work experience and 'know-how', with my co-workers, more frequently in the future.	Bock et al. 2005: 34; Chow and Chan 2008: 464; Fishbein and Ajzen 2010: 39; Kim and Ju 2008: 288; Reychav and Weisberg 2009: 298;Yang and Farn 2009: 217.
	Q.29	I will always share my 'know-where' and 'know-whom', with my co-workers, at their request.	Bock et al., 2005: 35; Fishbein and Ajzen, 2010: 39; Reychav and Weisberg, 2009: 299.
	Q.26	I intend to share expertise from my education and training with my co-workers more frequently in the future.	Bock et al. 2005: 35; Fishbein and Ajzen 2010: 39; Reychav and Weisberg 2009: 299.

APPENDIX C

DEFINITIONS

APPENDIX C – DEFINITIONS

Table C1 - Definitions of Social Capital

Author	Definition
Adler and Kwon (2002: 23).	"the goodwill available to an individual or group. Its source lies in the structure and content of the actor's social relations. Its effects flow from the information, influence and solidarity it make available to the actor".
Baker (1990: 619).	"a resource that actors derive from specific social structures and then use to pursue their interests. It is created by changes in the relationship among actors".
Belliveau, O'Reilly, and Wade (1996: 1572).	"an individual's personal network and elite institutional affiliations".
Bourdieu,(1986: 248).	"the aggregate of the actual or potential resources that are linked to the possession of a durable network, which is consisted of more or less institutionalized relationships of mutual acquaintance and recognition".
Boxman, De Graaf and Flap (1991: 52).	"the number of people who can be expected to provide support and the resources those people have at their disposal".
Brehm and Rahn (1997: 999).	"the web of cooperative relationships between citizens that facilitate resolution of collective action problems".
Grootaert and Bastelaer (2002: 2).	"institutions, relationships, attitudes, and values that govern interactions among people and contribute to economic and social development".
Inglehart (1997: 188).	"a culture of trust and tolerance, in which extensive networks of voluntary associations emerge".
Knoke (1999: 18).	"the process by which social actors create and mobilize their network connections within and between organisations to gain access to other social actors' resources".

Lin (2001: 29).	“resources embedded in one’s social networks, resources that can be accessed or mobilized through ties in the networks”.
Loury (1992: 100).	“naturally occurring social relationships among person which promote or assist the acquisition of skills and traits valued in the market place…an asset which may be as significant as financial bequests in accounting for the maintenance of inequality in our society”.
Portes (1998b: 6).	“the ability of actors to secure benefits by virtue of membership in social networks or other social structures”.
Portes and Sensenbrenner (1993: 1323).	“those expectation for action within a collectivity that affect the economic goals and goal-seeking behaviour of its members, even if these expectations are not oriented toward the economic sphere”.
Rose (1999: 1422).	“the stock of formal or informal social networks that individuals use to produce or allocate goods and services”.
Schiff (1992: 160).	“the set of elements of the social structure that affects relations among people and are inputs or arguments of the production and/or utility function”.
Woolcock (1998: 153).	“the information, trust, and norms of reciprocity inhering in one’s social networks”.

C2 Definitions of Measurement Constructs

Measurement	Definition of Measurement Constructs
Structural Dimension of Social Capital	
Social network.	"The degree of contact and accessibility of one with other people" (Chow and Chan 2008: 464; Nahapiet and Ghoshal 1998: 242).
	"A set of actors and the set of ties representing some relationship or lack of relationship-between the actors" (Brass, Butterfield and Skaggs1998: 17).
Relational Dimension of Social Capital	
Trust.	"A type of expectation that alleviates the fear that one's exchange partner will act opportunistically" (Bradach and Eccles 1989: 98).
	"The expectations that arise within a community of regular, honest, and cooperative behaviour, based on commonly shared norms, on the part of other members of that community" (Fukuyama 1995b: 26).
	"The willingness of a party to be vulnerable to the actions of another party" (Mayer, Davis and Schoorman 1995: 712).
	"The degree of one's willingness to be vulnerable to the actions of other people" (Chow and Chan 2008: 464; Nahapiet and Ghoshal 1998: 242).
	"The belief that the results of a co-worker's intended action will be appropriate from our point of view" (Misztal 1996: 9).
	"A set of beliefs about the other party (trustee), which lead to one (trustor) to assume that the trustee's actions will have a positive consequence for the trustor's self" (Gabbay and

	Leenders 2003: 512).
Affect-based trust.	"Affect-based trust is based on the emotional ties linking individuals, such as friendship, love, or care. It includes perceptions of reciprocal concerns and interpersonal caring" (Lewis and Weigert 1985: 970; McAllister 1995: 24).
Cognitive-based trust.	"Cognitive-based trust includes judgment of the other person's competence, reliability, dependability and knowledge ability in the work setting" (Moran 2005: 1129).
Shared values.	"The extent to which partners have beliefs in common about what behaviours, goals, and polices are important or unimportant, appropriate or inappropriate, and right or wrong" (Morgan and Hunt 1994: 25).
Shared norms.	"Social norms refer to what is acceptable or permissible behaviour in a group or society" (Fishbein and Ajzen 2010: 129).
Social norms.	"General, internalized sets of accepted behavior for members of the social network" (Hoffman, Hoelscher and Sherif 2005: 96).
	"Common belief system that allows participants to communicate their ideas and make sense of common experiences" (Adler and Kwon 2000: 18).
Norms of knowledge-based reciprocity.	"Actions that are contingent on rewarding reactions from others that cease when these expectations are not forthcoming" (Blau 1964: 6).
	"Knowledge exchanges that are mutual and perceived by the authors as fair" (Chiu 2006: 6).
	"the degree to which one believes one can improve mutual relationships with others through knowledge sharing" (Bock et al., 2005: 93).
Cognitive Dimension of Social Capital	

Shared vision.	“Shared vision refers to a clear and common picture of a desired future state that members of a group or organisation identify with themselves” (Goh 1998: 15; Hoe and Mc Shane 2010: 370; Santos-Vijande et al. 2005: 187; Shane 2010: 370; Sinkula et al. 1997: 305;Yang and Farn 2009: 212).
Shared goals.	“The degree to which one has collective goals, missions and visions with other people” (Chow and Chan, 2008: 464).
	“Shared goals represent the degree to which network members share a common understanding and approach to the achievement of network tasks and outcomes” (Inkpen and Tsang, 2005: 153).
‘Reasoned Action’ Dimensions	
Attitude toward knowledge sharing.	“The degree of one’s positive or negative feelings about sharing ones knowledge” (Bock et al. 2005: 30; Chow and Chan 2008: 464; Fishbein and Ajzen 1975: 45, 1981: 339; Hutchings and Michailova 2004: 82; Lin and Lee 2004 :120; Price Mueller, 1986: 65; Requena 2003: 332; Robinson and Shaver 1973: 60).
	“A latent disposition or tendency to respond with some degree of favorableness to a psychological object” (Fishbein and Ajzen 2010: 76).
Subjective norms about knowledge sharing.	“The degree to which one believes that people who bear pressure on one's actions expect one to perform the behavior in question multiplied by the degree of one's compliance with each of one's referents” (Bock et al. 2005: 30; Fishbein and Ajzen, 1975: 45).
Perceived norms about knowledge sharing.	“Perceived social pressure to perform or not perform a behavior” (Fishbein and Ajzen 2010: 130).
	“The degree of one’s perceived social pressure from important others to share or not to share one’s knowledge” (Chow and Chan 2008: 464; Requena 2003: 332; Hutchings and

	Michailova 2004: 82).
Perceived behavioral control.	“People’s perceptions of the degree to which they are capable of, or have control over, performing a given behavior” (Ajzen and Fishbein 2010: 154).
	“Perceived behavioural control is a measure of self-prediction and tells you how likely it is that the person will perform the behaviour” (Armitage and Conner 2001: 477).
Behavioral intention.	“An indication of an individual's readiness to perform a given behavior. It is assumed to be an immediate antecedent of behavior. It is based on attitude toward the behavior, perceived norm, and perceived behavioral control, with each predictor weighted for its importance in relation to the behavior and population of interest” (Ajzen 2002: 666).
Intention to share knowledge.	“The degree of one’s belief that one will engage in knowledge sharing behavior” (Chow and Chan 2008: 464; Requena 2003: 332; Hutchings and Michailova 2004: 82).
	“Readiness to engage in behaviour, a construct that incorporates such concepts as willingness, behavioural expectation, and trying” (Fishbein and Ajzen 2010: 43).
Behaviour.	“An individual's observable response in a given situation with respect to a given target” (Ajzen 2001: 35).

APPENDIX D

STATISTICAL TABLES

APPENDIX D1

DEMOGRAPHIC ANALYSIS

Table D1.1 Faculty - Frequency, Percent and Cumulative Percent

Faculty	Frequency	Percent	Cumulative Percent
Executive Management	7	1.3	1.3
Accounting and Informatics	33	6.0	7.2
Applied Science	41	7.4	14.6
Arts and Design	47	8.5	23.1
Engineering and the Built Environment	48	8.7	31.8
Health Sciences	68	12.3	44.0
Management Sciences	66	11.9	56.0
Support - academic	83	15.0	70.9
Support financial/administration	47	8.5	79.4
Support - general and associations	29	5.2	84.7
Unspecified	85	15.3	100.0
Total	554	100.0	

Table D1.2 Faculty - Means and Standard Deviations

Measurement Construct	Faculty	N	Mean	Std. Deviation
NT	Executive Management	7	3.3333	.43033
	Accounting and Informatics	33	3.2424	.85095
	Applied Science	41	3.5285	.64539
	Arts and Design	47	3.2979	.81423
	Engineering and the Built Env.	48	3.2708	.79495
	Health Sciences	68	3.4363	.88146
	Management Sciences	66	3.3636	.81593
	Support - Academic	83	3.4940	.77628
	Support - Financial/administration	47	3.3191	.72217
	Support - General and Associations	29	3.2759	.85016
	Total	469	3.3767	.79305
NR	Executive Management	7	3.5238	.76636
	Accounting and Informatics	33	3.3737	.69100
	Applied Science	41	3.6667	.65828
	Arts and Design	47	3.5106	.81606
	Engineering and the Built Env.	48	3.4583	.75207
	Health Sciences	68	3.5539	.89147
	Management Sciences	66	3.6414	.87376
	Support - Academic	83	3.5422	.77339
	Support - Financial/administration	47	3.3262	.80304
	Support - General and Associations	29	3.4253	.69520
	Total	469	3.5160	.79172
TRST	Executive Management	7	3.5476	.45860

	Accounting and Informatics	33	3.3232	.78056
	Applied Science	41	3.5366	.82033
	Arts and Design	47	3.6206	.88308
	Engineering and the Built Env.	48	3.5417	.85986
	Health Sciences	68	3.6814	.82746
	Management Sciences	66	3.5909	.74889
	Support - Academic	83	3.5221	.76720
	Support - Financial/administration	47	3.4362	.80123
	Support - General and Associations	29	3.3046	.99110
	Total	469	3.5323	.81575
SNV	Executive Management	7	3.8571	.51755
	Accounting and Informatics	33	3.5227	.73251
	Applied Science	41	3.6951	.71918
	Arts and Design	47	3.6064	.72932
	Engineering and the Built Env.	48	3.5573	.71875
	Health Sciences	68	3.6801	.71998
	Management Sciences	66	3.5720	.78785
	Support - Academic	83	3.5934	.73947
	Support-Financial/administration	47	3.4734	.55471
	Support - General and Associations	29	3.3190	.79310
	Total	469	3.5794	.72258
SV	Executive Management	7	3.5714	.56811
	Accounting and Informatics	33	3.0101	.88774
	Applied Science	41	3.3902	.95132
	Arts and Design	47	3.4113	.89608
	Engineering and the Built Env.	48	3.3889	.98531
	Health Sciences	68	3.5049	.87813
	Management Sciences	66	3.4394	.83953
	Support - Academic	83	3.4297	.87502
	Support - Financial/administration	47	3.3475	.84829
	Support - General and Associations	29	3.4368	.85960
	Total	469	3.3973	.88470
SG	Executive Management	7	3.7619	.49868
	Accounting and Informatics	33	3.2727	.92592
	Applied Science	41	3.7398	.84167
	Arts and Design	47	3.6879	.96910
	Engineering and the Built Env.	48	3.4375	.91779
	Health Sciences	68	3.5931	.84415
	Management Sciences	66	3.6717	.89154
	Support - Academic	83	3.7028	.88347
	Support - Financial/administration	47	3.6241	.88361
	Support - General and Associations	29	3.5402	1.17654
	Total	469	3.6098	.90770
ATT	Executive Management	7	3.9524	.82616
	Accounting and Informatics	33	3.7778	.54433
	Applied Science	41	4.0894	.56285
	Arts and Design	47	4.0355	.59480
	Engineering and the Built Env.	48	3.8819	.62072
	Health Sciences	68	3.9853	.73625
	Management Sciences	66	4.0303	.63172
	Support - Academic	83	4.0643	.64278
	Support - Financial/administration	47	4.0142	.69837

	Support - General and Associations	29	4.0805	.51682
	Total	469	4.0028	.63716
PN	Executive Management	7	4.0952	.89679
	Accounting and Informatics	33	3.6869	.46353
	Applied Science	41	3.7724	.56979
	Arts and Design	47	3.8014	.58425
	Engineering and the Built Env.	48	3.6597	.50290
	Health Sciences	68	3.6275	.76950
	Management Sciences	66	3.7273	.68415
	Support - Academic	83	3.8112	.62511
	Support- Financial/administration	47	3.6454	.67889
	Support - General and Associations	29	3.6322	.59325
	Total	469	3.7207	.63524
PBC	Executive Management	7	3.7143	.35635
	Accounting and Informatics	33	3.9192	.52725
	Applied Science	41	3.9512	.50311
	Arts and Design	47	3.9716	.56393
	Engineering and the Built Env.	48	3.9514	.51452
	Health Sciences	68	3.9363	.75806
	Management Sciences	66	4.0303	.60405
	Support - Academic	83	4.0241	.55285
	Support- Financial/administration	47	3.9149	.70357
	Support - General and Associations	29	3.9310	.60013
	Total	469	3.9645	.59967
INT	Executive Management	7	3.9048	.83254
	Accounting and Informatics	33	3.7576	.64157
	Applied Science	41	3.8780	.55154
	Arts and Design	47	3.9787	.59549
	Engineering and the Built Env.	48	3.7153	.54138
	Health Sciences	68	3.8824	.77431
	Management Sciences	66	3.9596	.67562
	Support - Academic	83	3.9598	.63416
	Support- Financial/administration	47	3.8511	.58487
	Support - General and Associations	29	4.0115	.63297
	Total	469	3.8955	.64216

Table D1.3 Faculty - Kruskal Wallis Test

	NT	NR	TRST	SNV	SV	SG	ATT	PN	PBC	INT
Chi-Square	6.599	10.490	10.656	10.943	9.379	10.481	10.949	5.787	5.506	10.264
df	9	9	9	9	9	9	9	9	9	9
Asymp. Sig.	.679	.312	.300	.280	.403	.313	.279	.761	.788	.330

a. Kruskal Wallis Test

b. Grouping Variable: Faculty

Table D1.4 Permanent and Non-Permanent Staff - Frequency, Percent and Cumulative Percent

Permanency	Frequency	Percent	Cumulative Percent
Permanent	433	78.2	78.2
Non-permanent	120	21.7	99.8
Unspecified	1	.2	100.0
Total	554	100.0	

Table D1.5 Permanent and Non-Permanent Staff - Means and Standard Deviations

Measurement Construct	Permanency	N	Mean	Std. Deviation
NT	Permanent	433	3.2918	.83353
	Non-permanent	120	3.5639	.68572
	Total	553	3.3508	.81099
NR	Permanent	433	3.4142	.84125
	Non-permanent	120	3.7583	.63210
	Total	553	3.4888	.81250
TRST	Permanent	433	3.3865	.83665
	Non-permanent	120	3.8111	.62545
	Total	553	3.4786	.81415
SNV	Permanent	433	3.4342	.78247
	Non-permanent	120	3.8083	.56763
	Total	553	3.5154	.75661
SV	Permanent	433	3.2818	.91352
	Non-permanent	120	3.6167	.77742
	Total	553	3.3544	.89582
SG	Permanent	433	3.4704	.96343
	Non-permanent	120	3.8694	.70253
	Total	553	3.5570	.92732
ATT	Permanent	433	3.9523	.69484
	Non-permanent	120	4.1000	.48237
	Total	553	3.9843	.65705
PN	Permanent	433	3.6875	.64814
	Non-permanent	120	3.7861	.54111
	Total	553	3.7089	.62733
PBC	Permanent	433	3.9407	.63572
	Non-permanent	120	3.9806	.49892
	Total	553	3.9494	.60846
INT	Permanent	433	3.8630	.67640
	Non-permanent	120	3.9583	.55771
	Total	553	3.8837	.65319

Table D1.6 Permanent and Non-Permanent Staff - Results of Kruskal Wallis Test

	NT	NR	TRST	SNV	SV	SG	ATT	PN	PBC	INT
Chi-Square	9.062	14.934	24.948	23.390	12.637	15.784	4.053	1.142	.357	1.668
df	1	1	1	1	1	1	1	1	1	1
Asymp. Sig.	.003	.000	.000	.000	.000	.000	.044	.285	.550	.197

a. Kruskal Wallis Test
b. Variable Permanent and Non-Permanent

Table D1.7 Job Position - Frequency, Percent and Cumulative Percent

Job Position	Frequency	Percent	Cumulative Percent
Senior management	9	1.6	1.6
Middle management	12	2.2	3.8
Junior management	15	2.7	6.5
Full prof./Ass. Prof.	14	2.5	9.0
Senior lecturer	58	10.5	19.5
Lecturer	180	32.5	52.0
Junior lecturer	36	6.5	58.5
Administrative	183	33.0	91.5
Technician	45	8.1	99.6
Unspecified	2	.4	100.0
Total	554	100.0	

Table D1.8 Job Position - Means and Standard Deviations

Measurement Construct	Job Position	N	Mean	Standard Deviation
NT	Senior management	9	3.9259	.46481
	Middle management	12	3.5278	.55883
	Junior management	15	2.9111	1.01939
	Full prof./Ass prof.	14	3.0952	1.22250
	Senior lecturer	58	3.1954	.94701
	Lecturer	180	3.3593	.79528
	Junior lecturer	36	3.5093	.57727
	Administrative	183	3.3953	.76143
	Technician	45	3.2519	.84134
	Total	552	3.3490	.81064
NR	Senior management	9	3.5556	.60093
	Middle management	12	3.5833	.66856
	Junior management	15	3.4889	.64077
	Full prof./Ass prof.	14	3.3571	1.27745
	Senior lecturer	58	3.1839	.96966
	Lecturer	180	3.5778	.72432
	Junior lecturer	36	3.9074	.69744
	Administrative	183	3.4262	.81079
	Technician	45	3.4370	.83733

	Total	552	3.4879	.81294
TRST	Senior management	9	3.6667	.68718
	Middle management	12	3.2639	.64533
	Junior management	15	3.1889	.90164
	Full prof./Ass prof.	14	3.5238	.91019
	Senior lecturer	58	3.1667	.95870
	Lecturer	180	3.5880	.69525
	Junior lecturer	36	3.8750	.77190
	Administrative	183	3.4772	.83458
	Technician	45	3.2259	.82889
	Total	552	3.4780	.81475
SNV	Senior management	9	3.9722	.40397
	Middle management	12	3.5000	.57406
	Junior management	15	3.0333	.61140
	Full prof./Ass prof.	14	3.3750	1.17158
	Senior lecturer	58	3.2241	.93035
	Lecturer	180	3.6222	.65507
	Junior lecturer	36	3.8819	.59307
	Administrative	183	3.5205	.72764
	Technician	45	3.2611	.86267
	Total	552	3.5149	.75723
SV	Senior management	9	3.8519	.80123
	Middle management	12	3.5556	.55656
	Junior management	15	3.0444	.77528
	Full prof./Ass prof.	14	3.1905	1.15258
	Senior lecturer	58	3.0115	.97526
	Lecturer	180	3.4130	.85972
	Junior lecturer	36	3.5556	.84703
	Administrative	183	3.4262	.83234
	Technician	45	3.1037	1.10514
	Total	552	3.3539	.89653
SG	Senior management	9	4.1111	.66667
	Middle management	12	3.8056	.54045
	Junior management	15	3.2889	.96664
	Full prof./Ass prof.	14	3.3571	1.34904
	Senior lecturer	58	3.1264	1.07936
	Lecturer	180	3.5981	.85271
	Junior lecturer	36	3.8519	.72788
	Administrative	183	3.6175	.90347
	Technician	45	3.4148	1.01543
	Total	552	3.5550	.92695
ATT	Senior management	9	4.5185	.47467
	Middle management	12	4.1389	.30011
	Junior management	15	3.8222	.71121
	Full prof./Ass prof.	14	3.8333	1.13039
	Senior lecturer	58	3.8678	.85142
	Lecturer	180	3.9796	.54490
	Junior lecturer	36	4.0833	.55990
	Administrative	183	4.0364	.64895
	Technician	45	3.8074	.72296
	Total	552	3.9837	.65748
PN	Senior management	9	4.1481	.52997

	Middle management	12	3.7778	.32824
	Junior management	15	3.5111	.53254
	Full prof./Ass prof.	14	3.5714	.95567
	Senior lecturer	58	3.7644	.68685
	Lecturer	180	3.7407	.53616
	Junior lecturer	36	3.8519	.62460
	Administrative	183	3.6667	.66115
	Technician	45	3.5704	.69856
	Total	552	3.7089	.62790
PBC	Senior management	9	4.2963	.48432
	Middle management	12	4.1111	.49916
	Junior management	15	3.8000	.57459
	Full prof./Ass prof.	14	3.9762	.98245
	Senior lecturer	58	4.0000	.74405
	Lecturer	180	3.9833	.51697
	Junior lecturer	36	3.9259	.55269
	Administrative	183	3.9399	.62656
	Technician	45	3.7407	.61909
	Total	552	3.9499	.60889
INT	Senior management	9	4.3704	.71578
	Middle management	12	4.0278	.43712
	Junior management	15	3.7778	.51434
	Full prof./Ass prof.	14	3.5714	.93761
	Senior lecturer	58	3.7529	.86869
	Lecturer	180	3.8926	.57428
	Junior lecturer	36	4.0741	.59688
	Administrative	183	3.9180	.60922
	Technician	45	3.7111	.74060
	Total	552	3.8829	.65350

Table D1.9 Job Position - Results of Kruskal Wallis test

	NT	NR	TRST	SNV	SV	SG	ATT	PN	PBC	INT
Chi-Square	13.316	17.294	26.777	34.897	16.960	18.888	15.304	11.370	14.257	12.703
df	8	8	8	8	8	8	8	8	8	8
Asymp. Sig.	.101	.027	.001	.000	.031	.015	.054	.182	.075	.122

a. Kruskal Wallis Test

b. Grouping Variable: Job position

Table D1.10 Age - Frequency, Percent and Cumulative Percent

Age	Frequency	Percent	Cumulative Percent
18 - 29	88	15.9	15.9
30 - 39	144	26.0	41.9
40 - 49	145	26.2	68.1
50 - 59	126	22.7	90.8
60 - 69	44	7.9	98.7
70+	4	.7	99.5
Unspecified	3	.5	100.0

Age	Frequency	Percent	Cumulative Percent
18 - 29	88	15.9	15.9
30 - 39	144	26.0	41.9
40 - 49	145	26.2	68.1
50 - 59	126	22.7	90.8
60 - 69	44	7.9	98.7
70+	4	.7	99.5
Unspecified	3	.5	100.0
Total	554	100.0	

Table D1.11 Age - Means and Standard Deviations

Measurement Construct	Age	N	Mean	Std. Deviation
NT	18 - 29	88	3.4470	.77457
	30 - 39	144	3.4097	.75901
	40 - 49	145	3.2184	.86814
	50 - 59	126	3.3466	.81802
	60 - 69	44	3.4470	.75720
	70+	4	3.4167	.68718
	Total	551	3.3539	.80577
NR	18 - 29	88	3.6402	.66132
	30 - 39	144	3.5278	.82360
	40 - 49	145	3.5080	.89502
	50 - 59	126	3.3148	.80587
	60 - 69	44	3.4924	.69879
	70+	4	3.9167	.16667
	Total	551	3.4918	.80847
TRST	18 - 29	88	3.8068	.70751
	30 - 39	144	3.5162	.74335
	40 - 49	145	3.3138	.89138
	50 - 59	126	3.3386	.83452
	60 - 69	44	3.5947	.72283
	70+	4	4.0417	.59900
	Total	551	3.4788	.81523
SNV	18 - 29	88	3.8693	.57732
	30 - 39	144	3.5122	.75744
	40 - 49	145	3.3638	.82810
	50 - 59	126	3.4206	.74810
	60 - 69	44	3.5455	.65653
	70+	4	4.0000	.20412
	Total	551	3.5154	.75663
SV	18 - 29	88	3.6212	.85647
	30 - 39	144	3.3519	.86167
	40 - 49	145	3.2483	.95078
	50 - 59	126	3.2381	.90122
	60 - 69	44	3.4545	.79758
	70+	4	4.1667	.19245
	Total	551	3.3557	.89629

SG	18 - 29	88	3.9242	.76268
	30 - 39	144	3.5509	.91123
	40 - 49	145	3.4368	1.00578
	50 - 59	126	3.4392	.94436
	60 - 69	44	3.5909	.76033
	70+	4	3.9167	.31914
	Total	551	3.5608	.92238
ATT	18 - 29	88	4.0455	.60475
	30 - 39	144	3.9861	.61435
	40 - 49	145	3.8943	.73462
	50 - 59	126	4.0635	.64734
	60 - 69	44	3.9621	.67136
	70+	4	3.8333	.19245
	Total	551	3.9861	.65752
PN	18 - 29	88	3.6515	.57382
	30 - 39	144	3.7616	.59611
	40 - 49	145	3.6552	.64599
	50 - 59	126	3.7460	.69209
	60 - 69	44	3.7500	.59335
	70+	4	3.6667	.27217
	Total	551	3.7108	.62689
PBC	18 - 29	88	3.9053	.60214
	30 - 39	144	3.9352	.56066
	40 - 49	145	3.9034	.68371
	50 - 59	126	4.0212	.62218
	60 - 69	44	4.0152	.49782
	70+	4	4.0833	.16667
	Total	551	3.9492	.60955
INT	18 - 29	88	4.0038	.61171
	30 - 39	144	3.9329	.58680
	40 - 49	145	3.7954	.71921
	50 - 59	126	3.9101	.67516
	60 - 69	44	3.7197	.60975
	70+	4	3.5000	.19245
	Total	551	3.8826	.65222

Table D1.12 Age - Results of Kruskal Wallis Test

Test Statistics[a,b]

	NT	NR	TRST	SNV	SV	SG	ATT	PN	PBC	INT
Chi-Square	5.390	12.692	26.379	30.601	16.761	20.152	5.332	4.148	3.322	13.197
df	5	5	5	5	5	5	5	5	5	5
Asymp. Sig.	.370	.026	.000	.000	.005	.001	.377	.528	.650	.022

a. Kruskal Wallis Test

b. Grouping Variable: Age

Table D1.13 Race - Frequency, Percent and Cumulative Percent

Race	Frequency	Percent	Cumulative Percent
White	134	24.2	24.2

Black	193	34.8	59.0
Asian	206	37.2	96.2
Coloured	19	3.4	99.6
Unspecified	2	.4	100.0
Total	554	100.0	

Table D1.14 Race - Means and Standard Deviations

Measurement Construct	Race	N	Mean	Std. Deviation
NT	White	134	3.2264	.89424
	Black	193	3.4076	.74668
	Asian	206	3.4029	.81051
	Coloured	19	3.0526	.73083
	Total	552	3.3496	.81125
NR	White	134	3.4453	.85150
	Black	193	3.6079	.81152
	Asian	206	3.4191	.78928
	Coloured	19	3.3158	.70688
	Total	552	3.4879	.81294
TRST	White	134	3.3831	.84615
	Black	193	3.6632	.76791
	Asian	206	3.3843	.82078
	Coloured	19	3.2807	.70064
	Total	552	3.4780	.81475
SNV	White	134	3.3843	.79037
	Black	193	3.6995	.68015
	Asian	206	3.4454	.78499
	Coloured	19	3.2895	.59665
	Total	552	3.5140	.75664
SV	White	134	3.0995	.88147
	Black	193	3.6114	.86626
	Asian	206	3.3010	.89202
	Coloured	19	3.1053	.71191
	Total	552	3.3539	.89653
SG	White	134	3.2786	.94828
	Black	193	3.7772	.93380
	Asian	206	3.5421	.88352
	Coloured	19	3.4211	.63676
	Total	552	3.5562	.92797
ATT	White	134	3.8259	.67627
	Black	193	4.0864	.65398
	Asian	206	4.0065	.64431
	Coloured	19	3.8596	.47552
	Total	552	3.9855	.65706
PN	White	134	3.7239	.58315
	Black	193	3.7478	.58013
	Asian	206	3.6699	.70152
	Coloured	19	3.6316	.56541
	Total	552	3.7089	.62790

PBC	White	134	3.9005	.66670
	Black	193	3.9775	.56423
	Asian	206	3.9773	.61378
	Coloured	19	3.7018	.53165
	Total	552	3.9493	.60900
INT	White	134	3.6716	.66539
	Black	193	4.0898	.59414
	Asian	206	3.8398	.65577
	Coloured	19	3.7895	.55789
	Total	552	3.8847	.65336

Table D1.15 Race - Results of Kruskal Wallis Test

	NT	NR	TRST	SNV	SV	SG	ATT	PN	PBC	INT
Chi-Square	8.822	7.463	18.498	20.185	32.363	29.590	14.789	1.582	5.960	37.147
df	3	3	3	3	3	3	3	3	3	3
Asymp. Sig.	.032	.059	.000	.000	.000	.000	.002	.663	.114	.000

a. Kruskal Wallis Test

b. Grouping Variable: Race

Table D1.16 Gender - Frequency, Percent and Cumulative Percent

Gender	Frequency	Percent	Cumulative Percent
Male	247	44.6	44.6
Female	305	55.1	99.6
Unspecified	2	.4	100.0
Total	554	100.0	

Table D1.17 Gender - Means and Standard Deviations

Measurement Construct	Gender	N	Mean	Std. Deviation
NT	Male	247	3.3320	.75409
	Female	305	3.3639	.85571
NR	Male	247	3.5358	.76359
	Female	305	3.4492	.85009
TRST	Male	247	3.4831	.80847
	Female	305	3.4738	.82110
SNV	Male	247	3.5111	.75245
	Female	305	3.5164	.76125
SV	Male	247	3.3698	.92346
	Female	305	3.3410	.87544
SG	Male	247	3.5722	.90919
	Female	305	3.5432	.94419
ATT	Male	247	3.9879	.67229
	Female	305	3.9836	.64557

PN	Male	247	3.7571	.62716
	Female	305	3.6699	.62682
PBC	Male	247	3.9744	.59868
	Female	305	3.9290	.61747
INT	Male	247	3.8785	.68247
	Female	305	3.8896	.62989

Table D1.18 Gender - Results of Kruskal Wallis Test

	NT	NR	TRST	SNV	SV	SG	ATT	PN	PBC	INT
Chi-Square	.925	.688	.002	.003	.128	.001	.039	3.490	.821	.002
df	1	1	1	1	1	1	1	1	1	1
Asymp. Sig.	.336	.407	.969	.956	.721	.973	.843	.062	.365	.960

a. Kruskal Wallis Test

b. Grouping Variable: Gender

Table D1.19 Education - Frequency, Percent and Cumulative Percent

Education	Frequency	Percent	Cumulative Percent
High school	32	5.8	5.8
College	12	2.2	7.9
Diploma	81	14.6	22.6
Degree	118	21.3	43.9
Honours	81	14.6	58.5
Masters	187	33.8	92.2
Doctorate	42	7.6	99.8
Unspecified	1	.2	100.0
Total	554	100.0	

Table D1.20 Education - Means and Standard Deviations

Measurement Construct	Education	N	Mean	Std. Deviation
NT	High school	32	3.4687	.68187
	College	12	3.2222	1.01835
	Diploma	81	3.4074	.68920
	Degree	118	3.2740	.74297
	Honours	81	3.4938	.78548
	Masters	187	3.3030	.86325
	Doctorate	42	3.3413	1.02407
	Total	553	3.3508	.81099
NR	High school	32	3.4792	.56122
	College	12	3.5556	.82061
	Diploma	81	3.5062	.67518
	Degree	118	3.3898	.84317
	Honours	81	3.6502	.80433

	Masters	187	3.4991	.81531
	Doctorate	42	3.3651	1.08403
	Total	553	3.4888	.81250
TRST	High school	32	3.3177	.81469
	College	12	3.4167	.93339
	Diploma	81	3.4794	.73616
	Degree	118	3.5184	.81556
	Honours	81	3.5638	.84062
	Masters	187	3.4706	.82207
	Doctorate	42	3.3770	.85861
	Total	553	3.4786	.81415
SNV	High school	32	3.4688	.75869
	College	12	3.4583	.87797
	Diploma	81	3.5957	.65974
	Degree	118	3.4428	.72605
	Honours	81	3.6728	.75585
	Masters	187	3.4960	.71395
	Doctorate	42	3.3988	1.09051
	Total	553	3.5154	.75661
SV	High school	32	3.3750	.83709
	College	12	2.9722	.88144
	Diploma	81	3.5720	.77502
	Degree	118	3.3164	.90461
	Honours	81	3.3621	.85505
	Masters	187	3.3280	.94121
	Doctorate	42	3.2381	.97749
	Total	553	3.3544	.89582
SG	High school	32	3.6563	.80982
	College	12	3.3889	.94102
	Diploma	81	3.8395	.80814
	Degree	118	3.4887	.92725
	Honours	81	3.5885	.87285
	Masters	187	3.4902	.93664
	Doctorate	42	3.4127	1.19123
	Total	553	3.5570	.92732
ATT	High school	32	4.0417	.59115
	College	12	3.8056	.94771
	Diploma	81	3.9712	.58499
	Degree	118	3.9887	.65217
	Honours	81	4.0535	.62016
	Masters	187	3.9626	.63858
	Doctorate	42	3.9683	.89506
	Total	553	3.9843	.65705
PN	High school	32	3.7396	.72208
	College	12	3.5556	.53811
	Diploma	81	3.6461	.58771
	Degree	118	3.6582	.60930
	Honours	81	3.7613	.54066
	Masters	187	3.7166	.66479
	Doctorate	42	3.8571	.68330
	Total	553	3.7089	.62733
PBC	High school	32	3.9167	.60464

	College	12	3.8611	.43712
	Diploma	81	3.8971	.53656
	Degree	118	3.9011	.64834
	Honours	81	3.9835	.63879
	Masters	187	3.9840	.56721
	Doctorate	42	4.0159	.78244
	Total	553	3.9494	.60846
INT	High school	32	3.8542	.66633
	College	12	3.5556	.85674
	Diploma	81	3.8642	.53432
	Degree	118	3.9520	.61367
	Honours	81	3.8889	.61010
	Masters	187	3.8966	.64481
	Doctorate	42	3.7778	.95329
	Total	553	3.8837	.65319

Table D1.21 Education - Results of Kruskal Wallis Test

	NT	NR	TRST	SNV	SV	SG	ATT	PN	PBC	INT
Chi-Square	6.138	5.980	4.894	7.881	7.935	10.310	2.427	4.093	5.450	4.546
df	6	6	6	6	6	6	6	6	6	6
Asymp. Sig.	.408	.425	.558	.247	.243	.112	.877	.664	.488	.603

a. Kruskal Wallis Test
b. Grouping Variable: Highest education

APPENDIX D2

VALIDITY AND RELIABILITY

STATISTICAL TABLES

APPENDIX D2

VALIDITY AND RELIABILITY

STATISTICAL TABLES

Table D2.1 Analysis of Questions - Sign test results

	q1	q2	q3	q4	q5	q6rec	q7	q8	q9	q10
Z	-4.118	15.254	-14.715	19.136	-1.249	-8.169	9.340	9.977	13.235	-1.941
Asymp. Sig. (2-tailed)	.000	.000	.000	.000	.211	.000	.000	.000	.000	.052

	q11	q12	q13	q14 -	q15	q16	q17	q18	q19	q20
Z	-7.714	-.624	-10.516	12.948	11.489	-10.784	9.302	-16.160	16.858	18.248
Asymp. Sig. (2-tailed)	.000	.533	.000	.000	.000	.000	.000	.000	.000	.000

	q21	q22	q23	q24	q25	q26	q27	q28	q29	q30rec
Z	14.685	14.033	10.372	-19.604	19.158	17.946	21.379	21.200	19.938	-11.732
Asymp. Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

	q31rec	q32	q33	q34	q35
Z	-8.248	-16.545	-10.758	-12.461	-12.293
Asymp. Sig. (2-tailed)	.000	.000	.000	.000	.000

Table D2.2 Analysis of Measurement Constructs - Results of Wilcoxon Signed-Ranks Test

	NT	NR	TRST	SNV	SV	SG	ATT	PN	PBC	INT
Z	9.487[a]	12.129[a]	12.025[a]	13.351[a]	8.765[a]	12.012[a]	18.970[a]	17.609[a]	19.083[a]	18.600[a]
Asymp. Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

a. Based on positive ranks.

b. Wilcoxon Signed Ranks Test

APPENDIX D3

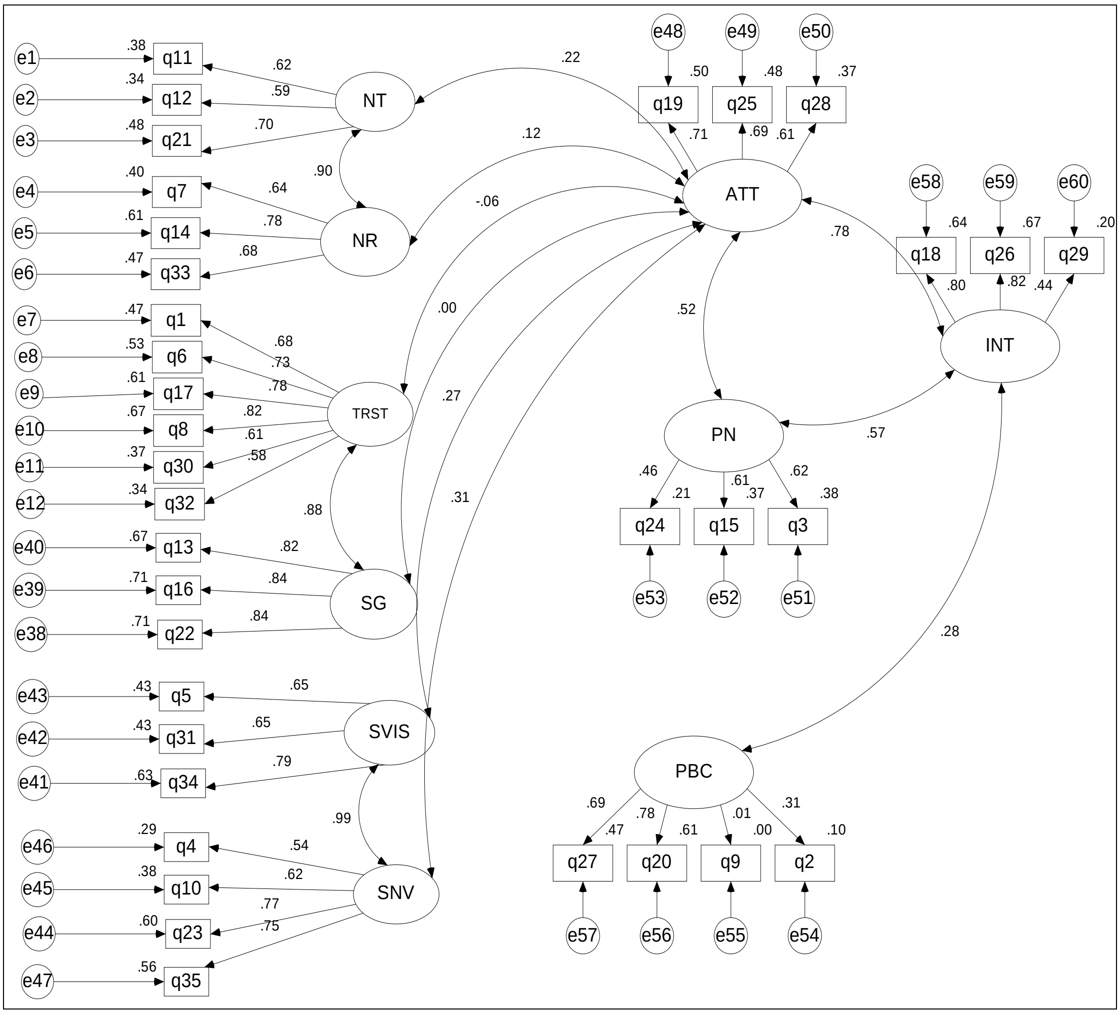
STUDY MODEL

STATISTICAL ANALYSIS

APPENDIX D3

STUDY MODEL - STATISTICAL ANALYSIS

Study Model - Measurement Model with Standardised Coefficients



Below are indices and estimated values in tables, as per Amos, Version 16.

Measurement Model - Fit Indices

Table D3.1 - CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	118	3956.538	547	.000	7.233
Saturated model	665	.000	0		
Independence model	70	10841.144	595	.000	18.220

CMIN/DF should be between 2 and 3 for an acceptable fit and <2 for a good fit.

Table D3.2 - CFI

Model	NFI	RFI	IFI	TLI	CFI
Default model	.635	.603	.669	.638	.667
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

CFI should be>.9 for an acceptable fit and >.95 for a good fit.

Table D3.3 - RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.106	.103	.109	.000
Independence model	.176	.174	.179	.000

RMSEA should be <.10 for a good fit and <.05 for a very good fit.

The fit indices for the model are:

The ratio of χ^2 (3956.5) to the degrees of freedom (547) was 7.233. Since this value is >3, it indicates that the data does not fit the model globally.

However, this statistic does suffer from limitations and a non-significant value may be unlikely even though the model may be a close fit to the data (Weston and Gore 2006: 742).

The comparative fit index (CFI) was 0.667 and the root mean square residual of approximation (RMSEA) was 0.106 (.103; .109. p = .005).

These fit indices indicate that there is a poor fit.

Measurement Model Identification

For this measurement model, there are 32 observed variables. The number of distinct sample moments is 665. The number of distinct parameters to be estimated is 118. The degrees of freedom is (665-118) = 547. Probability level = .000

The model is therefore over-identified and it is possible to test the model.

Table D3.4 - Regression Weights

			Estimate	S.E.	C.R.	P	Label
q32	<---	TRST	.706	.056	12.495	***	par_1
q30_recoded	<---	TRST	.911	.069	13.139	***	par_2
q8	<---	TRST	1.140	.066	17.162	***	par_3
q17	<---	TRST	1.141	.070	16.356	***	par_4
q6_recoded	<---	TRST	1.154	.074	15.497	***	par_5
q1	<---	TRST	1.000				
q19	<---	ATT	1.000				
q25	<---	ATT	.887	.058	15.256	***	par_6
q28	<---	ATT	.711	.051	13.985	***	par_7
q3	<---	PN	1.000				
q15	<---	PN	.900	.099	9.093	***	par_8
q24	<---	PN	.555	.088	6.333	***	par_9
q2	<---	PBN	1.000				
q9	<---	PBN	.038	.171	.220	.826	par_10
q20	<---	PBN	2.190	.389	5.625	***	par_11
q27	<---	PBN	1.532	.262	5.846	***	par_12
q18	<---	INT	1.000				
q26	<---	INT	.954	.044	21.618	***	par_13
q29	<---	INT	.527	.049	10.697	***	par_14
q14	<---	NS	1.123	.082	13.643	***	par_21
q7	<---	NS	1.000				
q33	<---	NS	.919	.075	12.261	***	par_16
q10	<---	SNV	1.371	.127	10.806	***	par_25
q4	<---	SNV	1.000				
q23	<---	SNV	1.659	.134	12.340	***	par_19
q35	<---	SNV	1.445	.119	12.108	***	par_20
q21	<---	NT	1.054	.094	11.245	***	par_15
q11	<---	NT	1.000				
q12	<---	NT	1.031	.097	10.667	***	par_22
q22	<---	SG	.934	.044	21.460	***	par_17
q13	<---	SG	1.000				
q16	<---	SG	1.013	.047	21.503	***	par_23
q5	<---	SV	1.000				
q34	<---	SV	.991	.065	15.194	***	par_18
q31_recoded	<---	SV	.968	.074	13.122	***	par_24

Table D3.5 - Standardized Regression Weights

			Estimate
q21	<---	NT	.696
q11	<---	NT	.618
q12	<---	NT	.586
q7	<---	NS	.636
q14	<---	NS	.780
q33	<---	NS	.682
q32	<---	TRST	.582
q30_recoded	<---	TRST	.609
q8	<---	TRST	.816
q17	<---	TRST	.782
q6_recoded	<---	TRST	.727
q1	<---	TRST	.685
q4	<---	SNV	.542
q23	<---	SNV	.774
q35	<---	SNV	.749
q10	<---	SNV	.615
q5	<---	SV	.653
q34	<---	SV	.794
q31_recoded	<---	SV	.652
q22	<---	SG	.845
q13	<---	SG	.820
q16	<---	SG	.845
q19	<---	ATT	.706
q25	<---	ATT	.693
q28	<---	ATT	.608
q3	<---	PN	.617
q15	<---	PN	.611
q24	<---	PN	.460
q2	<---	PBC	.315
q9	<---	PBC	.012
q20	<---	PBC	.778
q27	<---	PBC	.686
q18	<---	INT	.799
q26	<---	INT	.817
q29	<---	INT	.443

The estimated standardized factor loadings and the reliability of each measured variable is summarized in the table below.

Table D3.6 - Estimated Standardized Factor Loadings and Reliability for the Measurement Model

	Factor/Variable		Standardized Regression Weights	Reliability
SDIM	NT	q21	.696*	.48
	NT	q11	.618*	.38
	NT	q12	.586*	.34
	NS	q7	.636*	.40

	NS	q14	.780*	.61
	NS	q33	.682*	.47
RDIM	TRST	q32	.582*	.34
	TRST	q30_rec	.609*	.37
	TRST	q8	.816*	.67
	TRST	q17	.782*	.61
	TRST	q6_rec	.727*	.53
	TRST	q1	.685*	.47
	SNV	q4	.542*	.29
	SNV	q23	.774*	.60
	SNV	q35	.749*	.56
	SNV	q10	.615*	.38
CDIM	SV	q5	.653*	.43
	SV	q34	.794*	.63
	SV	q31_rec	.652*	.43
	SG	q22	.845*	.71
	SG	q13	.820*	.67
	SG	q16	.845*	.71
ATT	ATT	q19	.706*	.50
	ATT	q25	.693*	.48
	ATT	q28	.608*	.37
PN	PN	q3	.617*	.38
	PN	q15	.611*	.37
	PN	q24	.460*	.21
PBC	PBC	q2	.315*	.10
	PBC	q9	.012*	.00
	PBC	q20	.778*	.61
	PBC	q27	.686*	.47
INT	INT	q18	.799*	.64
	INT	q26	.817*	.67
	INT	q29	.443*	.20

* Statistically significant at α = 0.01

The estimated standardised regression weight's, reflect the validity of each observed variable as a measure of the latent variable. Ideally, these should be at least 0.5. The majority of the figures listed above are good except for q2 and q9. Q 24 and q 29 are also on the low side. These loadings are all significantly different from zero at the 0.001 level.

The estimated correlations between latent variables are all positive.

Reliability is calculated as estimate. The reliability of each observed variable, as a measure of the latent variable, ranged from 0.00 to 0.71.

Table D3.7 - Covariances

			Estimate	S.E.	C.R.	P	Label
PN	<-->	INT	.213	.030	7.134	***	par_34
PBC	<-->	INT	.053	.015	3.612	***	par_35
NT	<-->	NR	.393	.043	9.094	***	par_36
TRST	<-->	SG	.578	.051	11.244	***	par_37
SNV	<-->	SV	.372	.040	9.259	***	par_38
ATT	<-->	NT	.082	.027	2.992	.003	par_26
ATT	<-->	NR	.046	.025	1.841	.066	par_27
ATT	<-->	TRST	-.027	.040	-.680	.496	par_28
ATT	<-->	SG	-.001	.047	-.019	.985	par_29
ATT	<-->	SV	.121	.047	2.577	.010	par_30
ATT	<-->	SNV	.086	.029	2.954	.003	par_31
ATT	<-->	PN	.178	.027	6.465	***	par_32
ATT	<-->	INT	.282	.032	8.732	***	par_33

Table D3.8 - Correlations

			Estimate
PN	<-->	INT	.568
PBC	<-->	INT	.282
NT	<-->	NR	.896
TRST	<-->	SG	.882
SNV	<-->	SV	.991
ATT	<-->	NT	.223
ATT	<-->	NR	.117
ATT	<-->	TRST	-.064
ATT	<-->	SG	-.002
ATT	<-->	SV	.271
ATT	<-->	SNV	.309
ATT	<-->	PN	.522
ATT	<-->	INT	.775

Table D3.9 - Variances

	Estimate	S.E.	C.R.	P	Label
TRST	.551	.063	8.796	***	par_74
PN	.351	.061	5.758	***	par_75
PBC	.090	.028	3.197	.001	par_76
INT	.402	.038	10.434	***	par_77
NT	.408	.058	7.032	***	par_78
NR	.470	.063	7.471	***	par_79
SG	.780	.069	11.228	***	par_80
SV	.602	.074	8.084	***	par_81
SNV	.234	.036	6.475	***	par_82
ATT	.330	.037	8.984	***	par_83
e3	.483	.041	11.650	***	par_84
e2	.831	.059	13.992	***	par_85
e1	.660	.049	13.480	***	par_86
e6	.456	.036	12.605	***	par_87
e5	.382	.039	9.883	***	par_88
e4	.691	.050	13.724	***	par_89
e12	.537	.034	15.630	***	par_90
e11	.776	.050	15.453	***	par_91
e10	.360	.028	12.709	***	par_92
e8	.656	.046	14.376	***	par_93
e7	.624	.042	14.923	***	par_94
e38	.273	.024	11.251	***	par_95
e39	.320	.028	11.307	***	par_96
e40	.379	.032	11.968	***	par_97
e9	.457	.034	13.465	***	par_98
e41	.347	.030	11.437	***	par_99
e42	.762	.052	14.594	***	par_100
e43	.811	.055	14.623	***	par_101
e44	.432	.035	12.493	***	par_102
e45	.722	.048	15.109	***	par_103
e46	.563	.036	15.596	***	par_104
e47	.382	.029	13.215	***	par_105
e48	.333	.028	12.054	***	par_106
e49	.282	.023	12.084	***	par_107
e50	.283	.021	13.757	***	par_108
e51	.571	.055	10.430	***	par_109
e52	.478	.045	10.675	***	par_110
e53	.402	.030	13.331	***	par_111
e54	.815	.051	15.889	***	par_112
e55	.926	.056	16.627	***	par_113
e56	.280	.061	4.575	***	par_114
e57	.237	.032	7.381	***	par_115
e58	.227	.021	10.647	***	par_116
e59	.182	.018	9.923	***	par_117
e60	.457	.029	15.643	***	par_118

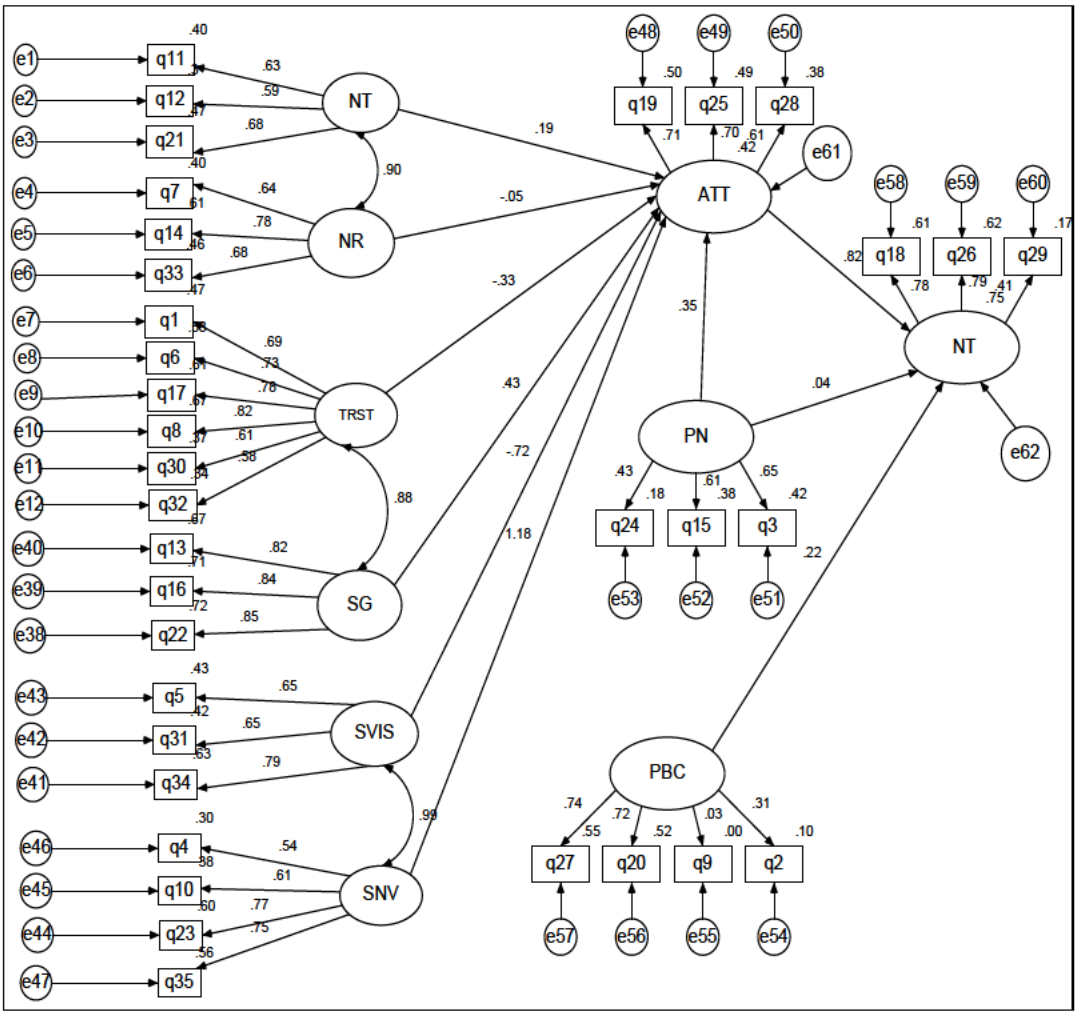
Table D3.10 - Squared Multiple Correlations

Question	Estimate

Question	Estimate
q29	.196
q26	.667
q18	.639
q27	.471
q20	.605
q9	.000
q2	.099
q24	.212
q15	.373
q3	.381
q28	.370
q25	.480
q19	.498
q35	.562
q4	.294
q10	.379
q23	.599
q5	.426
q31_recoded	.425
q34	.630
q13	.673
q16	.714
q22	.714
q1	.469
q6_recoded	.528
q17	.611
q8	.665
q30_recoded	.371
q32	.338
q7	.405
q14	.608
q33	.466
q11	.382
q12	.344
q21	.485

Results of the Analysis of the Study Model - Structural Model

The structural model with standardised coefficients is represented below:



Below are indices and estimated values in tables as per Amos, Version 16.

Structural Model Fit Indices

Table D3.11 - CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	118	3880.543	547	.000	7.094
Saturated model	665	.000	0		
Independence model	70	10841.144	595	.000	18.220

CMIN/DF should be between 2 and 3 for an acceptable fit and <2 for a good fit.

Table D3.12 - CFI

Model	NFI	RFI	IFI	TLI	CFI
Default model	.642	.611	.676	.646	.675
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

CFI should be>.9 for an acceptable fit and >.95 for a good fit.

Table D3.13 - RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.105	.102	.108	.000
Independence model	.176	.174	.179	.000

RMSEA should be <.10 for a good fit and <.05 for a very good fit.

There is a standardized value >1 on the path from SNV to ATT. This can be valid sometimes but usually points to other problems. Further paths added as per the modification index caused numerical problems (Haywood cases).

The fit indices for the model are:

The ratio of χ^2 (3880.5) to the degrees of freedom (547) was 7.094. Since this value is >3, it indicates that the data does not fit the model globally.

However, this statistic does suffer from limitations and a non-significant value may be unlikely even though the model may be a close fit to the data (Weston and Gore, 2006: 742).

The comparative fit index (CFI) was 0.675 and the root mean square residual of approximation (RMSEA) was 0.105 (.102; .108. p = .005).

These fit indices indicate that there is a poor fit.

Table D3.14 - Regression Weights

			Estimate	S.E.	C.R.	P	Label
ATT	<---	PN	.324	.079	4.086	***	par_15
ATT	<---	NT	.170	.212	.799	.424	par_30
ATT	<---	NR	-.040	.183	-.222	.825	par_31
ATT	<---	TRST	-.255	.116	-2.196	.028	par_32
ATT	<---	SG	.282	.096	2.946	.003	par_33
ATT	<---	SV	-.533	2.033	-.262	.793	par_34
ATT	<---	SNV	1.400	3.246	.431	.666	par_35
INT	<---	ATT	.836	.073	11.515	***	par_16
INT	<---	PN	.034	.061	.551	.582	par_17
INT	<---	PBC	.431	.151	2.846	.004	par_18
q32	<---	TRST	.705	.056	12.506	***	par_1
q30_recoded	<---	TRST	.912	.069	13.165	***	par_2

			Estimate	S.E.	C.R.	P	Label
q8	<---	TRST	1.138	.066	17.176	***	par_3
q17	<---	TRST	1.138	.070	16.351	***	par_4
q6_recoded	<---	TRST	1.154	.074	15.522	***	par_5
q1	<---	TRST	1.000				
q19	<---	ATT	1.000				
q25	<---	ATT	.889	.057	15.541	***	par_6
q28	<---	ATT	.714	.050	14.262	***	par_7
q3	<---	PN	1.000				
q15	<---	PN	.856	.108	7.919	***	par_8
q24	<---	PN	.487	.083	5.841	***	par_9
q2	<---	PBC	1.000				
q9	<---	PBC	.091	.175	.518	.604	par_10
q20	<---	PBC	2.073	.359	5.774	***	par_11
q27	<---	PBC	1.680	.334	5.028	***	par_12
q18	<---	INT	1.000				
q26	<---	INT	.945	.043	22.039	***	par_13
q29	<---	INT	.525	.049	10.797	***	par_14
q21	<---	NT	1.016	.090	11.268	***	par_19
q7	<---	NS	1.000				
q33	<---	NS	.917	.075	12.246	***	par_20
q22	<---	SG	.940	.044	21.533	***	par_21
q5	<---	SV	1.000				
q34	<---	SV	.989	.065	15.268	***	par_22
q4	<---	SNV	1.000				
q23	<---	SNV	1.649	.133	12.359	***	par_23
q35	<---	SNV	1.444	.119	12.169	***	par_24
q14	<---	NS	1.129	.083	13.672	***	par_25
q11	<---	NT	1.000				
q12	<---	NT	1.013	.095	10.706	***	par_26
q13	<---	SG	1.000				
q16	<---	SG	1.015	.047	21.541	***	par_27
q31_recoded	<---	SV	.965	.073	13.141	***	par_28
q10	<---	SNV	1.362	.126	10.815	***	par_29

Table D3.15 - Standardized Regression Weights

			Estimate
q21	<---	NT	.684
q11	<---	NT	.630
q12	<---	NT	.587
q7	<---	NR	.635
q33	<---	NR	.680
q14	<---	NR	.783
q32	<---	TRST	.582
q30_recoded	<---	TRST	.610
q8	<---	TRST	.816
q17	<---	TRST	.780
q6_recoded	<---	TRST	.728
q1	<---	TRST	.686
q4	<---	SNV	.544
q23	<---	SNV	.772
q35	<---	SNV	.752
q10	<---	SNV	.614
q22	<---	SG	.848
13	<---	SG	.818
q16	<---	SG	.844
q31_recoded	<---	SV	.651
q5	<---	SV	.654

			Estimate
q34	<---	SV	.794
q19	<---	ATT	.708
q25	<---	ATT	.697
q28	<---	ATT	.614
q3	<---	PN	.651
q15	<---	PN	.613
q24	<---	PN	.426
q2	<---	PBC	.309
q9	<---	PBC	.028
q20	<---	PBC	.723
q27	<---	PBC	.739
q18	<---	INT	.778
q26	<---	INT	.788
q29	<---	INT	.413
ATT	<---	NT	.192
ATT	<---	NR	-.048
ATT	<---	TRST	-.329
ATT	<---	SG	.430
ATT	<---	SV	-.719
ATT	<---	SNV	1.180
ATT	<---	PN	.351
INT	<---	ATT	.825
INT	<---	PN	.036
INT	<---	PBC	.217

The estimated standardized factor loadings and the reliability of each measured variable is summarized in the table below.

Table D3.16 - Estimated Standardized Factor Loadings and Reliability for the Measurement Model

	Factor/Variable		Standardized Regression Weights	Reliability
SDIM	NT	q21	.684	.47
	NT	q11	.630	.40
	NT	q12	.587	.34
	NR	q7	.635	.40
	NR	q33	.680	.46
	NR	q14	.783	.61
RDIM	TRST	q32	.582	.34
	TRST	q30_rec	.610	.37
	TRST	q8	.816	.67
	TRST	q17	.780	.61

	TRST	q6_rec	.728	.56
	TRST	q1	.686	.47
	SNV	q4	.544	.39
	SNV	q23	.772	.60
	SNV	q35	.752	.56
	SNV	q10	.614	.38
CDIM	SG	q22	.848	.72
	SG	13	.818	.67
	SG	q16	.844	.71
	SV	q31_rec	.651	.42
	SV	q5	.654	.43
	SV	q34	.794	.63
ATT	ATT	q19	.708	.50
	ATT	q25	.697	.49
	ATT	q28	.614	.38
PN	PN	q3	.651	.42
	PN	q15	.613	.38
	PN	q24	.426	.18
PBC	PBC	q2	.309	.10
	PBC	q9	.028	.00
	PBC	q20	.723	.52
	PBC	q27	.739	.55
INT	INT	q18	.778	.61
	INT	q26	.788	.62
	INT	q29	.413	.17
	NT	ATT	.192	
	NR	ATT	-.048	
	TRST	ATT	-.329	
	SG	ATT	.430	
	SV	ATT	-.719	
	SNV	ATT	1.180	

	PN	ATT	.351	
	ATT	INT	.825	
	PN	INT	.036	
	PBC	INT	.217	

* Statistically significant at α = 0.01

The estimated standardised regression weight's, reflect the validity of each observed variable as a measure of the latent variable. Ideally, these should be at least 0.5. The majority of the question figures listed above are good except for q2 and q9. Q 24 and q 29 are also on the low side. These loadings are all significantly different from zero at the 0.001 level.

There are problems with the associations between the constructs – specifically from shared norms about tacit knowledge sharing to attitude – 1.180

The estimated correlations between latent variables are positive and negative.

Reliability is calculated as estimate. The reliability of each observed variable, as a measure of the latent variable, ranged from 0.00 to 0.72.

Table D3.17 - Covariances

			Estimate	S.E.	C.R.	P	Label
TRST	<-->	SG	.577	.051	11.237	***	par_36
SNV	<-->	SV	.374	.040	9.291	***	par_37
NT	<-->	NR	.401	.043	9.226	***	par_38

Table D3.18 - Variances

	Estimate	S.E.	C.R.	P	Label
TRST	.553	.063	8.807	***	par_74
PN	.391	.069	5.669	***	par_75
PBG	.087	.028	3.059	.002	par_76
NT	.425	.059	7.202	***	par_77
NR	.469	.063	7.471	***	par_78
SG	.776	.069	11.198	***	par_79
SV	.604	.074	8.113	***	par_80
SNV	.236	.036	6.502	***	par_81
e61	.193	.035	5.552	***	par_82
e62	.085	.019	4.406	***	par_83
e3	.499	.042	11.846	***	par_84
e2	.829	.060	13.818	***	par_85
e1	.644	.048	13.288	***	par_86
e6	.459	.036	12.660	***	par_87
e5	.377	.038	9.802	***	par_88
e4	.692	.050	13.765	***	par_89

	Estimate	S.E.	C.R.	P	Label
e12	.537	.034	15.624	***	par_90
e11	.774	.050	15.444	***	par_91
e10	.360	.028	12.703	***	par_92
e8	.654	.046	14.364	***	par_93
e7	.623	.042	14.911	***	par_94
e38	.268	.024	11.154	***	par_95
e39	.321	.028	11.433	***	par_96
e40	.383	.032	12.102	***	par_97
e9	.459	.034	13.498	***	par_98
e41	.347	.030	11.517	***	par_99
e42	.764	.052	14.640	***	par_100
e43	.809	.055	14.637	***	par_101
e44	.435	.035	12.543	***	par_102
e45	.724	.048	15.125	***	par_103
e46	.561	.036	15.587	***	par_104
e47	.379	.029	13.176	***	par_105
e48	.330	.027	12.041	***	par_106
e49	.278	.022	12.398	***	par_107
e50	.280	.020	13.990	***	par_108
e51	.531	.061	8.702	***	par_109
e52	.476	.046	10.250	***	par_110
e53	.417	.031	13.622	***	par_111
e54	.818	.052	15.799	***	par_112
e55	.925	.056	16.621	***	par_113
e56	.338	.065	5.222	***	par_114
e57	.203	.042	4.832	***	par_115
e58	.223	.021	10.690	***	par_116
e59	.186	.018	10.457	***	par_117
e60	.457	.029	15.722	***	par_118

Table D3.19 - Squared Multiple Correlations

	Estimate
ATT	.419
INT	.750
q29	.171
q26	.621
q18	.605
q27	.546
q20	.523
q9	.001
q2	.096
q24	.182
q15	.376
q3	.424
q28	.376
q25	.485
q19	.502
q35	.565
q4	.296
q10	.377
q23	.596
q5	.427
q31_recoded	.424
q34	.630
q13	.669
q16	.713
q22	.719

	Estimate
q1	.470
q6_recoded	.529
q17	.609
q8	.665
q30_recoded	.372
q32	.339
q7	.404
q14	.613
q33	.462
q11	.398
q12	.345
q21	.468

APPENDIX D4

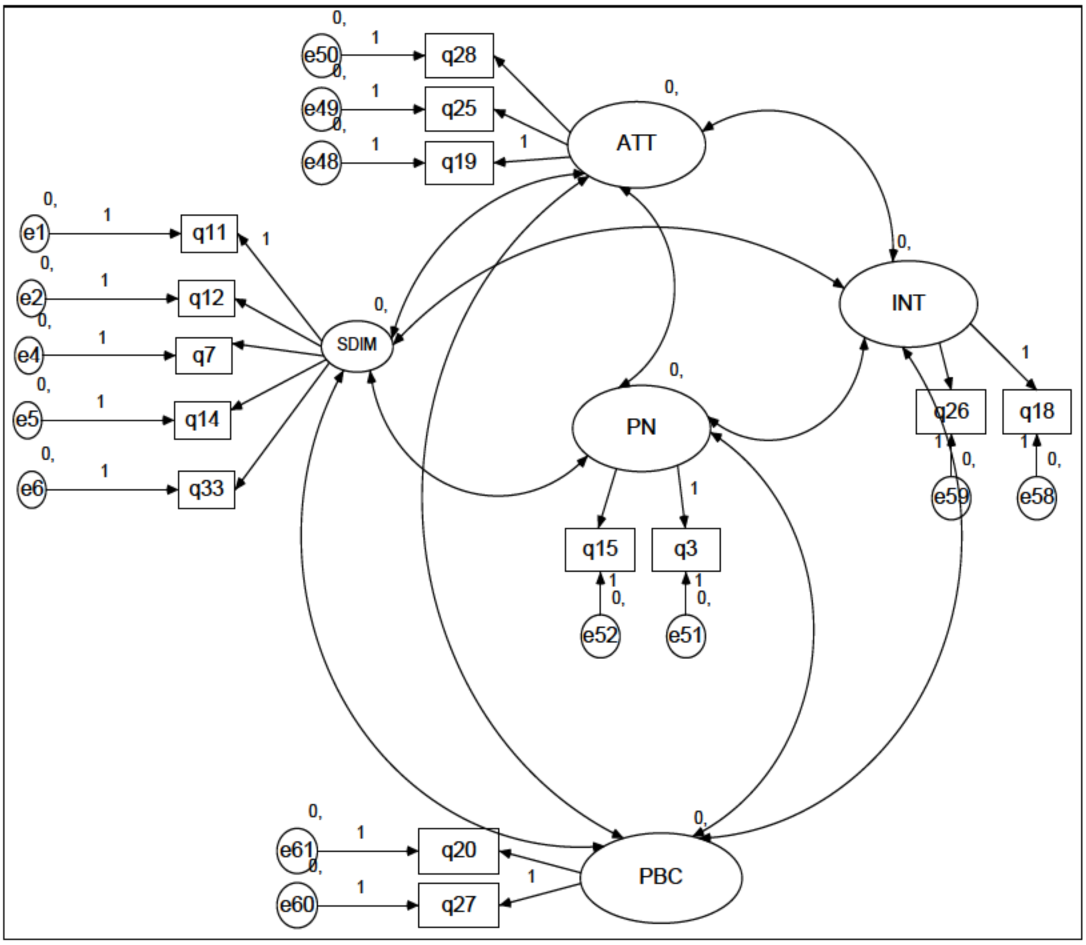
STRUCTURAL DIMENSION OF SOCIAL CAPITAL

STATISTICAL ANALYSIS

APPENDIX D4

STRUCTURAL DIMENSION OF SOCIAL CAPITAL STATISTICAL ANALYSIS

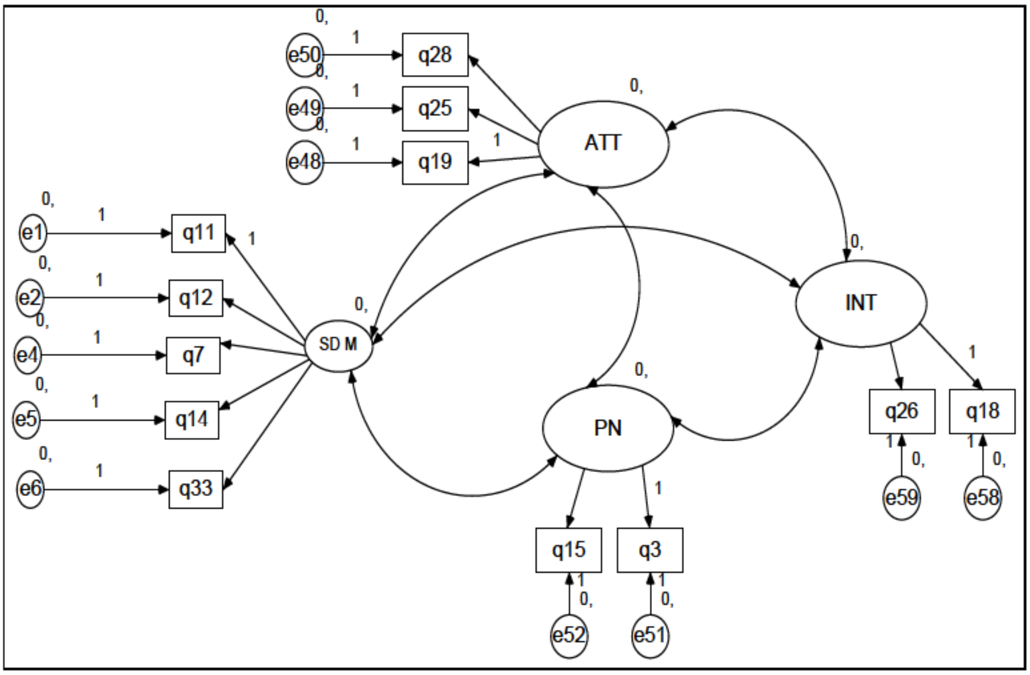
Results of the Analysis of the Hypothesized Model



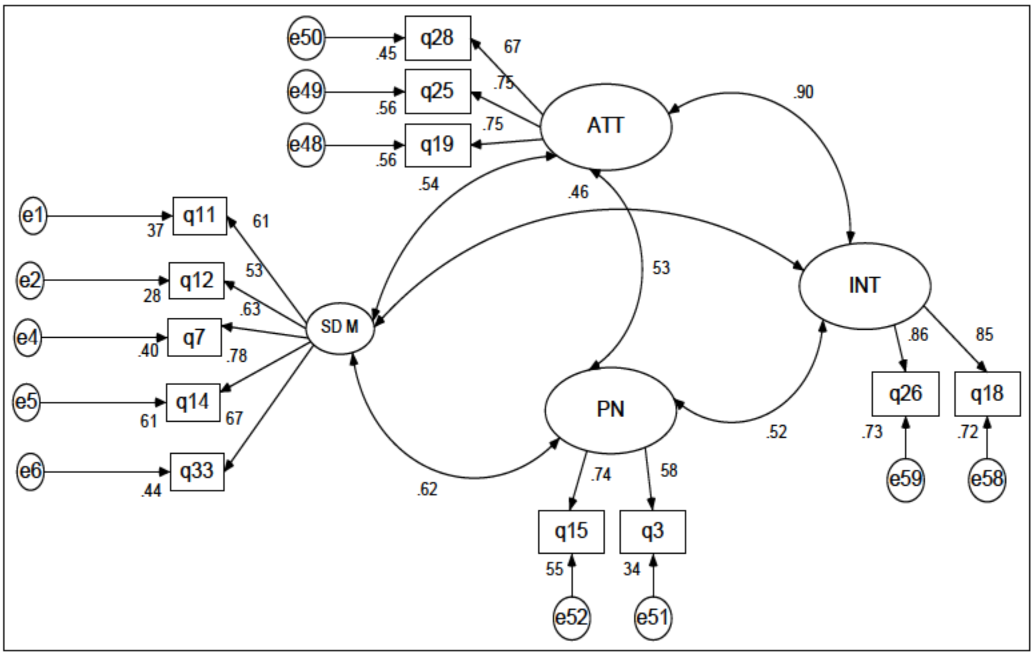
The results of this measurement model did not fit the data and the measurement model was re-specified by removing perceived behavioural control.

Results of the Analysis of the Revised Measurement Model

The revised measurement model is represented by the diagram below:



Revised Measurement Model with Standardised Coefficients



Measurement Model Fit Indices

Below are indices and estimated values in tables as per AMOS, Version 16.

Table D4.1 - CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	42	168.595	48	.000	3.512
Saturated model	90	.000	0		
Independence model	24	2481.725	66	.000	37.602

CMIN/DF should be between 2 and 3 for an acceptable fit and <2 for a good fit.

Table D4.2 - CFI

Model	NFI	RFI	IFI	TLI	CFI
Default model	.932	.907	.950	.931	.950
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

CFI should be >.9 for an acceptable fit and >.95 for a good fit.

Table D4.3 - RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.067	.057	.079	.005
Independence model	.257	.249	.266	.000

RMSEA should be <.10 for a good fit and <.05 for a very good fit.

The fit indices for the model are:

Chi-square/df = 3.512

The ratio of χ^2 (168.6) to the degrees of freedom (48) was 3.512. Since this value is >3, it indicates that the data does not fit the model globally.

However, this statistic does suffer from limitations and a non-significant value may be unlikely even though the model may be a close fit to the data (Weston and Gore 2006: 742).

The comparative fit index (CFI) was 0.950 and the root mean square residual of approximation (RMSEA) was 0.067 (.057; .079. p = .005).

These fit indices indicate that there is a good fit.

Measurement Model Identification

For this measurement model, there are 12 observed variables. The number of distinct sample moments is 90. The number of distinct parameters to be estimated is 42. The degrees of freedom is (90- 42) = 48. Probability level = .000
The model is therefore over-identified and it is possible to test the model.

Table D4.4 - Regression Weights

			Estimate	S.E.	C.R.	P	Label
q12	<---	SDIM	.940	.092	10.186	***	par_1
q11	<---	SDIM	1.000				
q19	<---	ATT	1.000				
q25	<---	ATT	.904	.059	15.309	***	par_2
q28	<---	ATT	.725	.052	14.044	***	par_3
q18	<---	INT	1.000				
q26	<---	INT	.946	.044	21.275	***	par_4
q7	<---	SDIM	1.080	.095	11.318	***	par_5
q14	<---	SDIM	1.226	.092	13.304	***	par_6
q33	<---	SDIM	.974	.084	11.655	***	par_7
q3	<---	PN	1.000				
q15	<---	PN	1.153	.130	8.885	***	par_8

Table D4.5 - Standardized Regression Weights

			Estimate
q11	<---	SDIM	.610
q12	<---	SDIM	.527
q7	<---	SDIM	.632
q14	<---	SDIM	.783

			Estimate
q33	<---	SDIM	.665
q28	<---	ATT	.669
q25	<---	ATT	.749
q19	<---	ATT	.747
q26	<---	INT	.856
q18	<---	INT	.847
q15	<---	PN	.741
q3	<---	PN	.585

The estimated standardized factor loadings and the reliability of each measured variable is summarized in the table below.

Table D4.6 - Estimated Standardized Factor Loadings and Reliability for the Measurement Model

Factor/Variable		Standardized Regression Weights	Reliability
SDIM	Q11	.61*	.37
	Q12	.53*	.28
	Q7	.63*	.40
	Q14	.78*	.61
	Q33	.67*	.44
ATT	Q28	.67*	.45
	Q25	.75*	.56
	Q19	.75*	.56
INT	Q26	.86*	.73
	Q18	.85*	.72
PN	Q15	.74*	.55
	Q3	.59*	.34

* Statistically significant at $\alpha = 0.01$

The estimated standardised regression weight's, reflect the validity of each observed variable as a measure of the latent variable. Ideally, these should be at least 0.5. The figures listed above are all good. These loadings are all significantly different from zero at the 0.001 level.

The estimated correlations between latent variables are all positive.

Reliability is calculated as estimate. The reliability of each observed variable, as a measure of the latent variable, ranged from 0.28 to 0.73.

Table D4.7 - Variances

	Estimate	S.E.	C.R.	P	Label
SDIM	.398	.055	7.199	***	par_27
ATT	.432	.046	9.437	***	par_28
INT	.520	.045	11.497	***	par_29
PN	.315	.053	5.966	***	par_30
e2	.914	.060	15.156	***	par_31
e1	.671	.047	14.376	***	par_32
e6	.475	.036	13.384	***	par_33
e5	.376	.036	10.488	***	par_34
e4	.697	.049	14.114	***	par_35
e48	.342	.028	12.314	***	par_36
e49	.276	.023	12.009	***	par_37
e50	.279	.020	13.700	***	par_38
e51	.607	.049	12.435	***	par_39
e52	.343	.048	7.190	***	par_40
e58	.205	.021	9.688	***	par_41
e59	.170	.018	9.209	***	par_42

Table D4.8 - Covariances

			Estimate	S.E.	C.R.	P	Label
PN	<-->	SDIM	.221	.031	7.092	***	par_9
SDIM	<-->	ATT	.225	.030	7.502	***	par_10
ATT	<-->	INT	.425	.037	11.606	***	par_11
PN	<-->	INT	.211	.032	6.624	***	par_12
PN	<-->	ATT	.196	.031	6.364	***	par_13
SDIM	<-->	INT	.211	.029	7.349	***	par_14

Table D4.9 - Correlations

			Estimate
PN	<-->	SDIM	.624
SDIM	<-->	ATT	.542
ATT	<-->	INT	.898
PN	<-->	INT	.521
PN	<-->	ATT	.532
SDIM	<-->	INT	.464

Table D4.10 - Squared Multiple Correlations

	Estimate
q26	.732
q18	.717
q15	.550
q3	.342
q28	.448

	Estimate
q25	.561
q19	.558
q7	.399
q14	.614
q33	.443
q11	.372
q12	.278

Table D4.11 - Standardized Residual Covariances

	q26	q18	q15	q3	q28	q25	q19	q7	q14	q33	q11	q12
q26	.000											
q18	.000	.000										
q15	-.572	-.228	.000									
q3	.467	1.084	.000	.000								
q28	.127	-1.116	-2.367	.080	.000							
q25	.882	-.287	-1.131	-.402	1.592	.000						
q19	-.832	.913	2.195	1.547	-.307	-.904	.000					
q7	-.240	-.402	-.105	-1.224	-1.957	-2.568	.583	.000				
q14	-.639	.473	-.347	-.483	-1.018	-1.793	2.211	.806	.000			
q33	.770	1.221	1.644	-.339	1.263	.042	2.670	.829	-.696	.000		
q11	-.338	.477	.045	.258	-.924	-.856	.978	-1.006	.579	-1.016	.000	
q12	-1.202	-.701	.380	-.422	-.618	-1.378	2.482	-1.047	-.361	.279	1.518	.000

Table D4.12 - Correlations

	INT	ATT	SDIM	PN	q26	q18	q15	q3	q28	q25	q19	q7	q14	q33	q11	q12
INT	1.000															
ATT	.898	1.000														
SDIM	.464	.542	1.000													
PN	.521	.532	.624	1.000												
q26	.856	.768	.397	.446	1.000											
q18	.847	.760	.393	.441	.725	1.000										
q15	.386	.394	.463	.741	.331	.327	1.000									
q3	.305	.311	.365	.585	.261	.258	.434	1.000								
q28	.601	.669	.363	.356	.514	.509	.264	.208	1.000							
q25	.672	.749	.406	.398	.575	.569	.295	.233	.501	1.000						
q19	.670	.747	.405	.397	.574	.568	.294	.232	.500	.559	1.000					
q7	.293	.343	.632	.394	.251	.248	.292	.231	.229	.257	.256	1.000				
q14	.364	.425	.783	.489	.311	.308	.363	.286	.285	.318	.317	.495	1.000			
q33	.309	.361	.665	.415	.264	.262	.308	.243	.242	.270	.270	.420	.521	1.000		
q11	.283	.331	.610	.381	.242	.240	.282	.223	.222	.248	.247	.385	.478	.406	1.000	
q12	.245	.286	.527	.329	.209	.207	.244	.192	.191	.214	.213	.333	.413	.351	.321	1.000

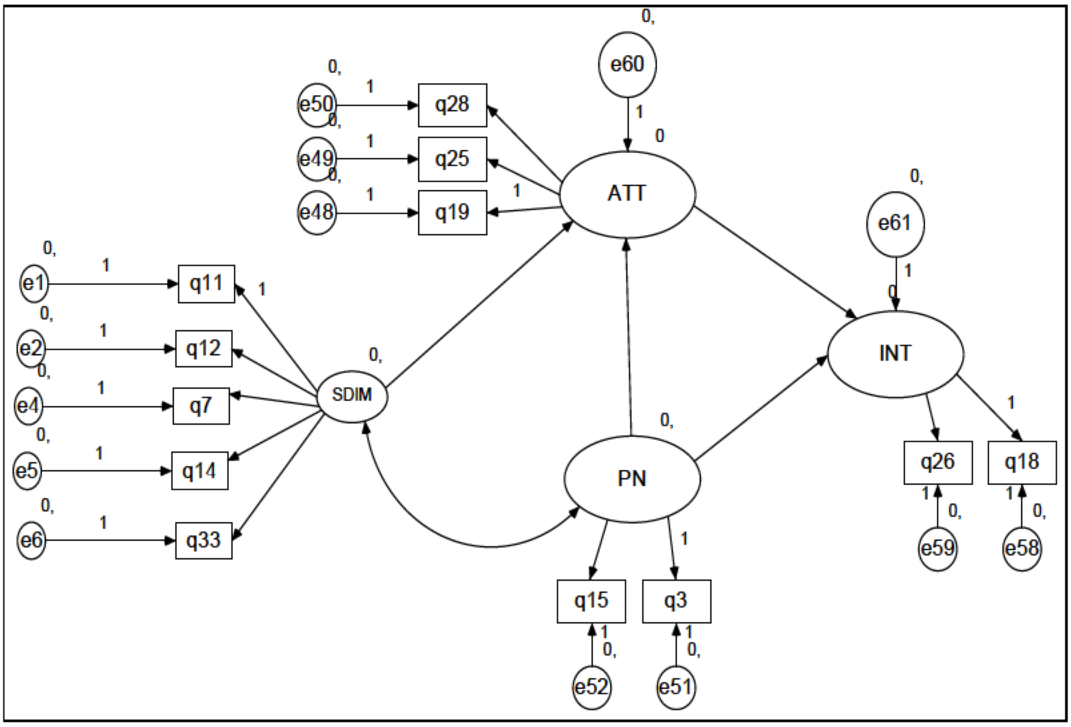
Table D4.13 - Means

INT	ATT	SDIM	PN	q26	q18	q15	q3	q28	q25	q19	q7	q14	q33	q11	q12
.000	.000	.000	.000	3.857	3.751	3.475	3.699	4.144	3.969	3.834	3.422	3.610	3.437	3.327	3.013

Given the above results from the confirmatory factor analysis, the measurement model may be used as part of the SEM model.

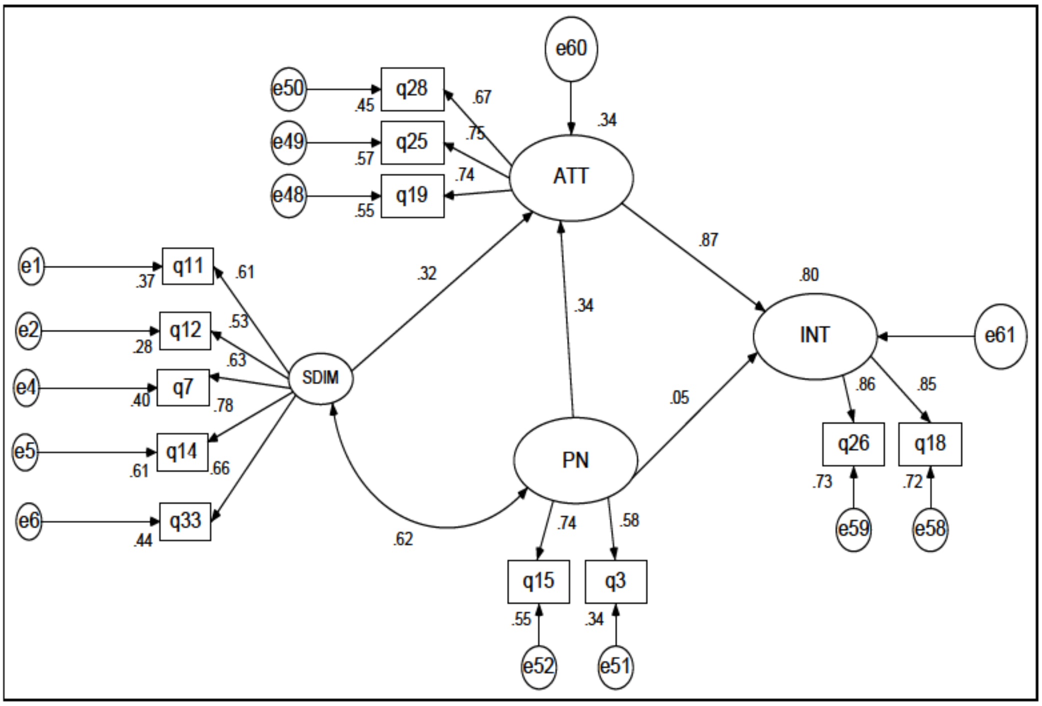
Results of the Analysis of the Structural Model

The structural model is represented below:



Results of the Structural Model with Standardised Coefficients

The structural model is analysed using SEM, Version 16:



Structural Model Fit Indices

Table D4.14 - CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	41	170.268	49	.000	3.475

Model	NPAR	CMIN	DF	P	CMIN/DF
Saturated model	90	.000	0		
Independence model	24	2481.725	66	.000	37.602

CMIN/DF should be between 2 and 3 for an acceptable fit and <2 for a good fit.

Table D4.15 - CFI

Model	NFI	RFI	IFI	TLI	CFI
Default model	.931	.908	.950	.932	.950
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

CFI should be >.9 for an acceptable fit and >.95 for a good fit.

Table D4.16 - RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.067	.056	.078	.006
Independence model	.257	.249	.266	.000

RMSEA should be <.10 for a good fit and <.05 for a very good fit.

The fit indices for the model are:

The ratio of χ^2 (2481.7) to the degrees of freedom (66) was 3.475. Since this value is >3, it indicates that the data does not fit the model globally.

However, this statistic does suffer from limitations and a non-significant value may be unlikely even though the model may be a close fit to the data (Weston, 2006: 742).

The comparative fit index (CFI) was 0.95 and the root mean square residual of approximation (RMSEA) was .067 (.056; .078. p = .005).

These fit indices indicate that there is a good fit.

Table D4.17 - Regression Weights

			Estimate	S.E.	C.R.	P	Label
ATT	<---	PN	.393	.101	3.885	***	par_10
ATT	<---	SDIM	.328	.081	4.061	***	par_11
INT	<---	PN	.066	.072	.911	.362	par_8
INT	<---	ATT	.953	.069	13.896	***	par_12
q12	<---	SDIM	.936	.092	10.168	***	par_1
q11	<---	SDIM	1.000				
q19	<---	ATT	1.000				

			Estimate	S.E.	C.R.	P	Label
q25	<---	ATT	.913	.060	15.317	***	par_2
q28	<---	ATT	.730	.052	14.051	***	par_3
q18	<---	INT	1.000				
q26	<---	INT	.945	.044	21.259	***	par_4
q7	<---	SDIM	1.082	.095	11.338	***	par_5
q14	<---	SDIM	1.226	.092	13.307	***	par_6
q33	<---	SDIM	.973	.083	11.651	***	par_7
q3	<---	PN	1.000				
q15	<---	PN	1.159	.132	8.797	***	par_9

Table D4.18 - Standardized Regression Weights

			Estimate
ATT	<---	PN	.336
ATT	<---	SDIM	.316
INT	<---	PN	.051
INT	<---	ATT	.866
q11	<---	SDIM	.610
q12	<---	SDIM	.525
q7	<---	SDIM	.634
q14	<---	SDIM	.784
q33	<---	SDIM	.664
q28	<---	ATT	.673
q25	<---	ATT	.754
q19	<---	ATT	.745
q26	<---	INT	.855
q18	<---	INT	.847
q15	<---	PN	.744
q3	<---	PN	.584

Note that PN to INT (.051) is not significant. The estimate is not significantly different from zero. Thus, there is no causal effect.

The estimated standardized factor loadings and the reliability of each measured variable is summarized in the table below.

Table D4.19 - Estimated Standardized Factor Loadings and Reliability for the Structural Model

Factor/Variable		Standardized Regression Weights	Reliability
SDIM	q11	.610	.37
	q12	.525	.28
	q7	.634	.40
	q14	.784	.61
	q33	.664	.44
ATT	q28	.673	.45
	q25	.754	.57

	q19	.745	.55
INT	q26	.855	.73
	q18	.847	.72
PN	q15	.744	.55
	q3	.584	.34

* Statistically significant at α = 0.01

The estimated standardised regression weights reflect the validity of each observed variable as a measure of the latent variable. Ideally, these should be at least 0.5. The figures listed above are all good. These loadings are all significantly different from zero at the 0.001 level.

The estimated correlations between latent variables are all positive.

Reliability is calculated as estimate. The reliability of each observed variable, as a measure of the latent variable, ranged from .28 to .73.

Table D4.20 - Variances

	Estimate	S.E.	C.R.	P	Label
SDIM	.398	.055	7.202	***	par_26
PN	.314	.053	5.932	***	par_27
e60	.281	.032	8.778	***	par_28
e61	.104	.021	4.966	***	par_29
e2	.916	.060	15.177	***	par_30
e1	.670	.047	14.370	***	par_31
e6	.476	.036	13.400	***	par_32
e5	.376	.036	10.476	***	par_33
e4	.695	.049	14.101	***	par_34
e48	.345	.028	12.254	***	par_35
e49	.271	.023	11.979	***	par_36
e50	.277	.020	13.690	***	par_37
e51	.608	.049	12.393	***	par_38
e52	.340	.048	7.052	***	par_39
e58	.205	.021	9.661	***	par_40
e59	.170	.018	9.217	***	par_41

Table D4.21 - Covariances

	Estimate	S.E.	C.R.	P	Label
PN <--> SDIM	.220	.031	7.051	***	par_9

Table D4.22 - Correlations

	Estimate
PN <--> SDIM	.621

Table D4.23 - Squared Multiple Correlations

	Estimate
ATT	.345

	Estimate
INT	.800
q26	.732
q18	.718
q15	.554
q3	.341
q28	.452
q25	.569
q19	.554
q7	.401
q14	.614
q33	.442
q11	.372
q12	.276

Table D4.24 - Standardized Total Effects

	SDIM	PN	ATT	INT
ATT	.316	.336	.000	.000
INT	.274	.342	.866	.000
q26	.234	.293	.741	.855
q18	.232	.290	.734	.847
q15	.000	.744	.000	.000
q3	.000	.584	.000	.000
q28	.212	.226	.673	.000
q25	.238	.253	.754	.000
q19	.235	.250	.745	.000
q7	.634	.000	.000	.000
q14	.784	.000	.000	.000
q33	.664	.000	.000	.000
q11	.610	.000	.000	.000
q12	.525	.000	.000	.000

Table D4.25 - Standardized Direct Effects

	SDIM	PN	ATT	INT
ATT	.316	.336	.000	.000
INT	.000	.051	.866	.000
q26	.000	.000	.000	.855
q18	.000	.000	.000	.847
q15	.000	.744	.000	.000
q3	.000	.584	.000	.000
q28	.000	.000	.673	.000
q25	.000	.000	.754	.000
q19	.000	.000	.745	.000
q7	.634	.000	.000	.000
q14	.784	.000	.000	.000
q33	.664	.000	.000	.000
q11	.610	.000	.000	.000
q12	.525	.000	.000	.000

Table D4.26 - Standardized Indirect Effects

	SDIM	PN	ATT	INT
ATT	.000	.000	.000	.000
INT	.274	.291	.000	.000
q26	.234	.293	.741	.000
q18	.232	.290	.734	.000

	SDIM	PN	ATT	INT
q15	.000	.000	.000	.000
q3	.000	.000	.000	.000
q28	.212	.226	.000	.000
q25	.238	.253	.000	.000
q19	.235	.250	.000	.000
q7	.000	.000	.000	.000
q14	.000	.000	.000	.000
q33	.000	.000	.000	.000
q11	.000	.000	.000	.000
q12	.000	.000	.000	.000

Table D4.27 - Standardized Residual Covariances

	q26	q18	q15	q3	q28	q25	q19	q7	q14	q33	q11	q12
q26	.000											
q18	.000	.000										
q15	-.473	-.135	.000									
q3	.580	1.192	-.025	.000								
q28	.136	-1.116	-2.421	.063	.000							
q25	.866	-.311	-1.205	-.433	1.470	.000						
q19	-.739	1.001	2.182	1.567	-.325	-.947	.000					
q7	-.522	-.686	-.117	-1.204	-1.822	-2.431	.778	.000				
q14	-.964	.140	-.344	-.444	-.839	-1.610	2.470	.773	.000			
q33	.496	.943	1.659	-.296	1.431	.213	2.903	.816	-.687	.000		

q11	-.598	.213	.048	.289	-.782	-.709	1.179	-1.032	.570	-1.009	.000	
q12	-1.407	-.909	.404	-.378	-.477	-1.232	2.678	-1.042	-.335	.315	1.539	.000

Table D4.28 - Correlations

	SDIM	PN	ATT	INT	q26	q18	q15	q3	q28	q25	q19	q7	q14	q33	q11	q12
SDIM	1.000															
PN	.621	1.000														
ATT	.525	.532	1.000													
INT	.486	.512	.893	1.000												
q26	.416	.438	.764	.855	1.000											
q18	.412	.434	.757	.847	.725	1.000										
q15	.462	.744	.396	.381	.326	.323	1.000									
q3	.363	.584	.311	.299	.256	.253	.435	1.000								
q28	.353	.358	.673	.601	.514	.509	.266	.209	1.000							
q25	.396	.401	.754	.674	.576	.571	.299	.234	.507	1.000						
q19	.391	.396	.745	.665	.569	.563	.295	.231	.501	.562	1.000					
q7	.634	.393	.332	.308	.263	.261	.293	.230	.224	.251	.247	1.000				
q14	.784	.487	.411	.381	.326	.323	.362	.284	.277	.310	.306	.497	1.000			
q33	.664	.413	.349	.323	.276	.274	.307	.241	.234	.263	.260	.421	.521	1.000		
q11	.610	.379	.320	.297	.254	.251	.282	.221	.215	.241	.238	.387	.478	.406	1.000	

q12	.525	.326	.275	.255	.218	.216	.243	.190	.185	.208	.205	.333	.412	.349	.321	1.000

Table D4.29 - Means

SDIM	PN	ATT	INT	q26	q18	q15	q3	q28	q25	q19	q7	q14	q33	q11	q12
.000	.000	.000	.000	3.857	3.751	3.475	3.699	4.144	3.969	3.834	3.422	3.610	3.437	3.327	3.013

APPENDIX D5

RELATIONAL DIMENSION OF SOCIAL CAPITAL

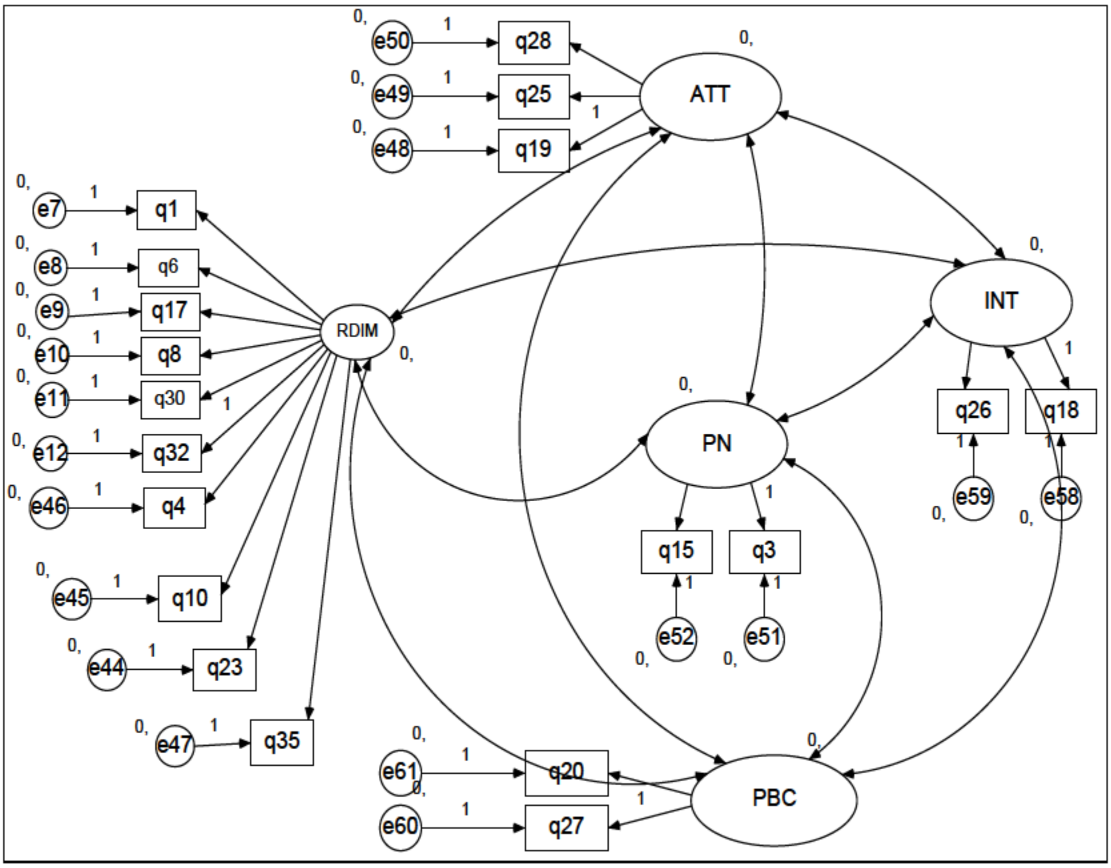
STATISTICAL ANALYSIS

APPENDIX D5

RELATIONAL DIMENSION OF SOCIAL CAPITAL

STATISTICAL ANALYSIS

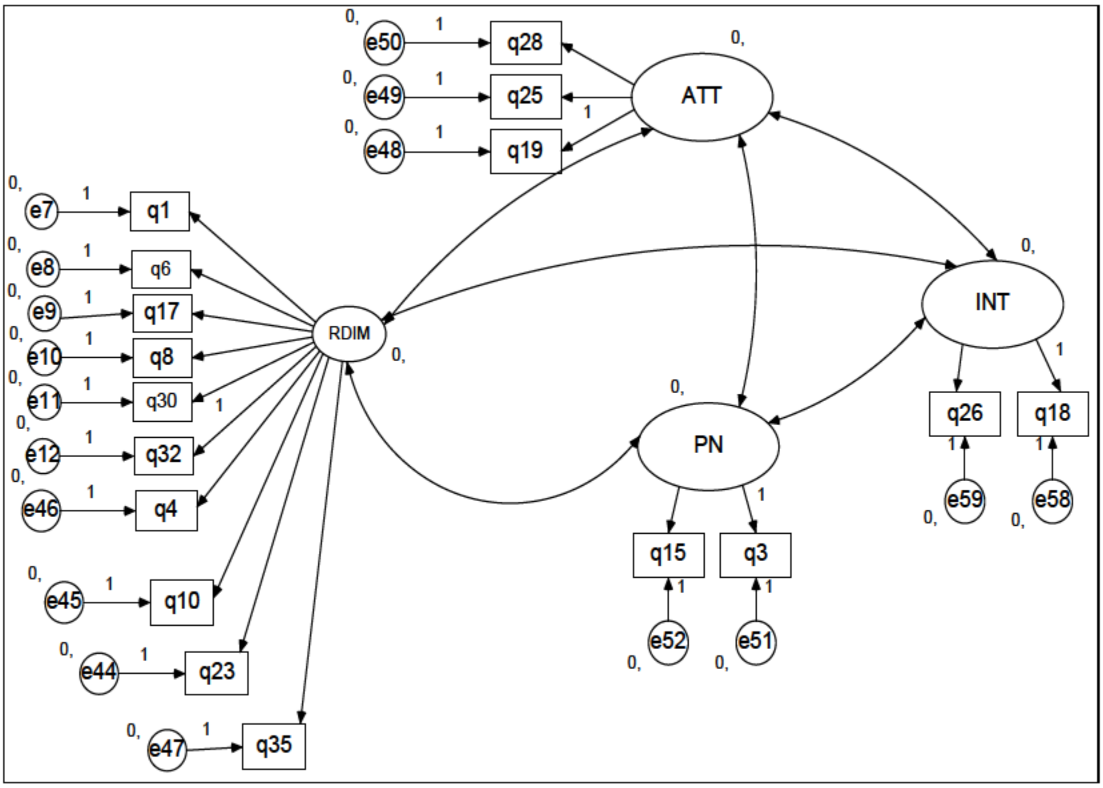
Results of the Analysis of the Initial Hypothesized Model



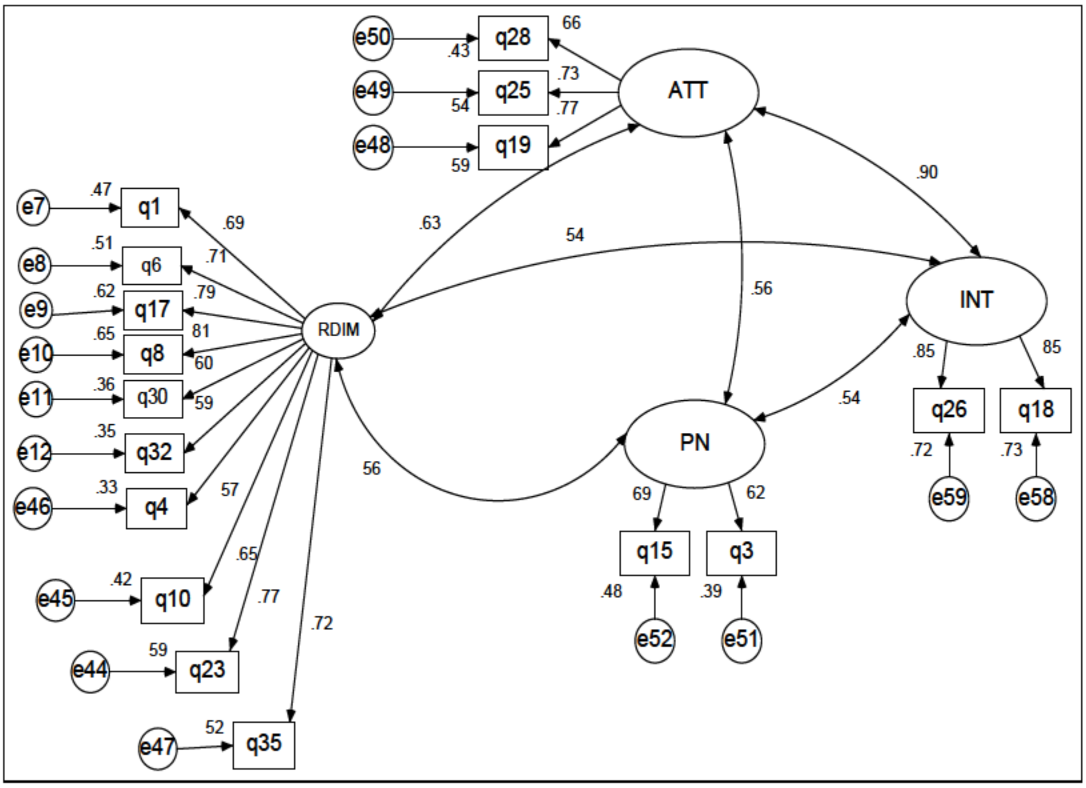
The results of the measurement model did not fit the data and the measurement model was re-specified by removing perceived behavioural control.

Results of the Analysis of the Revised Measurement Model

The revised measurement model is represented by the diagram below:



Revised Measurement Model with Standardized Coefficients



Measurement Model Fit Indices

Table D5.1 - CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	57	379.288	113	.000	3.357
Saturated model	170	.000	0		
Independence model	34	4489.434	136	.000	33.011

CMIN/DF should be between 2 and 3 for an acceptable fit and <2 for a good fit.

Table D5.2 - CFI

Model	NFI	RFI	IFI	TLI	CFI
Default model	.916	.898	.939	.926	.939
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

CFI should be>.9 for an acceptable fit and >.95 for a good fit.

Table D5.3 - RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.065	.058	.073	.000
Independence model	.241	.235	.247	.000

RMSEA should be <.10 for a good fit and <.05 for a very good fit.

The fit indices for the model are:

The ratio of χ^2 (379.2) to the degrees of freedom (113) was 3.367. Since this value is >3, it indicates that the data does not fit the model globally.

However, this statistic does suffer from limitations and a non-significant value may be unlikely even though the model may be a close fit to the data (Weston and Gore 2006: 742).

The comparative fit index (CFI) was 0.939 and the root mean square residual of approximation (RMSEA) was 0.065 (.058; .073. p = .005).

These fit indices indicate that there is an acceptable fit.

Measurement Model Identification

For this measurement model, there are 17 observed variables. The number of distinct sample moments is 170. The number of distinct parameters to be estimated is 57. The degrees of freedom is (170-57) = 113. Probability level = .000

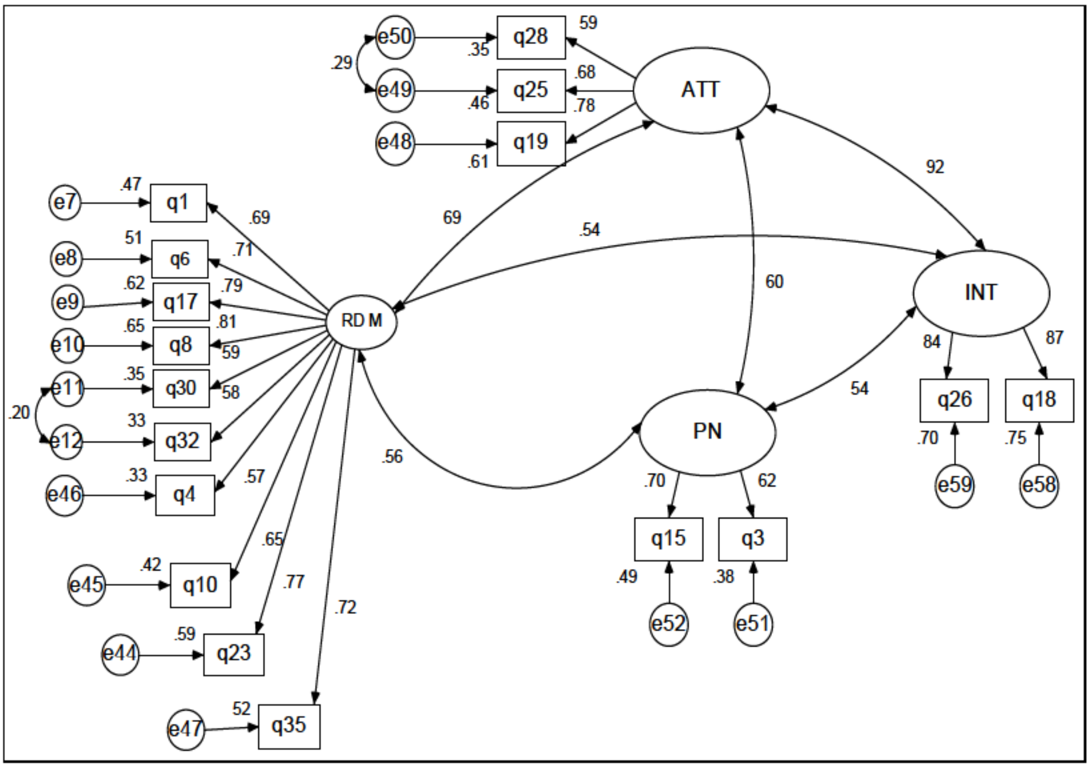
The model is therefore over-identified and it is possible to test the model

Table D5.4 - Covariances

			Estimate	S.E.	C.R.	P	Label
RDIM	<-->	PN	.179	.025	7.067	***	par_13
RDIM	<-->	ATT	.226	.027	8.439	***	par_14
INT	<-->	ATT	.441	.037	11.974	***	par_15
ATT	<-->	PN	.225	.032	6.959	***	par_16
INT	<-->	PN	.234	.033	7.154	***	par_17
INT	<-->	RDIM	.209	.025	8.370	***	par_18

Measurement Model Re-Specification

Final measurement model with two adjustments. Double headed arrows were inserted between question 25 and question 28, and between question 30 and question 32, providing a significant improvement.



Improvement in this model from initial model is significant: chi-square = 379.288 - 324.802; df = 113 - 111; p < .001.

Table D5.5 - CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	59	324.802	111	.000	2.926
Saturated model	170	.000	0		
Independence model	34	4489.434	136	.000	33.011

CMIN/DF should be between 2 and 3 for an acceptable fit and <2 for a good fit.

Measurement Model Fit Indices

Table D5.6 - CFI

Model	NFI	RFI	IFI	TLI	CFI
Default model	.928	.911	.951	.940	.951
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

CFI should be>.9 for an acceptable fit and >.95 for a good fit.

Table D5.7 - RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.059	.052	.067	.023
Independence model	.241	.235	.247	.000

RMSEA should be <.10 for a good fit and <.05 for a very good fit.

The fit indices for the model are:

The ratio of χ^2 (324.8) to the degrees of freedom (111) was 2.926. Since this value is <3, it indicates that the data fits the model globally.

The comparative fit index (CFI) was 0.951 and the root mean square residual of approximation (RMSEA) was .059(.052; .067. p = .005).

These fit indices indicate that there is a good fit.

Table D5.8 - Regression Weights

			Estimate	S.E.	C.R.	P	Label
q32	<---	RDIM	1.000				
q30_recoded	<---	RDIM	1.264	.099	12.711	***	par_1
q8	<---	RDIM	1.610	.116	13.872	***	par_2
q17	<---	RDIM	1.646	.119	13.812	***	par_3
q6_recoded	<---	RDIM	1.622	.126	12.914	***	par_4
q1	<---	RDIM	1.436	.114	12.583	***	par_5
q19	<---	ATT	1.000				
q25	<---	ATT	.786	.053	14.915	***	par_6
q28	<---	ATT	.618	.047	13.254	***	par_7
q3	<---	PN	1.000				
q15	<---	PN	1.025	.116	8.816	***	par_8

			Estimate	S.E.	C.R.	P	Label
q4	<---	RDIM	.983	.088	11.109	***	par_9
q10	<---	RDIM	1.347	.111	12.093	***	par_10
q23	<---	RDIM	1.533	.113	13.621	***	par_11
q35	<---	RDIM	1.293	.099	13.051	***	par_12
q26	<---	INT	.904	.043	20.989	***	par_19
q18	<---	INT	1.000				

This table indicates if the estimate is significant. If p <.05 or =*** then the estimate is significant. For estimate = 1 may be taken as significant.

Table D5.9 - Standardized Regression Weights

			Estimate
q1	<---	RDIM	.688
q6_recoded	<---	RDIM	.714
q17	<---	RDIM	.789
q8	<---	RDIM	.806
q30_recoded	<---	RDIM	.591
q32	<---	RDIM	.577
q4	<---	RDIM	.572
q10	<---	RDIM	.649
q23	<---	RDIM	.768
q35	<---	RDIM	.720
q28	<---	ATT	.595
q25	<---	ATT	.679
q19	<---	ATT	.779
q15	<---	PN	.699
q3	<---	PN	.620
q26	<---	INT	.836
q18	<---	INT	.866

The estimated standardized factor loadings and the reliability of each measured variable is summarized in the table below:

Table D5.10 - Estimated Standardized Factor Loadings and Reliability for the Revised Measurement Model

Factor/Variable		Standardized Loading	Reliability
RDIM	q1	.688*	.47
	q6_recoded	.714*	.51
	q17	.789*	.62
	q8	.806*	.65
	q30_recoded	.591*	.36
	q32	.577*	.35
	q4	.572*	.33

	q10	.649*	.42
	q23	.768*	.59
	q35	.720*	.52
ATT	q28	.595*	.43
	q25	.679*	.54
	q19	.779*	.59
PN	q15	.699*	.48
	q3	.620*	.62
INT	q26	.836*	.72
	q18	.866*	.73

* Statistically significant at α =0.01

The estimated standardised regression weights, reflect the validity of each observed variable as a measure of the latent variable. Ideally, these should be at least 0.5. The figures listed above are all good. These loadings are all significantly different from zero at the 0.001 level.

The estimated correlations between latent variable's are all positive.

Reliability is calculated as estimate. The reliability of each observed variable, as a measure of the latent variable, ranged from .33 to .73.

Table D5.11 - Covariances

			Estimate	S.E.	C.R.	P	Label
RDIM	<-->	PN	.175	.025	6.996	***	par_13
RDIM	<-->	ATT	.244	.028	8.867	***	par_14
INT	<-->	ATT	.464	.037	12.561	***	par_15
ATT	<-->	PN	.246	.033	7.373	***	par_16
INT	<-->	PN	.235	.033	7.132	***	par_17
INT	<-->	RDIM	.208	.025	8.373	***	par_18
e49	<-->	e50	.098	.018	5.366	***	par_20
e12	<-->	e11	.132	.030	4.331	***	par_21

Table D5.12 - Correlations

			Estimate
RDIM	<-->	PN	.565
RDIM	<-->	ATT	.686
INT	<-->	ATT	.919
ATT	<-->	PN	.604
INT	<-->	PN	.536
INT	<-->	RDIM	.544
e49	<-->	e50	.294
e12	<-->	e11	.200

Table D5.13 - Squared Multiple

	Estimate
q26	.700
q18	.750
q15	.489
q3	.384
q28	.354
q25	.461
q19	.607
q35	.519
q4	.327
q10	.421
q23	.589
q1	.474
q6_recoded	.510
q17	.623
q8	.650
q30_recoded	.350
q32	.332

Table D5.14 - Standardized Residual Covariances

For this table, the mean = 0 and variance = 1

	q26	q18	q15	q3	q28	q25	q19	q35	q4	q10	q23	q1	q6_rec	q17	q8	q30rec	q32
q26	.000																
q18	.000	.000															
q15	-.194	-.175	.000														
q3	.070	.397	.000	.000													
q28	1.354	-.374	-2.078	-.251	.000												
q25	2.021	.312	-.934	-.883	.000	.000											
q19	-1.325	-.149	1.409	.186	.474	-.279	.000										
q35	1.447	1.246	1.124	-.424	1.338	.015	2.337	.000									
q4	-.140	2.222	-.313	2.033	1.803	-.182	1.873	-.198	.000								
q10	-1.192	-.623	-.584	-1.092	-2.244	-1.229	.740	-1.058	-.775	.000							
q23	.034	.023	.162	.039	-.061	-.703	1.121	1.056	-.257	-.616	.000						
q1	-1.630	-.491	-1.016	-.441	-1.497	-2.239	-.159	-.967	-.154	1.720	-.122	.000					
q6rec	-1.031	-.230	-.072	-.541	-2.384	-1.966	.958	-.422	-.870	.133	-.693	.642	.000				
q17	.239	1.549	2.031	1.164	-1.618	-1.875	2.259	.423	-.397	-.356	.685	-.392	-.551	.000			

q8	-1.186	.006	-.628	-.414	-1.652	-2.835	.442	-.580	.822	1.259	-.793	.502	1.094	-.376	.000		
q30rec	-1.587	-.661	-2.284	.063	-1.557	-1.936	-.379	-.357	.172	-.062	-.146	.533	1.461	-.704	.412	.000	
q32	.292	-.020	-.637	-.708	.402	-1.196	.743	.479	.554	-.627	.942	-.729	-.356	.442	-.668	.000	.000

Table D5.15 - Correlations

	PN	ATT	RDIM	INT	q26	q18	q15	q3	q28	q25	q19	q35	q4	q10	q23	q1	q6r
PN	1.000																
ATT	.604	1.000															
RDIM	.565	.686	1.000														
INT	.536	.919	.544	1.000													
q26	.449	.768	.455	.836	1.000												
q18	.465	.796	.471	.866	.725	1.000											
q15	.699	.422	.395	.375	.314	.325	1.000										
q3	.620	.374	.350	.333	.278	.288	.434	1.000									
q28	.359	.595	.408	.546	.457	.473	.251	.223	1.000								
q25	.410	.679	.466	.624	.522	.540	.287	.254	.577	1.000							
q19	.470	.779	.534	.715	.598	.620	.329	.292	.463	.529	1.000						
q35	.407	.494	.720	.392	.328	.339	.284	.252	.294	.335	.385	1.000					
q4	.323	.392	.572	.311	.260	.269	.226	.200	.233	.266	.305	.412	1.000				
q10	.367	.445	.649	.353	.295	.306	.256	.227	.265	.302	.347	.467	.371	1.000			
q23	.433	.526	.768	.418	.349	.362	.303	.269	.313	.357	.410	.553	.439	.498	1.000		
q1	.389	.472	.688	.374	.313	.324	.272	.241	.281	.320	.368	.496	.394	.447	.528	1.000	
q6rec	.403	.490	.714	.389	.325	.337	.282	.250	.291	.333	.382	.515	.409	.464	.548	.492	1.0
q17	.446	.541	.789	.429	.359	.372	.312	.276	.322	.367	.422	.568	.451	.512	.606	.543	.5
q8	.455	.553	.806	.439	.367	.380	.318	.282	.329	.375	.431	.581	.461	.523	.619	.555	.5

q30re	.334	.405	.591	.322	.269	.279	.233	.207	.241	.275	.316	.426	.338	.384	.454	.407	.4
q32	.326	.395	.577	.314	.262	.272	.228	.202	.235	.268	.308	.415	.330	.374	.443	.397	.4

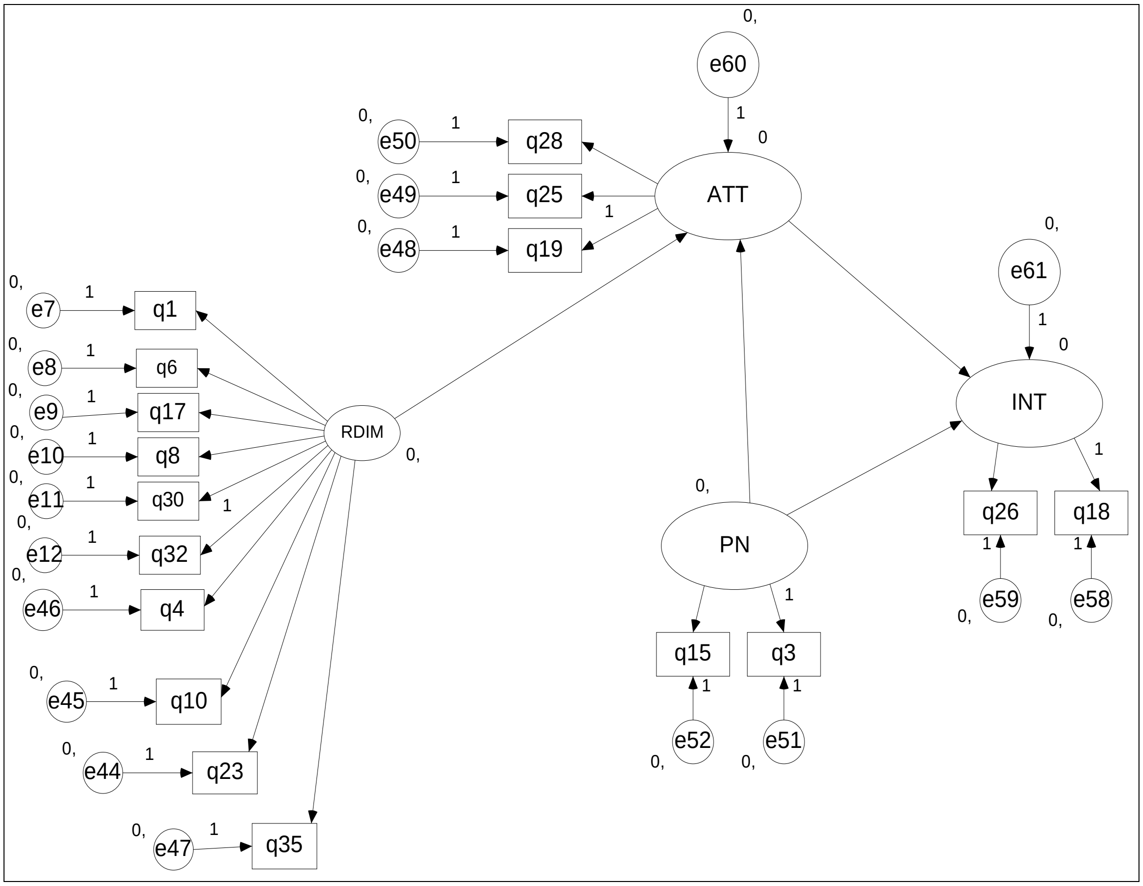
Table D5.16 - Means

PN	ATT	RDIM	INT	q26	q18	q15	q3	q28	q25	q19	q35	q4	q10	q23	q1	q6rec	q17	q8	q30_rec	q32
.000	*.000*	*.000*	*.000*	*3.857*	*3.751*	*3.475*	*3.699*	*4.144*	*3.969*	*3.834*	*3.514*	*4.078*	*3.018*	*3.439*	*3.179*	*3.395*	*3.442*	*3.435*	*3.628*	*3.791*

Given the above results from the confirmatory factor analysis, the measurement model may be used as part of the SEM model.

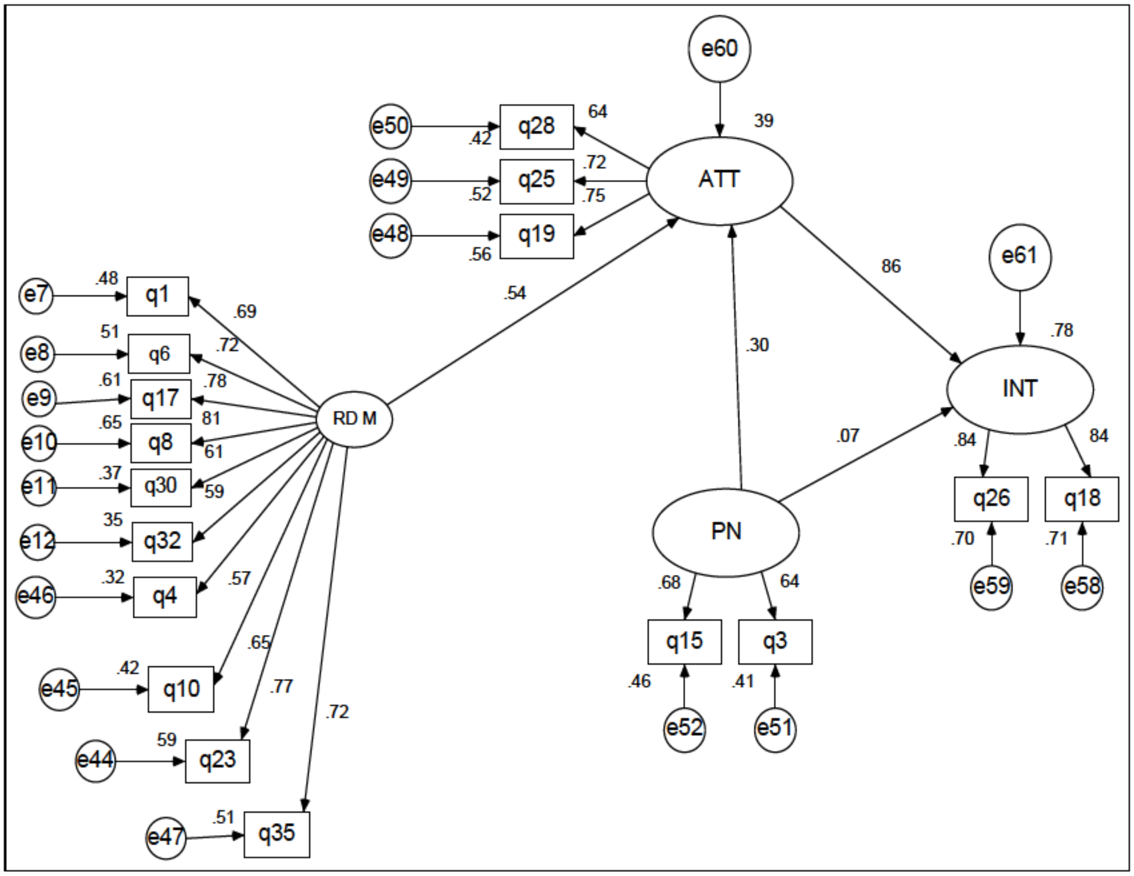
Results of the Analysis of the Structural Model

The initial structural model is represented below:



Results of the Structural Model with Standardised Coefficients

The initial model is analysed using SEM:



Structural Model Fit Indices

Table D5.17 - CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	55	486.708	115	.000	4.232
Saturated model	170	.000	0		
Independence model	34	4489.434	136	.000	33.011

CMIN/DF should be between 2 and 3 for an acceptable fit and <2 for a good fit.

Table D5.18 - CFI

Model	NFI	RFI	IFI	TLI	CFI
Default model	.892	.872	.915	.899	.915
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

CFI should be>.9 for an acceptable fit and >.95 for a good fit.

Table D5.19 - RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.076	.070	.084	.000

RMSEA should be <.10 for a good fit and <.05 for a very good fit.

The fit indices for the model are:

The ratio of χ^2 (486.7) to the degrees of freedom (115) was 4.232. Since this value is >3, it indicates that the data does not fit the model globally.

However, this statistic does suffer from limitations and a non-significant value may be unlikely even though the model may be a close fit to the data (Weston and Gore 2006: 742).

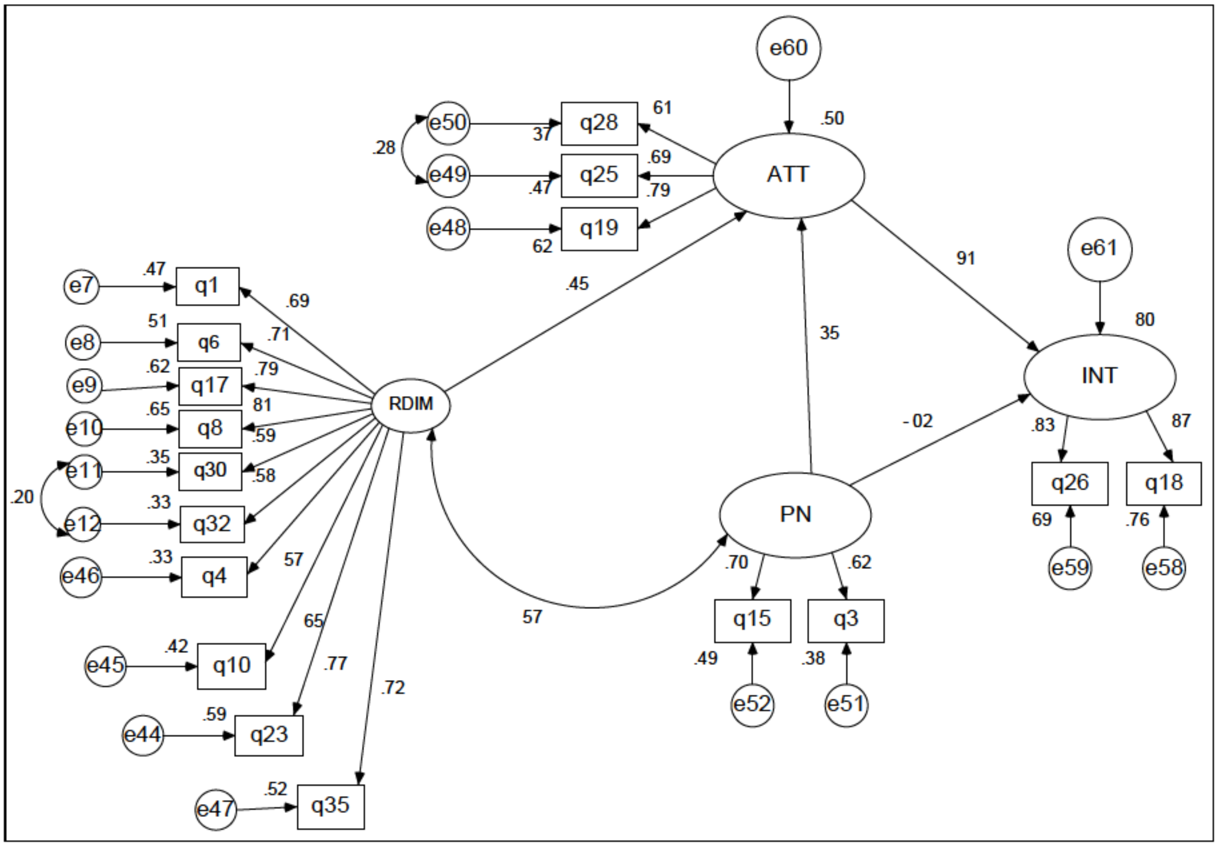
The comparative fit index (CFI) was 0.915 and the root mean square residual of approximation (RMSEA) was 0.076 (.070; .084. p = .005).

These fit indices indicate that there is an acceptable fit.

Model Re-Specification

3 paths were added as a modification- between q30 and q32, between q28 and q25 and between RDIM and PN. This led to a significant improvement: chi-square = 486.708 – 330.992; df = 115-112 = 3; p <.001.

Final Structural Model, with 3 Adjustments:



Structural Model Fit Indices

Table D5.20 - CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	58	330.992	112	.000	2.955
Saturated model	170	.000	0		
Independence model	34	4489.434	136	.000	33.011

CMIN/DF should be between 2 and 3 for an acceptable fit and <2 for a good fit.

Table D5.21 - CFI

Model	NFI	RFI	IFI	TLI	CFI
Default model	.926	.910	.950	.939	.950
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

CFI should be>.9 for an acceptable fit and >.95 for a good fit.

Table D5.22 - RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.059	.052	.067	.018
Independence model	.241	.235	.247	.000

RMSEA should be <.10 for a good fit and <.05 for a very good fit.

The fit indices for the model are:

The ratio of χ^2 (330.9) to the degrees of freedom (112) was 2.955. Since this value is <3, it indicates that the data fits the model globally.

The comparative fit index (CFI) was 0.950 and the root mean square residual of approximation (RMSEA) was 0.059 (.052; .067. p = .005).

These fit indices indicate that there is a good fit.

Table D5.23 - Regression Weights

			Estimate	S.E.	C.R.	P	Label
ATT	<---	RDIM	.606	.093	6.531	***	par_14
ATT	<---	PN	.406	.090	4.517	***	par_15
INT	<---	PN	-.023	.084	-.279	.780	par_16
INT	<---	ATT	.965	.081	11.911	***	par_17
q32	<---	RDIM	1.000				
q30_recoded	<---	RDIM	1.264	.099	12.710	***	par_1
q8	<---	RDIM	1.611	.116	13.873	***	par_2
q17	<---	RDIM	1.648	.119	13.813	***	par_3
q6_recoded	<---	RDIM	1.622	.126	12.910	***	par_4
q1	<---	RDIM	1.437	.114	12.582	***	par_5
q19	<---	ATT	1.000				
q25	<---	ATT	.786	.055	14.389	***	par_6
q28	<---	ATT	.620	.047	13.065	***	par_7
q3	<---	PN	1.000				
q15	<---	PN	1.033	.117	8.828	***	par_8
q4	<---	RDIM	.983	.088	11.104	***	par_9
q10	<---	RDIM	1.347	.111	12.086	***	par_10
q23	<---	RDIM	1.532	.113	13.613	***	par_11
q35	<---	RDIM	1.293	.099	13.044	***	par_12
q26	<---	INT	.896	.043	20.850	***	par_13
q18	<---	INT	1.000				

Table D5.24 - Standardized Regression Weights

			Estimate
ATT	<---	RDIM	.453
ATT	<---	PN	.346
INT	<---	PN	-.019
INT	<---	ATT	.906
q1	<---	RDIM	.688
q6_recoded	<---	RDIM	.714
q17	<---	RDIM	.790
q8	<---	RDIM	.807
q30_recoded	<---	RDIM	.591
q32	<---	RDIM	.577
q4	<---	RDIM	.572
q10	<---	RDIM	.649
q23	<---	RDIM	.767
q35	<---	RDIM	.720
q28	<---	ATT	.606
q25	<---	ATT	.689
q19	<---	ATT	.790
q15	<---	PN	.701
q3	<---	PN	.617
q26	<---	INT	.833
q18	<---	INT	.870

The estimated standardized factor loadings and the reliability of each measured variable is summarized in the table below.

Table D5.25 - Estimated Standardized Factor Loadings and Reliability for the Structural Model

Factor/Variable		Standardized Loading	Reliability
RDIM	q1	.688*	.47
	q6_recoded	.714*	.51
	q17	.790*	.62
	q8	.807*	.65
	q30_recoded	.591*	.35
	q32	.577*	.33
	q4	.572*	.33
	q10	.649*	.42
	q23	.767*	.59

	q35	.720*	.52
ATT	q28	.606*	.37
	q25	.689*	.47
	q19	.790*	.62
PN	q15	.701*	.49
	q3	.617*	.38
INT	q26	.833*	.69
	q18	.870*	.76

* Statistically significant at α =0. 01

The estimated standardised regression weights, reflect the validity of each observed variable as a measure of the latent variable. Ideally, these should be at least 0.5. The figures listed above are all good. These loadings are all significantly different from zero at the 0.001 level.

The estimated correlations between latent variables are all positive.

Reliability is calculated as estimate. The reliability of each observed variable, as a measure of the latent variable, ranged from .33 to .76.

Table D5.26 - Variances

	Estimate	S.E.	C.R.	P	Label
RDIM	.270	.038	7.126	***	par_38
PN	.351	.057	6.143	***	par_39
e60	.241	.029	8.393	***	par_40
e61	.109	.026	4.131	***	par_41
e12	.542	.034	15.812	***	par_42
e11	.802	.051	15.747	***	par_43
e10	.376	.028	13.558	***	par_44
e8	.681	.046	14.945	***	par_45
e7	.619	.041	15.185	***	par_46
e9	.442	.032	13.951	***	par_47
e44	.443	.031	14.305	***	par_48
e45	.673	.044	15.453	***	par_49
e46	.537	.034	15.861	***	par_50
e47	.420	.028	14.888	***	par_51
e48	.291	.029	10.112	***	par_52
e49	.330	.025	13.192	***	par_53
e50	.320	.022	14.476	***	par_54
e51	.570	.051	11.292	***	par_55
e52	.387	.046	8.456	***	par_56
e58	.177	.022	8.171	***	par_57
e59	.194	.019	10.169	***	par_58

Table D5.27 - Covariances

			Estimate	S.E.	C.R.	P	Label
PN	<-->	RDIM	.174	.025	6.979	***	par_18
e49	<-->	e50	.090	.018	4.996	***	par_19
e12	<-->	e11	.132	.030	4.331	***	par_20

Table D5.28 - Correlations

			Estimate
PN	<-->	RDIM	.566
e49	<-->	e50	.277
e12	<-->	e11	.200

Table D5.29 - Squared Multiple

	Estimate
ATT	.502
INT	.801
q26	.694
q18	.756
q15	.492
q3	.381
q28	.367
q25	.475
q19	.625
q35	.518
q4	.327
q10	.421
q23	.588
q1	.474
q6_recoded	.510
q17	.624
q8	.651
q30_recoded	.350
q32	.332

Table D5.30 - Standardized Total Effects

	PN	RDIM	ATT	INT
ATT	.346	.453	.000	.000
INT	.295	.411	.906	.000
q26	.245	.342	.755	.833
q18	.256	.357	.788	.870
q15	.701	.000	.000	.000
q3	.617	.000	.000	.000
q28	.210	.274	.606	.000
q25	.238	.312	.689	.000
q19	.273	.358	.790	.000
q35	.000	.720	.000	.000
q4	.000	.572	.000	.000
q10	.000	.649	.000	.000

	PN	RDIM	ATT	INT
q23	.000	.767	.000	.000
q1	.000	.688	.000	.000
q6_recoded	.000	.714	.000	.000
q17	.000	.790	.000	.000
q8	.000	.807	.000	.000
q30_recoded	.000	.591	.000	.000
q32	.000	.577	.000	.000

Table D5.31 - Standardized Direct Effects

	RDIM	PN	ATT	INT
ATT	.453	.346	.000	.000
INT	.000	-.019	.906	.000
q26	.000	.000	.000	.833
q18	.000	.000	.000	.870
q15	.000	.701	.000	.000
q3	.000	.617	.000	.000
q28	.000	.000	.606	.000
q25	.000	.000	.689	.000
q19	.000	.000	.790	.000
q35	.720	.000	.000	.000
q4	.572	.000	.000	.000
q10	.649	.000	.000	.000
q23	.767	.000	.000	.000
q1	.688	.000	.000	.000
q6_recoded	.714	.000	.000	.000
q17	.790	.000	.000	.000
q8	.807	.000	.000	.000
q30_recoded	.591	.000	.000	.000
q32	.577	.000	.000	.000

Table D5.32 - Standardized Indirect Effects

	RDIM	PN	ATT	INT
ATT	.000	.000	.000	.000
INT	.411	.313	.000	.000
q26	.342	.245	.755	.000
q18	.357	.256	.788	.000
q15	.000	.000	.000	.000
q3	.000	.000	.000	.000
q28	.274	.210	.000	.000
q25	.312	.238	.000	.000
q19	.358	.273	.000	.000
q35	.000	.000	.000	.000
q4	.000	.000	.000	.000
q10	.000	.000	.000	.000
q23	.000	.000	.000	.000
q1	.000	.000	.000	.000
q6_recoded	.000	.000	.000	.000
q17	.000	.000	.000	.000
q8	.000	.000	.000	.000
q30_recoded	.000	.000	.000	.000
q32	.000	.000	.000	.000

Table D5.33 - Standardized Residual Covariances

	q26	q18	q15	q3	q28	q25	q19	q35	q4	q10	q23	q1	q6r	q17	q8	q30r	q32
q26	.000																
q18	.000	.000															
q15	-.064	-.098	.000														
q3	.233	.514	.011	.000													
q28	1.471	-.337	-2.185	-.310	.000												
q25	2.193	.393	-1.033	-.929	.000	.000											
q19	-1.142	-.056	1.296	.136	.139	-.606	.000										
q35	1.031	.752	1.096	-.405	1.589	.319	2.695	.000									
q4	-.472	1.817	-.336	2.047	2.003	.062	2.159	-.190	.000								
q10	-1.557	-1.060	-.608	-1.075	-2.026	-.957	1.059	-1.046	-.767	.000							
q23	-.397	-.489	.134	.060	.201	-.383	1.495	1.071	-.247	-.603	.000						
q1	-2.019	-.959	-1.046	-.427	-1.270	-1.961	.167	-.963	-.152	1.725	-.116	.000					
q6r	-1.435	-.714	-.102	-.526	-2.149	-1.676	1.302	-.416	-.867	.139	-.685	.641	.000				
q17	-.216	1.000	1.992	1.176	-1.364	-1.564	2.637	.422	-.400	-.356	.686	-.401	-.558	.000			
q8	-1.639	-.539	-.667	-.401	-1.394	-2.522	.815	-.581	.818	1.258	-.793	.492	1.087	-.392	.000		
q30r	-1.926	-1.068	-2.309	.075	-1.359	-1.692	-.094	-.353	.174	-.058	-.140	.531	1.460	-.711	.404	.000	
q32	-.045	-.419	-.661	-.695	.600	-.954	1.026	.486	.557	-.621	.950	-.729	-.354	.437	-.673	.000	.000

Table D5.34 - Correlations

	RDIM	PN	ATT	INT	q26	q18	q15	q3	q28	q25	q19	q35	q4	q10	q23	q1	q6r	q17	
RDIM	1.000																		
PN	.566	1.000																	
ATT	.649	.602	1.000																
INT	.577	.527	.895	1.000															
q26	.481	.439	.745	.833	1.000														
q18	.502	.458	.778	.870	.725	1.000													
q15	.397	.701	.422	.369	.308	.321	1.000												
q3	.349	.617	.372	.325	.271	.283	.433	1.000											
q28	.393	.365	.606	.542	.452	.472	.256	.225	1.000										
q25	.447	.415	.689	.617	.514	.536	.291	.256	.577	1.000									
q19	.513	.476	.790	.707	.589	.615	.334	.294	.479	.545	1.000								
q35	.720	.407	.467	.415	.346	.361	.285	.251	.283	.322	.369	1.000							
q4	.572	.323	.371	.330	.275	.287	.227	.200	.225	.256	.293	.411	1.000						
q10	.649	.367	.421	.374	.312	.326	.257	.227	.255	.290	.333	.467	.371	1.000					
q23	.767	.434	.497	.443	.369	.385	.304	.268	.301	.343	.393	.552	.438	.498	1.000				
q1	.688	.389	.446	.397	.331	.346	.273	.240	.270	.308	.353	.495	.394	.447	.528	1.000			
q6r	.714	.404	.463	.412	.343	.359	.283	.249	.281	.319	.366	.514	.408	.464	.548	.492	1.000		
q17	.790	.447	.512	.456	.380	.396	.313	.276	.310	.353	.405	.568	.451	.512	.606	.544	.564	1.000	
q8	.807	.456	.523	.466	.388	.405	.320	.282	.317	.361	.414	.581	.461	.523	.619	.555	.576	.637	1.0
q30r	.591	.334	.384	.341	.284	.297	.235	.206	.232	.264	.303	.426	.338	.384	.454	.407	.422	.467	.4
q32	.577	.326	.374	.333	.277	.289	.229	.201	.227	.258	.296	.415	.330	.374	.442	.397	.412	.455	.4

Table D5.35 - Means

RDIM	PN	ATT	INT	q26	q18	q15	q3	q28	q25	q19	q35	q4	q10	q23	q1	q6rec	q17
.000	.000	.000	.000	3.857	3.751	3.475	3.699	4.144	3.969	3.834	3.514	4.078	3.018	3.439	3.179	3.395	3.442

APPENDIX D6

TRUST

STATISTICAL ANALYSIS

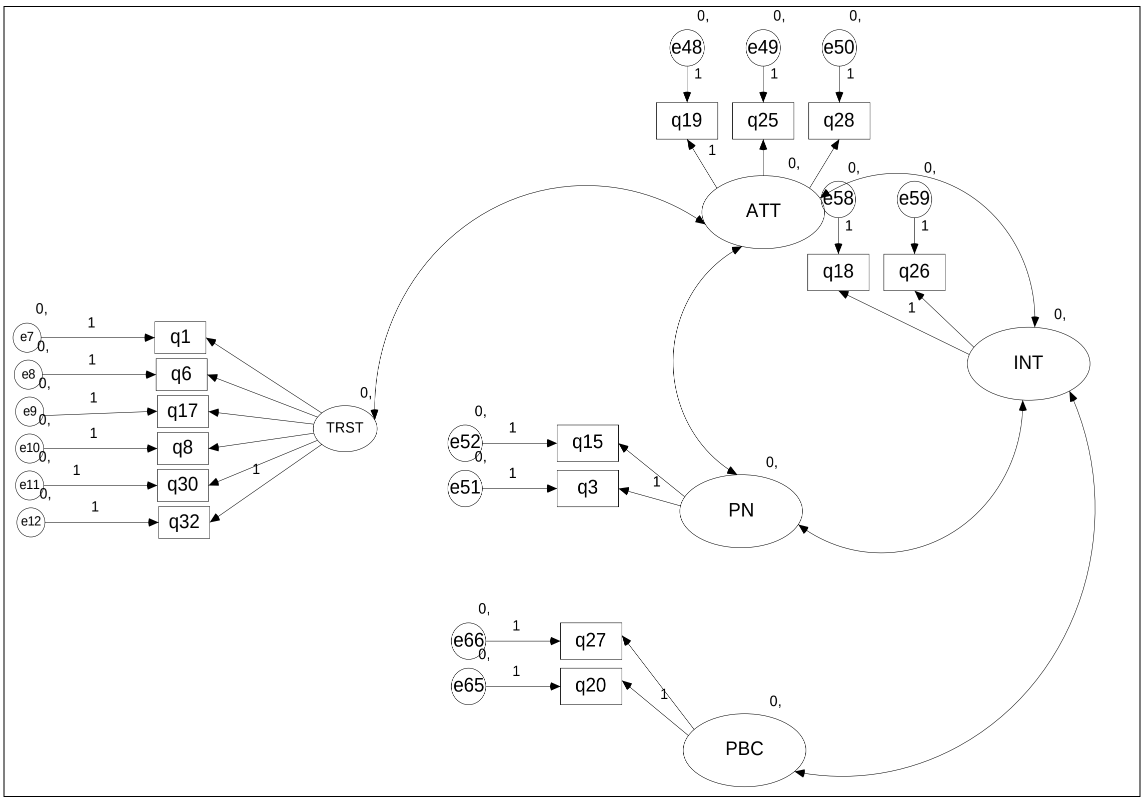
APPENDIX D6

TRUST

STATISTICAL ANALYSIS

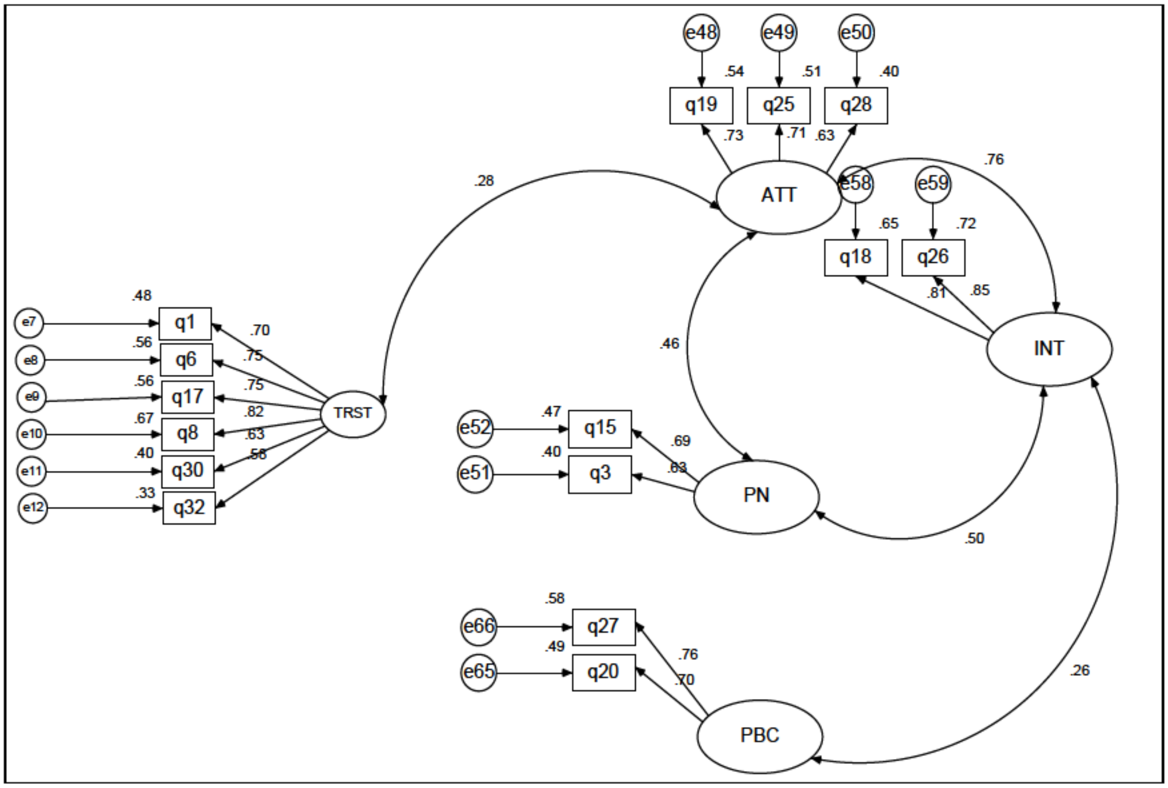
Results of the analysis of the initial hypothesized trust measurement model (with PBC).

The initial hypothesized trust, measurement model is represented by the diagram below:



Results of the analysis of the initial hypothesized, trust measurement model with standardised coefficients

The initial hypothesized, trust, measurement model with standardised coefficients is represented by the diagram below:



Trust - Measurement Model Fit Indices

Table D6.1 - CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	50	909.234	85	.000	10.697
Saturated model	135	.000	0		
Independence model	30	3850.838	105	.000	36.675

CMIN/DF should be between 2 and 3 for an acceptable fit and <2 for a good fit.

Table D6.2 - CFI

Model	NFI	RFI	IFI	TLI	CFI
Default model	.764	.708	.781	.728	.780
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

CFI should be >.9 for an acceptable fit and >.95 for a good fit.

Table D6.3 - RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.132	.125	.140	.000
Independence model	.254	.247	.261	.000

RMSEA should be <.10 for a good fit and <.05 for a very good fit.

The fit indices for the model are:

The ratio of χ^2 (909.2) to the degrees of freedom (85) was 10.6. Since this value is >3, it indicates that the data does not fit the model globally.

However, this statistic does suffer from limitations and a non-significant value may be unlikely even though the model may be a close fit to the data (Weston and Gore, 2006: 742).

The comparative fit index (CFI) was 0.780 and the root mean square residual of approximation (RMSEA) was 0.132 (.125; .140. p = .005).

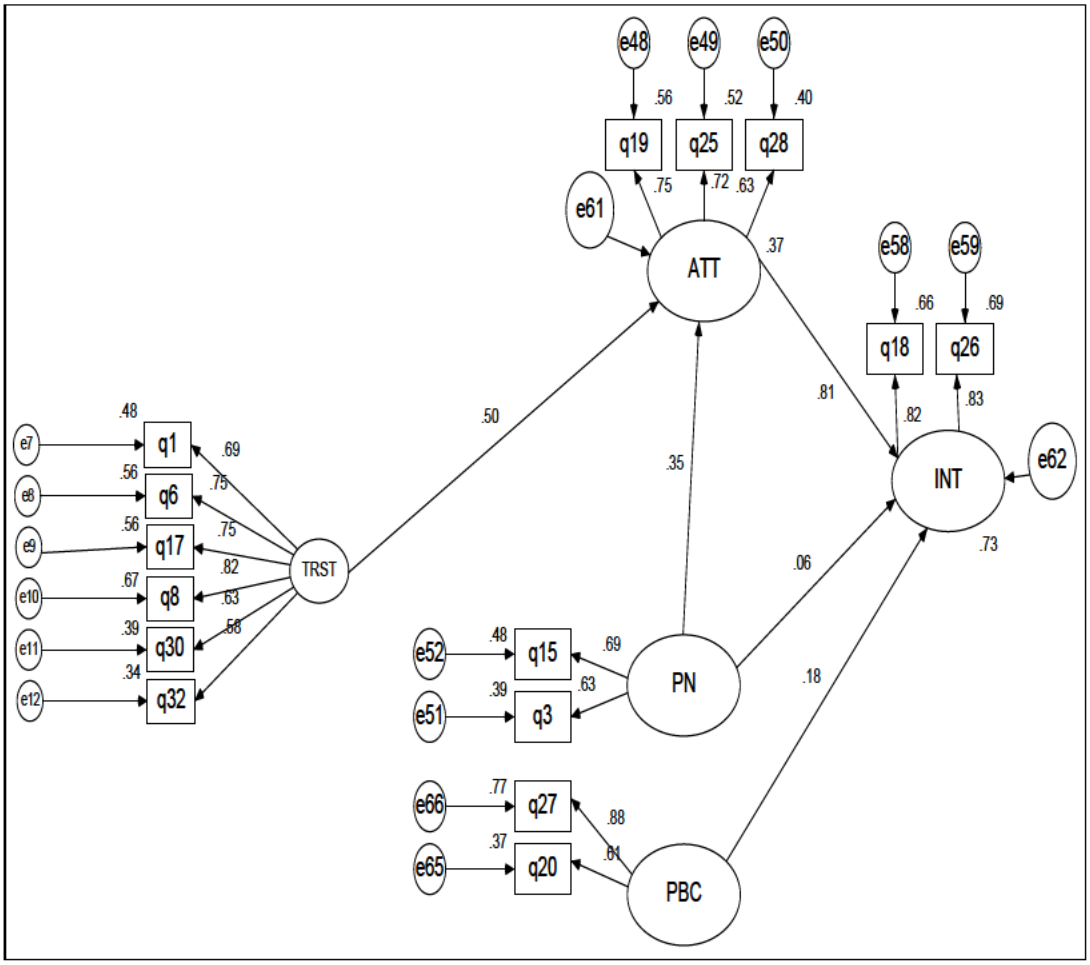
The results above indicate an unacceptable fit.

Measurement Model Identification

For this measurement model, there are 15 observed variables. The number of distinct sample moments is 135. The number of distinct parameters to be estimated is 50. The degrees of freedom is (135-50) = 85. Probability level = .000
The model is therefore over-identified and it is possible to test the model.

Results of the Analysis of the Structural Model

Initial hypothesized structural model with standardised coefficients.



Trust-Structural Model Fit Indices

Table D6.4 - CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	50	848.391	85	.000	9.981
Saturated model	135	.000	0		
Independence model	30	3850.838	105	.000	36.675

CMIN/DF should be between 2 and 3 for an acceptable fit and <2 for a good fit.

Table D6.5 - CFI

Model	NFI	RFI	IFI	TLI	CFI
Default model	.780	.728	.797	.748	.796
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

CFI should be>.9 for an acceptable fit and >.95 for a good fit.

Table D6.6 - RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.127	.120	.135	.000
Independence model	.254	.247	.261	.000

RMSEA should be <.10 for a good fit and <.05 for a very good fit.

The fit indices for the model are:

The ratio of χ^2 (848.3) to the degrees of freedom (85) was 9.981. Since this value is >3, it indicates that the data does not fit the model globally.

However, this statistic does suffer from limitations and a non-significant value may be unlikely even though the model may be a close fit to the data (Weston and Gore, 2006: 742).

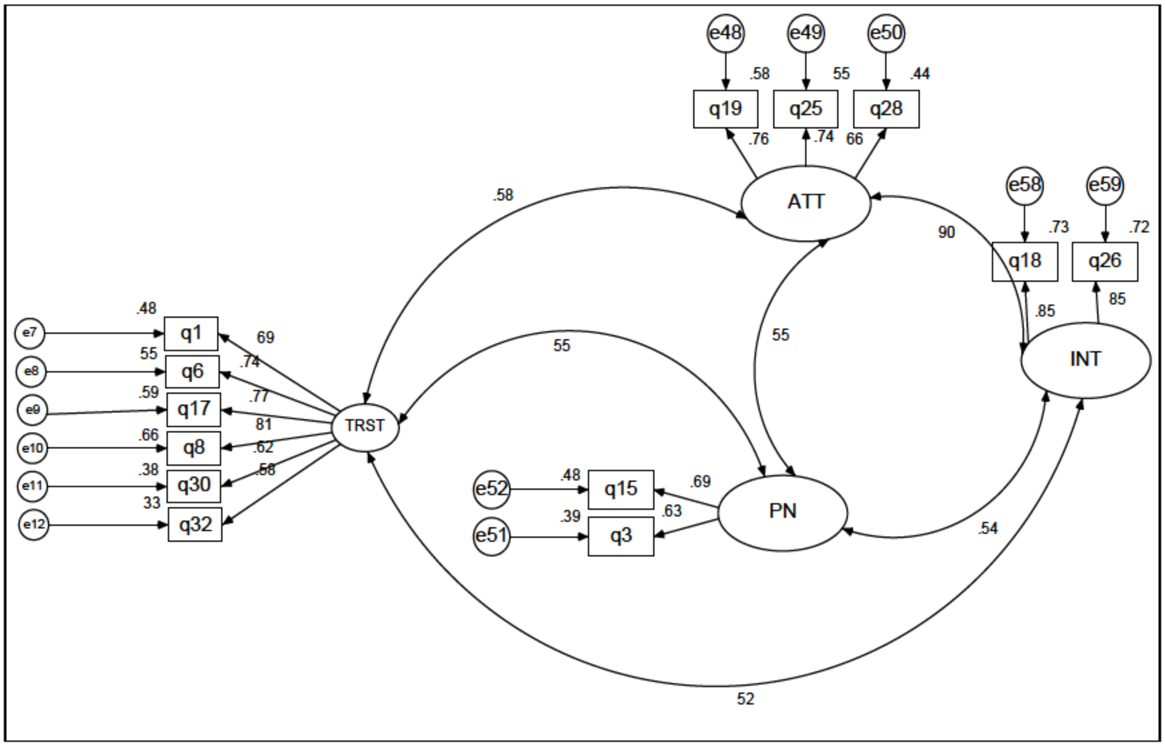
The comparative fit index (CFI) was 0.796 and the root mean square residual of approximation (RMSEA) was 0.127 (.120; .135. p = .005).

The results above indicate an unacceptable fit. There were variables/ numerical errors related to PBC.

Modification indices indicated that a path from PBC to ATT would improve fit greatly and provide an acceptable fit. However, this caused numerical errors in the measurement model.

The trust model was thus revised eliminating PBC.

Results of the Revised Trust Measurement Model



Below are indices and estimated values in tables as per AMOS - Version 16.

Trust-Measurement Model Fit Indices

Table D6.7 - CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	45	233.721	59	.000	3.961
Saturated model	104	.000	0		
Independence model	26	3135.133	78	.000	40.194

CMIN/DF should be between 2 and 3 for an acceptable fit and <2 for a good fit.

Table D6.8 - CFI

Model	NFI	RFI	IFI	TLI	CFI
Default model	.925	.901	.943	.924	.943
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

CFI should be>.9 for an acceptable fit and >.95 for a good fit.

Table D6.9 - RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.073	.063	.083	.000
Independence model	.266	.258	.274	.000

RMSEA should be <.10 for a good fit and <.05 for a very good fit.

The fit indices for the model are:

The ratio of χ^2 (233.7) to the degrees of freedom (59) was 3.961. Since this value is >3, it indicates that the data does not fit the model globally.

However, this statistic does suffer from limitations and a non-significant value may be unlikely even though the model may be a close fit to the data (Weston and Gore 2006: 742).

The comparative fit index (CFI) was .943 and the root mean square residual of approximation (RMSEA) was 0.073 (.063; .083. p = .005). The results indicate that there was an acceptable fit.

Measurement Model Identification

For this measurement model, there are 13 observed variables. The number of distinct sample moments is 104. The number of distinct parameters to be estimated is 45. The degrees of freedom is (104- 45) = 59. Probability level = .000.
The model is therefore over-identified and it is possible to test the model.

Table D6.10 - Regression Weights

			Estimate	S.E.	C.R.	P	Label
q32	<---	TRST	1.000				
q30_recoded	<---	TRST	1.323	.114	11.648	***	par_1
q8	<---	TRST	1.620	.121	13.429	***	par_2
q17	<---	TRST	1.595	.121	13.229	***	par_3
q6_recoded	<---	TRST	1.681	.131	12.796	***	par_4
q1	<---	TRST	1.436	.117	12.232	***	par_5
q19	<---	ATT	1.000				
q25	<---	ATT	.877	.058	15.204	***	par_6
q28	<---	ATT	.702	.050	13.923	***	par_7
q3	<---	PN	1.000				
q15	<---	PN	.998	.115	8.684	***	par_8
q18	<---	intention	1.000				
q26	<---	intention	.930	.044	21.316	***	par_9

Table D6.11 - Standardized Regression Weights

			Estimate
q1	<---	TRST	.689
q6_recoded	<---	TRST	.742
q17	<---	TRST	.766
q8	<---	TRST	.813
q30_recoded	<---	TRST	.620
q32	<---	TRST	.578
q19	<---	ATT	.760
q25	<---	ATT	.739
q28	<---	ATT	.660
q15	<---	PN	.690
q3	<---	PN	.628
q18	<---	INT	.854
q26	<---	INT	.849

Table D6.12 - Estimated Standardized Factor Loadings and Reliability for the Revised Measurement Model

Factor/Variable		Standardized Loading	Reliability
TRST	q1	.689*	.48
TRST	q6_recoded	.742*	.55
TRST	q17	.766*	.59
TRST	q8	.813*	.66
TRST	q30_recoded	.620*	.38
TRST	q32	.578*	.33
ATT	q19	.760*	.58
ATT	q25	.739*	.55
ATT	q28	.660*	.44
PN	q15	.690*	.48
PN	q3	.628*	.39
INT	q18	.854*	.73
INT	q26	.849*	.72

* Statistically significant at α =0. 01

The estimated standardised regression weights reflect the validity of each observed variable as a measure of the latent variable. Ideally, these should be at least 0.5. The figures listed above are all good. These loadings are all significantly different from zero at the 0.001 level.

The estimated correlations between latent variables are all positive.

Reliability is calculated as estimate. The reliability of each observed variable, as a measure of the latent variable, ranged from .33 to .73.

Table D6.13 - Covariances

			Estimate	S.E.	C.R.	P	Label
TRST	<-->	PN	.172	.025	6.806	***	par_10
TRST	<-->	ATT	.202	.026	7.768	***	par_11
ATT	<-->	PN	.223	.032	6.918	***	par_12
INT	<-->	ATT	.437	.037	11.848	***	par_13
INT	<-->	PN	.236	.033	7.181	***	par_14
INT	<-->	TRST	.195	.025	7.897	***	par_15

Table D6.14 - Correlations

			Estimate
TRST	<-->	PN	.547
TRST	<-->	ATT	.580
ATT	<-->	PN	.552
INT	<-->	attitude	.898
INT	<-->	P	.538
INT	<-->	TRST	.515

Table D6.15 - Squared Multiple Correlations

Questions	Estimate
q26	.720
q18	.729
q15	.476
q3	.395
q28	.436
q25	.546
q19	.578
q1	.475
q6_recoded	.551
q17	.587
q8	.661
q30_recoded	.385
q32	.334

Table D6.16 - Correlations

	PN	ATT	TRST	INT	q26	q18	q15	q3	q28	q25	q19	q1	q6r	q17	q8	q30r	q32
PN	1.000																
ATT	.552	1.000															
trst	.547	.580	1.000														
int	.538	.898	.515	1.000													
q26	.456	.762	.437	.849	1.000												
q18	.459	.767	.440	.854	.725	1.000											
q15	.690	.381	.377	.371	.315	.317	1.000										
q3	.628	.347	.344	.338	.287	.289	.434	1.000									
q28	.365	.660	.383	.593	.503	.506	.251	.229	1.000								
q25	.408	.739	.429	.664	.563	.567	.282	.257	.488	1.000							
q19	.420	.760	.441	.683	.579	.583	.290	.264	.502	.562	1.000						
q1	.377	.400	.689	.355	.302	.303	.260	.237	.264	.296	.304	1.000					
q6r	.406	.431	.742	.383	.325	.327	.280	.255	.284	.318	.327	.512	1.000				
q17	.419	.444	.766	.395	.335	.337	.289	.263	.293	.329	.338	.528	.569	1.000			
q8	.444	.472	.813	.419	.356	.358	.307	.279	.311	.349	.359	.561	.604	.623	1.000		
q30r	.339	.360	.620	.320	.271	.273	.234	.213	.238	.266	.273	.428	.460	.475	.504	1.000	
q32	.316	.335	.578	.298	.253	.254	.218	.198	.221	.248	.255	.398	.429	.443	.470	.358	1.000

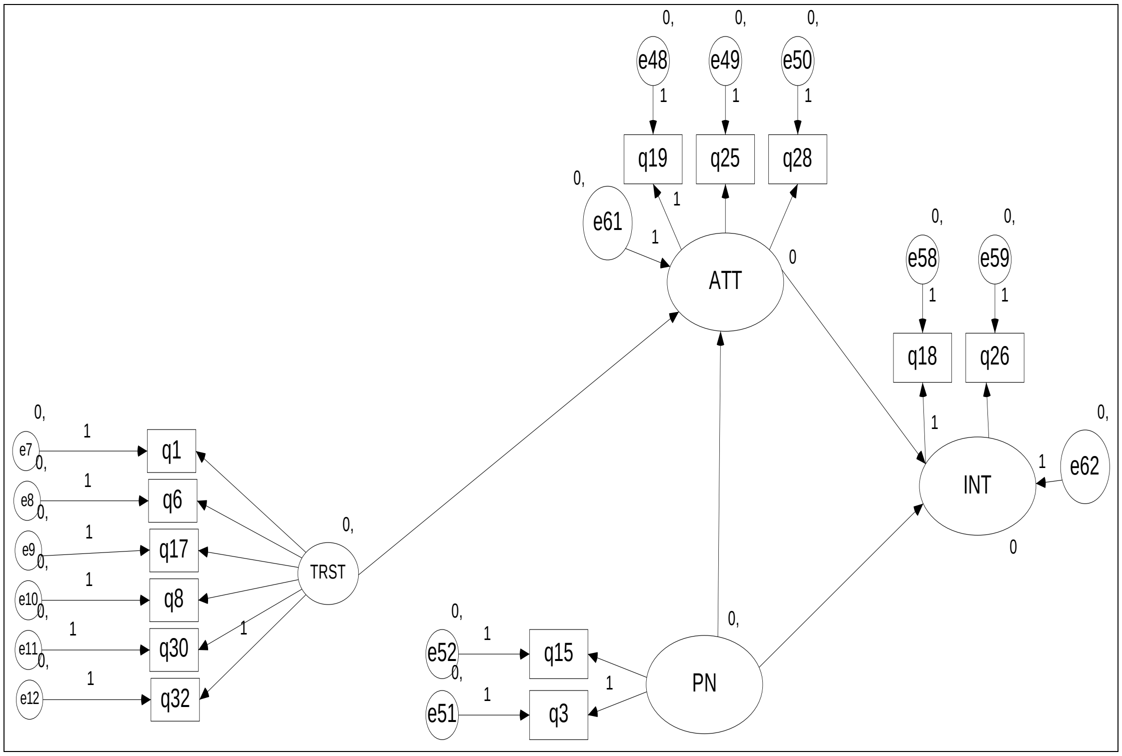
Table D6.17 - Standardized Residual Covariances

	q26	q18	q15	q3	q28	q25	q19	q1	q6rec	q17	q8	q30_rec
q26	.000											
q18	.000	.000										
q15	-.221	.006	.000									
q3	-.126	.386	.000	.000								
q28	.359	-1.061	-2.088	-.399	.000							
q25	1.129	-.236	-.822	-.937	1.889	.000						
q19	-.949	.598	2.310	.819	-.343	-.951	.000					
q1	-1.374	-.022	-.751	-.347	-1.124	-1.695	1.269	.000				
q6rec	-1.022	-.005	-.022	-.651	-2.226	-1.652	2.189	.219	.000			
q17	.776	2.341	2.557	1.466	-.987	-1.028	4.189	-.082	-.647	.000		
q8	-.944	.495	-.368	-.348	-1.270	-2.267	2.047	.382	.526	-.113	.000	
q30rec	-1.637	-.532	-2.294	-.076	-1.475	-1.728	.577	.083	.631	-.882	-.173	.000
q32	.513	.378	-.414	-.630	.722	-.729	1.966	-.761	-.719	.711	-.773	2.525

Given the above results from the confirmatory factor analysis, the measurement model may be used as part of the SEM model.

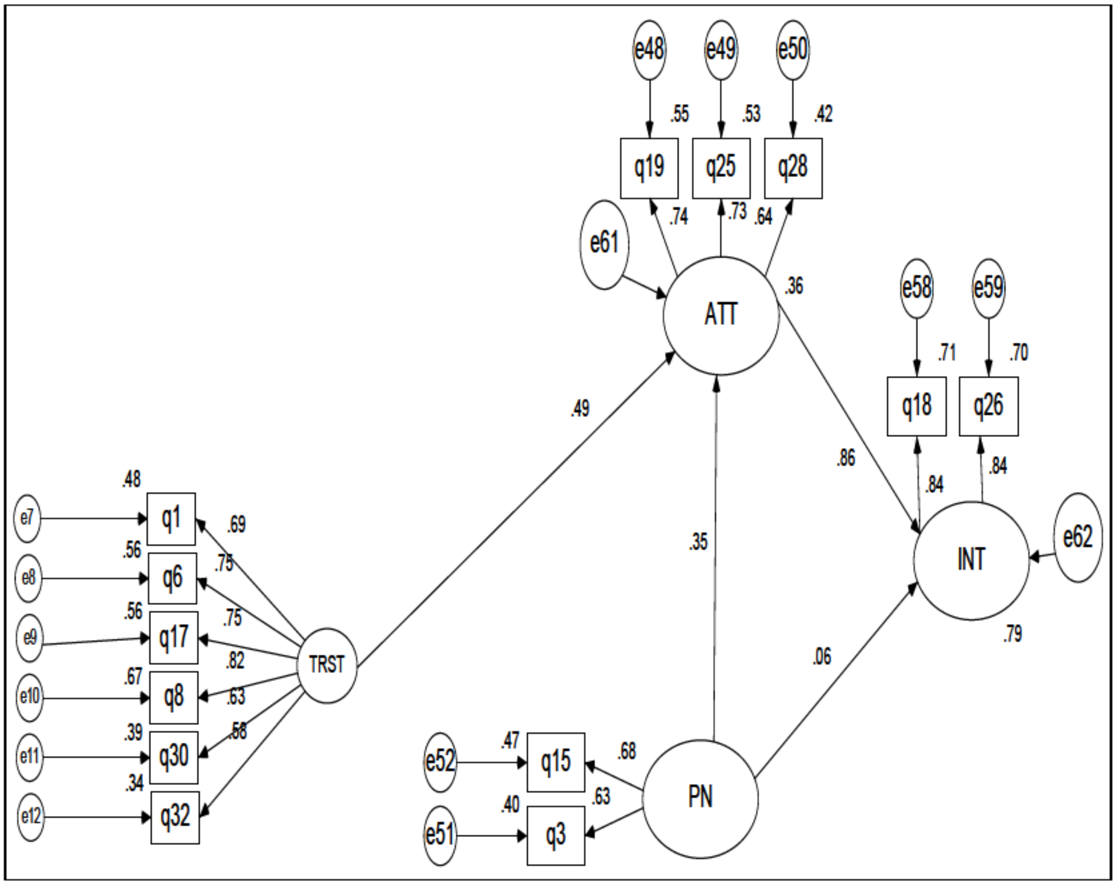
Results of the Analysis of the Trust Structural Model

The path diagram for the revised trust model is presented below:



Revised Trust Structural Model with Standardized Coefficients

The revised trust, structural model with standardized coefficients is represented by the diagram below:



Trust Structural Model Fit Indices

Table D6.18 - CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	43	328.340	61	.000	5.383
Saturated model	104	.000	0		
Independence model	26	3135.133	78	.000	40.194

CMIN/DF should be between 2 and 3 for an acceptable fit and <2 for a good fit.

Table D6.19 - CFI

Model	NFI	RFI	IFI	TLI	CFI
Default model	.895	.866	.913	.888	.913
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

CFI should be >.9 for an acceptable fit and >.95 for a good fit.

Table D6.20 - RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.089	.080	.099	.000
Independence model	.266	.258	.274	.000

RMSEA should be <.10 for a good fit and <.05 for a very good fit.

The fit indices for the model are:

The ratio of χ^2 (328.3) to the degrees of freedom (61) was 5.383. Since this value is >3, it indicates that the data does not fit the model globally.

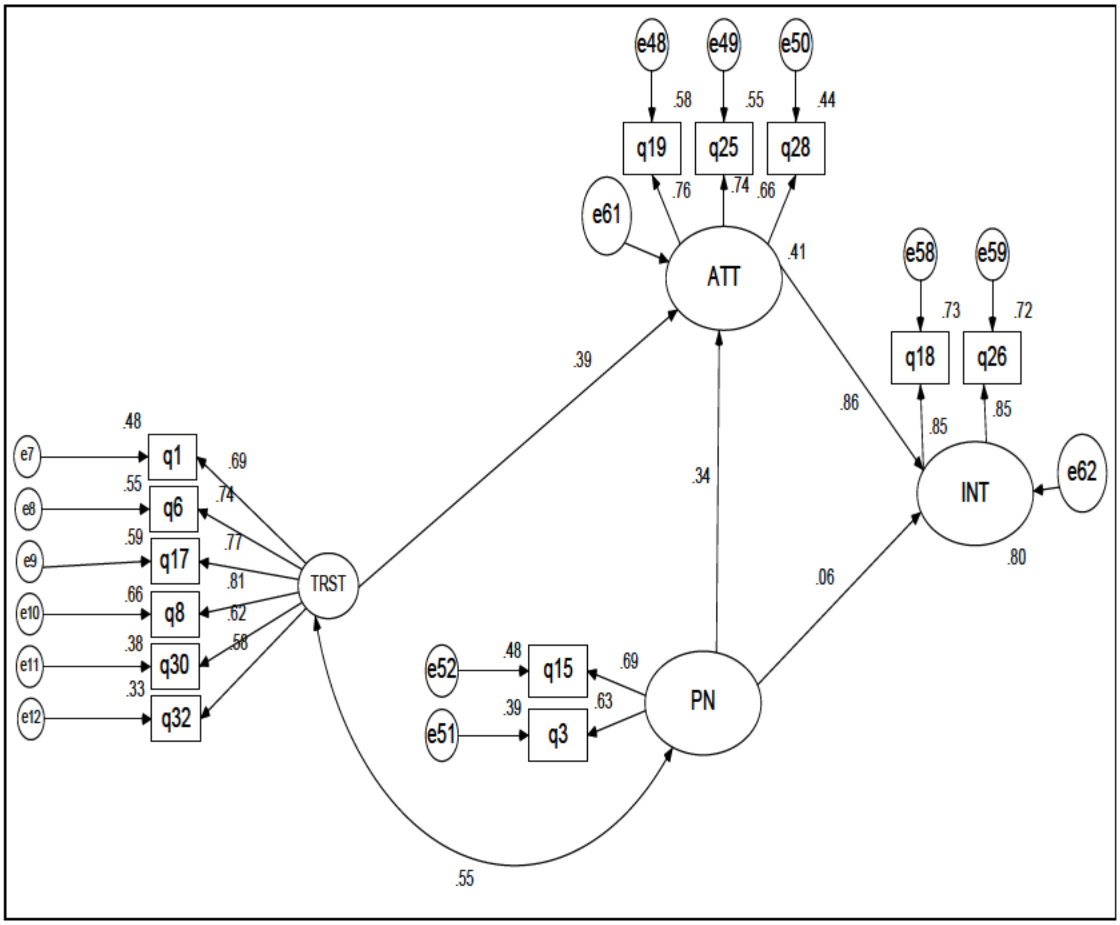
However, this statistic does suffer from limitations and a non-significant value may be unlikely even though the model may be a close fit to the data (Weston and Core 2006: 742).

The comparative fit index (CFI) was 0.913 and the root mean square residual of approximation (RMSEA) was 0.089 (.080; .099. p = .005).

These results indicate that there was almost an acceptable fit.

Modification indices suggested adding in a double headed arrow from PN to TRST.

Results of the Structural Model with double headed arrow from PN to TRST.



Re-specified Trust, Structural Model Fit Indices

Trust - Structural Model Fit Indices

Table D6.21 - CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	44	234.075	60	.000	3.901
Saturated model	104	.000	0		
Independence model	26	3135.133	78	.000	40.194

CMIN/DF should be between 2 and 3 for an acceptable fit and <2 for a good fit.

Table D6.22 - CFI

Model	NF1	RFI	IFI	TLI	CFI
Default model	.925	.903	.943	.926	.943
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

CFI should be >.9 for an acceptable fit and >.95 for a good fit.

Table D6.23 - RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.072	.063	.082	.000
Independence model	.266	.258	.274	.000

RMSEA should be <.10 for a good fit and <.05 for a very good fit.

The fit indices for the model are:

The ratio of χ^2 (234.0) to the degrees of freedom (60) was 3.901. Since this value is >3, it indicates that the data does not fit the model globally.

However, this statistic does suffer from limitations and a non-significant value may be unlikely even though the model may be a close fit to the data (Weston 2006: 742).

The comparative fit index (CFI) was 0.943 and the root mean square residual of approximation (RMSEA) was 0.072 (.063; .082. p = .005).

These fit indices indicate that there is an acceptable fit.

Table D6.24 - Regression Weights

			Estimate	S.E.	C.R.	P	Label
ATT	<---	TRST	.494	.086	5.741	***	par_11
ATT	<---	PN	.378	.086	4.403	***	par_13
INT	<---	PN	.071	.071	.991	.322	par_9
INT	<---	ATT	.941	.069	13.701	***	par_10
q32	<---	TRST	1.000				
q30_recoded	<---	TRST	1.323	.114	11.645	***	par_1
q8	<---	TRST	1.621	.121	13.427	***	par_2
q17	<---	TRST	1.595	.121	13.228	***	par_3
q6_recoded	<---	TRST	1.681	.131	12.793	***	par_4
q1	<---	TRST	1.436	.117	12.230	***	par_5
q19	<---	ATT	1.000				
q25	<---	ATT	.882	.058	15.333	***	par_6
q28	<---	ATT	.707	.050	14.044	***	par_7
q3	<---	PN	1.000				
q15	<---	PN	.999	.115	8.653	***	par_8
q18	<---	INT	1.000				
q26	<---	INT	.929	.044	21.345	***	par_12

Table D6.25 - Standardized Regression Weights

			Estimate
ATT	<---	TRST	.385
ATT	<---	PN	.342
INT	<---	PN	.059
INT	<---	ATT	.863
q1	<---	TRST	.689
q6_recoded	<---	TRST	.742
q17	<---	TRST	.766
q8	<---	TRST	.813
q30_recoded	<---	TRST	.620
q32	<---	TRST	.578
q19	<---	ATT	.759
q25	<---	ATT	.742
q28	<---	ATT	.663
q15	<---	PN	.691
q3	<---	PN	.628
q18	<---	INT	.854
q26	<---	INT	.848

Table D6.26 - Estimated Standardized Factor Loadings and Reliability for the Structural Model

Factor/Variable		Standardized loading	Reliability
TRST	q1	.689*	.48
	q6_recoded	.742*	.55
	q17	.766*	.59
	q8	.813*	.66
	q30_recoded	.620*	.38
	q32	.578*	.33
ATT	q19	.759*	.58
	q25	.742*	.55
	q28	.663*	.44
PN	q15	.691*	.48
	q3	.628*	.39
INT	q18	.854*	.73
	q26	.848*	.72

* Statistically significant at α = 0.01

The estimated standardised regression weights reflect the validity of each observed variable as a measure of the latent variable. Ideally, these should be at least 0.5. The figures listed above are all good. These loadings are all significantly different from zero at the 0.001 level.

The estimated correlations between latent variables are all positive.

Reliability is calculated as estimate. The reliability of each observed variable, as a measure of the latent variable, ranged from .33 to .73.

Table D6.27 - Variances

	Estimate	S.E.	C.R.	P	Label
TRST	.271	.039	6.990	***	par_28
PN	.364	.059	6.160	***	par_29
e61	.263	.030	8.802	***	par_30
e62	.104	.021	4.918	***	par_31
e12	.541	.035	15.393	***	par_32
e11	.759	.050	15.101	***	par_33
e10	.364	.031	11.930	***	par_34
e8	.625	.046	13.670	***	par_35
e7	.617	.043	14.486	***	par_36
e9	.485	.037	13.067	***	par_37
e48	.329	.028	11.871	***	par_38
e49	.282	.023	12.300	***	par_39
e50	.284	.020	13.881	***	par_40
e51	.558	.052	10.799	***	par_41
e52	.399	.046	8.685	***	par_42
e58	.196	.021	9.318	***	par_43
e59	.178	.018	9.666	***	par_44

Table D6.28 - Covariances

			Estimate	S.E.	C.R.	P	Label
PN	<-->	TRST	.171	.025	6.794	***	par_14

Table D6.29 - Correlations

			Estimate
PN	<-->	TRST	.545

Table D6.30 - Squared Multiple Correlations

	Estimate
ATT	.409
INT	.804
q26	.719
q18	.730
q15	.477
q3	.395
q28	.439
q25	.551
q19	.575
q1	.475
q6 recoded	.551
q17	.587
q8	.661
q30 recoded	.385
q32	.334

Table D6.31 - Standardized Total Effects

	TRST	PN	ATT	INT
ATT	.385	.342	.000	.000
INT	.332	.354	.863	.000
q26	.282	.300	.732	.848
q18	.284	.302	.737	.854
q15	.000	.691	.000	.000
q3	.000	.628	.000	.000
q28	.255	.227	.663	.000
q25	.286	.254	.742	.000
q19	.292	.259	.759	.000
q1	.689	.000	.000	.000
q6_recoded	.742	.000	.000	.000
q17	.766	.000	.000	.000
q8	.813	.000	.000	.000
q30_recoded	.620	.000	.000	.000
q32	.578	.000	.000	.000

Table D6.32 - Standardized Direct Effects

	TRST	PN	ATT	INT
ATT	.385	.342	.000	.000
INT	.000	.059	.863	.000
q26	.000	.000	.000	.848
q18	.000	.000	.000	.854
q15	.000	.691	.000	.000
q3	.000	.628	.000	.000
q28	.000	.000	.663	.000
q25	.000	.000	.742	.000
q19	.000	.000	.759	.000
q1	.689	.000	.000	.000
q6_recoded	.742	.000	.000	.000
q17	.766	.000	.000	.000
q8	.813	.000	.000	.000
q30_recoded	.620	.000	.000	.000
q32	.578	.000	.000	.000

Table D6.33 - Standardized Indirect Effects

	TRST	PN	ATT	INT
ATT	.000	.000	.000	.000
INT	.332	.295	.000	.000
q26	.282	.300	.732	.000
q18	.284	.302	.737	.000
q15	.000	.000	.000	.000
q3	.000	.000	.000	.000
q28	.255	.227	.000	.000
q25	.286	.254	.000	.000
q19	.292	.259	.000	.000

	TRST	PN	ATT	INT
q1	.000	.000	.000	.000
q6_recoded	.000	.000	.000	.000
q17	.000	.000	.000	.000
q8	.000	.000	.000	.000
q30_recoded	.000	.000	.000	.000
q32	.000	.000	.000	.000

	TRST	PN	ATT	INT	q26	q18	q15	q28	q3	q25	q19	q1	q6r	q17	q8	q30r	q32
TRST	1.000																
PN	.545	1.000															
ATT	.571	.552	1.000														

Table D6.34 - Standardized Residual Covariances

INT	.525	.535	.895	1.000													
q26	.445	.453	.759	.848	1.000												
q18	.449	.457	.765	.854	.725	1.000											
q15	.377	.691	.381	.369	.313	.316	1.000										
q3	.343	.628	.347	.336	.285	.287	.434		1.000								
q28	.379	.366	.663	.593	.503	.507	.253	1.000	.230								
q25	.424	.410	.742	.665	.564	.568	.283	.492	.257	1.000							
q19	.433	.418	.759	.679	.576	.580	.289	.503	.263	.563	1.000						
q1	.689	.376	.394	.362	.307	.309	.260	.261	.236	.292	.299	1.000					
q6r	.742	.405	.424	.390	.330	.333	.280	.281	.254	.315	.322	.512	1.000				
q17	.766	.418	.438	.402	.341	.344	.289	.290	.263	.325	.332	.528	.569	1.000			
q8	.813	.444	.465	.427	.362	.365	.306	.308	.279	.345	.352	.561	.604	.623	1.000		
q30r	.620	.338	.354	.326	.276	.278	.234	.235	.212	.263	.269	.427	.460	.475	.504	1.000	
q32	.578	.315	.330	.303	.257	.259	.218	.219	.198	.245	.250	.398	.429	.443	.470	.358	1.000

Table D6.35 - Correlations

	q26	q18	q15	q3	q28	q25	q19	q1	q6rec	q17	q8	q30rec	q32
q26	.000												
q18	.000	.000											
q15	-.185	.032	.000										
q3	-.084	.418	-.010	.000									
q28	.358	-1.077	-2.112	-.414	.000								

q25	1.127	-.256	-.851	-.955	1.799	.000							
q19	-.880	.652	2.321	.837	-.365	-.978	.000						
q1	-1.494	-.154	-.744	-.333	-1.058	-1.623	1.389	.000					
q6rec	-1.150	-.147	-.015	-.636	-2.156	-1.575	2.318	.221	.000				
q17	.638	2.189	2.563	1.480	-.916	-.950	4.323	-.083	-.648	.000			
q8	-1.085	.339	-.362	-.333	-1.195	-2.186	2.186	.383	.526	-.117	.000		
q30rec	-1.746	-.651	-2.287	-.063	-1.415	-1.662	.685	.086	.634	-.882	-.173	.000	
q32	.409	.265	-.408	-.618	.780	-.667	2.068	-.758	-.716	.711	-.772	2.527	.000

Table D6.36 - Means

TRST	PN	ATT	INT	q26	q18	q15	q3	q28	q25	q19	q1	q6rec	q17	q8	q30r	q32
.000	.000	.000	.000	3.857	3.751	3.475	3.699	4.144	3.969	3.834	3.179	3.395	3.442	3.435	3.628	3.791

APPENDIX D7

SHARED NORMS AND VALUES

STATISTICAL ANALYSIS

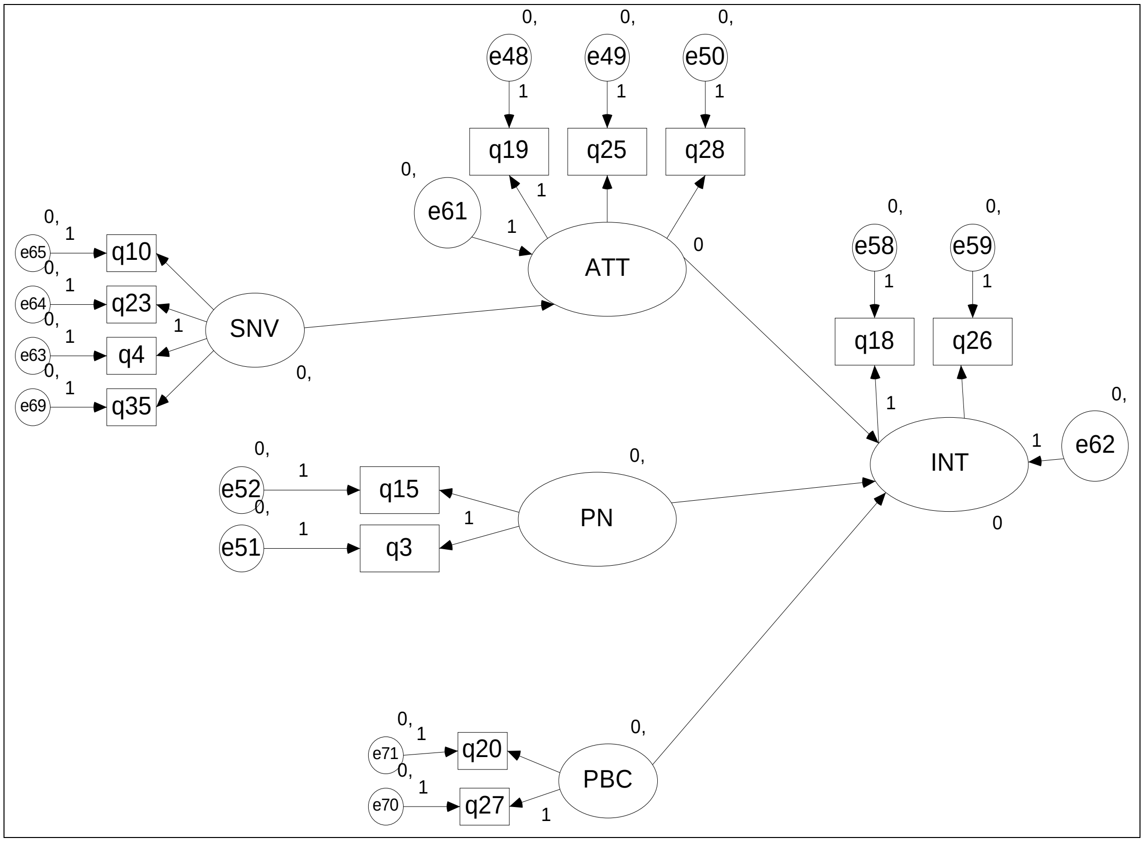
APPENDIX D7

SHARED NORMS AND VALUES

STATISTICAL ANALYSIS

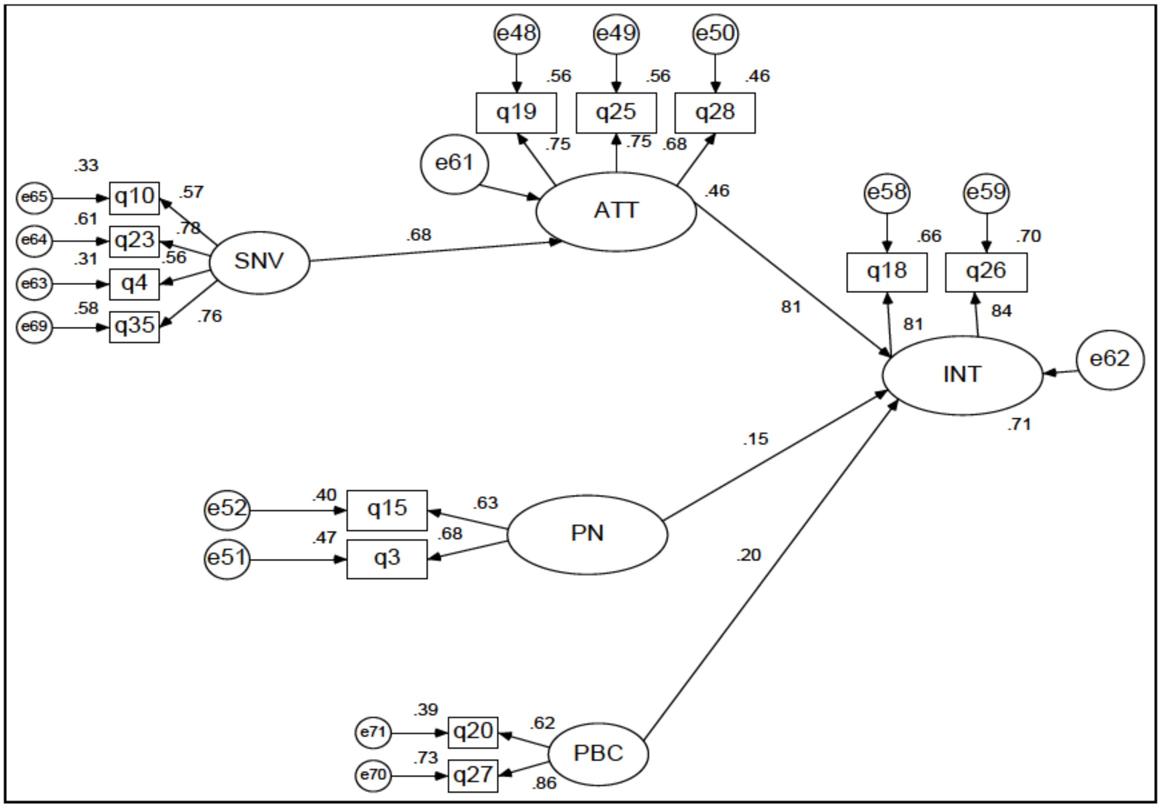
Results of the Analysis of the Initial Hypothesized Structural Model

The structural model is represented by the diagram below:



Results of the initial hypothesized structural model with standardised coefficients

The initial hypothesized model is analysed using SEM:



Structural Model Fit Indices

Table D7.1 - CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	43	796.001	61	.000	13.049
Saturated model	104	.000	0		
Independence model	26	3112.376	78	.000	39.902

CMIN/DF should be between 2 and 3 for an acceptable fit and <2 for a good fit.

Table D7.2 - CFI

Model	NFI	RFI	IFI	TLI	CFI
Default model	.744	.673	.759	.690	.758

Model	NFI	RFI	IFI	TLI	CFI
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

CFI should be>.9 for an acceptable fit and >.95 for a good fit.

Table D7.3 - RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.148	.139	.157	.000
Independence model	.265	.257	.273	.000

RMSEA should be <.10 for a good fit and <.05 for a very good fit.

The fit indices for the model are:

The ratio of χ^2 (796.001) to the degrees of freedom (61) was 13.049. Since this value is >3, it indicates that the data does not fit the model globally.

However, this statistic does suffer from limitations and a non-significant value may be unlikely even though the model may be a close fit to the data (Weston 2006: 742).

The comparative fit index (CFI) was 0.758 and the root mean square residual of approximation (RMSEA) was 0.148 (.139; 0. 157, p = .005).

These fit indices indicate that the data does not fit the model.

Table D7.4 - Regression Weights

	Estimate	S.E.	C.R.	P	Label

ATT	<---	SNV	.900	.095	9.476	***	par_9
INT	<---	PN	.149	.059	2.510	.012	par_4
INT	<---	ATT	.782	.067	11.599	***	par_5
INT	<---	PBC	.221	.086	2.573	.010	par_12
q19	<---	ATT	1.000				
q25	<---	ATT	.899	.061	14.797	***	par_1
q28	<---	ATT	.727	.053	13.837	***	par_2
q3	<---	PN	1.000				
q15	<---	PN	.843	.317	2.658	.008	par_3
q18	<---	INT	1.000				
q26	<---	INT	.962	.046	21.140	***	par_6
q4	<---	SNV	1.000				
q23	<---	SNV	1.622	.137	11.878	***	par_7
q10	<---	SNV	1.240	.123	10.112	***	par_8
q35	<---	SNV	1.428	.122	11.725	***	par_10
q27	<---	PBC	1.000				
q20	<---	PBC	.916	.253	3.616	***	par_11

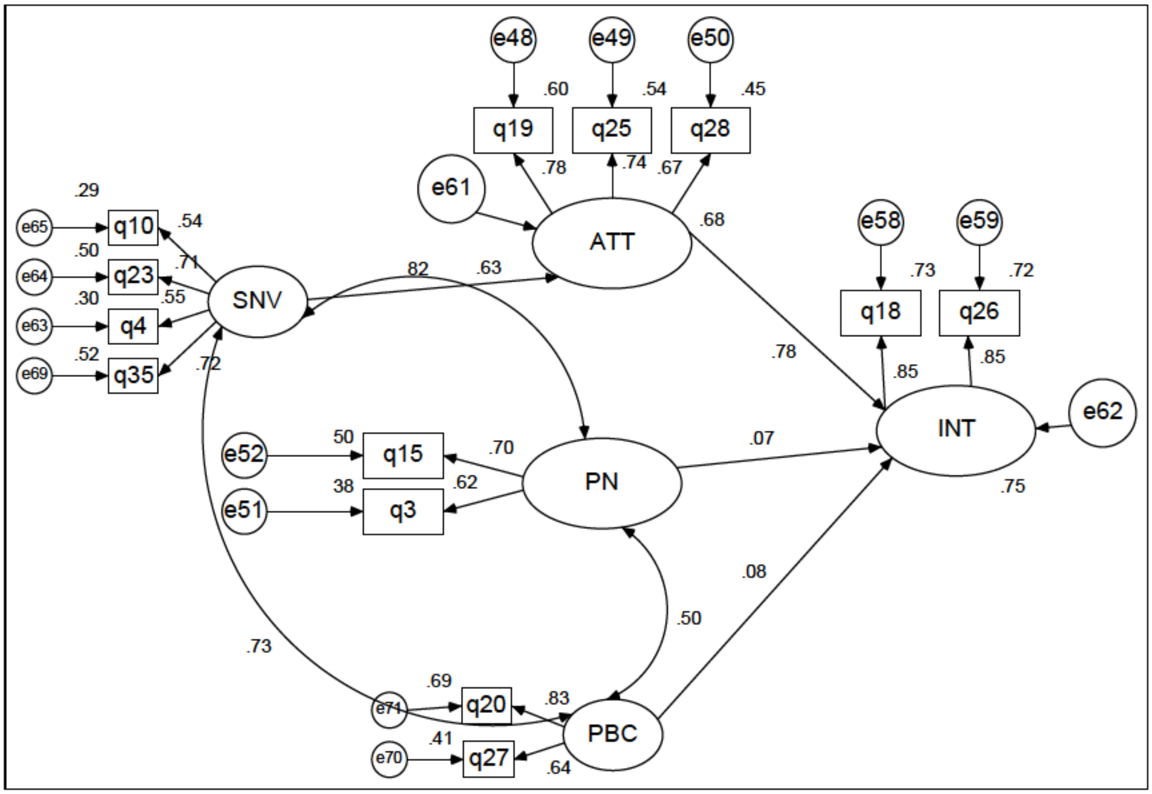
Table D7.5 - Standardized Regression Weights

			Estimate
ATT	<---	SNV	.679
INT	<---	PN	.153
INT	<---	ATT	.808
INT	<---	PBC	.197
q19	<---	ATT	.751
q25	<---	ATT	.749
q28	<---	ATT	.676
q3	<---	PN	.684
q15	<---	PN	.634
q18	<---	INT	.810
q26	<---	INT	.837
q4	<---	SNV	.559
q23	<---	SNV	.780
q10	<---	SNV	.574
q35	<---	SNV	.763
q27	<---	PBC	.856
q20	<---	PBC	.622

Table D7.6 - Squared Multiple Correlations

	Estimate
ATT	.461
INT	.715
q20	.387
q27	.733
q35	.582
q10	.329
q23	.608
q4	.312
q26	.701
q18	.657
q15	.402
q3	.467
q28	.456
q25	.560
q19	.564

Structural model with two modifications, double headed arrows from SNV to PN and from SNV to PN.



Structural Model Fit Indices

Table D7.7 - CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	46	499.735	58	.000	8.616
Saturated model	104	.000	0		
Independence model	26	3112.376	78	.000	39.902

CMIN/DF should be between 2 and 3 for an acceptable fit and <2 for a good fit.

Table D7.8 - CFI

Model	NFI	RFI	IFI	TLI	CFI
Default model	.839	.784	.855	.804	.854
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

CFI should be>.9 for an acceptable fit and >.95 for a good fit.

Table D7.9 - RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.117	.108	.127	.000
Independence model	.265	.257	.273	.000

RMSEA should be <.10 for a good fit and <.05 for a very good fit.

The fit indices for the model are:

The ratio of χ^2 (499.7) to the degrees of freedom (58) was 8.616. Since this value is >3, it indicates that the data does not fit the model globally.

However, this statistic does suffer from limitations and a non-significant value may be unlikely even though the model may be a close fit to the data (Weston and Gore 2006: 742).

The comparative fit index (CFI) was 0.854 and the root mean square residual of approximation (RMSEA) was 0.117 (.108; .0. 127 p = .005).

These fit indices indicate that the data does not fit the model.

Also, some paths became non-significant. Correlation ←-> paths were all significant.

Table D7.10 - Regression Weights

			Estimate	S.E.	C.R.	P	Label
ATT	<---	SNV	1.151	.120	9.569	***	par_9
INT	<---	PN	.081	.069	1.181	.237	par_4
INT	<---	ATT	.820	.084	9.762	***	par_5
INT	<---	PBC	.135	.120	1.124	.261	par_12
q19	<---	ATT	1.000				
q25	<---	ATT	.854	.055	15.461	***	par_1
q28	<---	ATT	.703	.048	14.547	***	par_2
q3	<---	PN	1.000				
q15	<---	PN	1.033	.122	8.469	***	par_3
q18	<---	INT	1.000				
q26	<---	INT	.930	.044	21.261	***	par_6
q4	<---	SNV	1.000				
q23	<---	SNV	1.498	.131	11.463	***	par_7

q10	<---	SNV	1.182	.122	9.690	***	par_8
q35	<---	SNV	1.372	.119	11.555	***	par_10
q27	<---	PBC	1.000				
q20	<---	PBC	1.636	.146	11.241	***	par_11

Table D7.11 - Standardized Regression Weights

			Estimate
ATT	<---	SNV	.824
INT	<---	PN	.067
INT	<---	ATT	.775
INT	<---	PBC	.080
q19	<---	ATT	.776
q25	<---	ATT	.736
q28	<---	ATT	.674
q3	<---	PN	.619
q15	<---	PN	.704
q18	<---	INT	.852
q26	<---	INT	.847
q4	<---	SNV	.547
q23	<---	SNV	.706
q10	<---	SNV	.536
q35	<---	SNV	.719
q27	<---	PBC	.642
q20	<---	PBC	.833

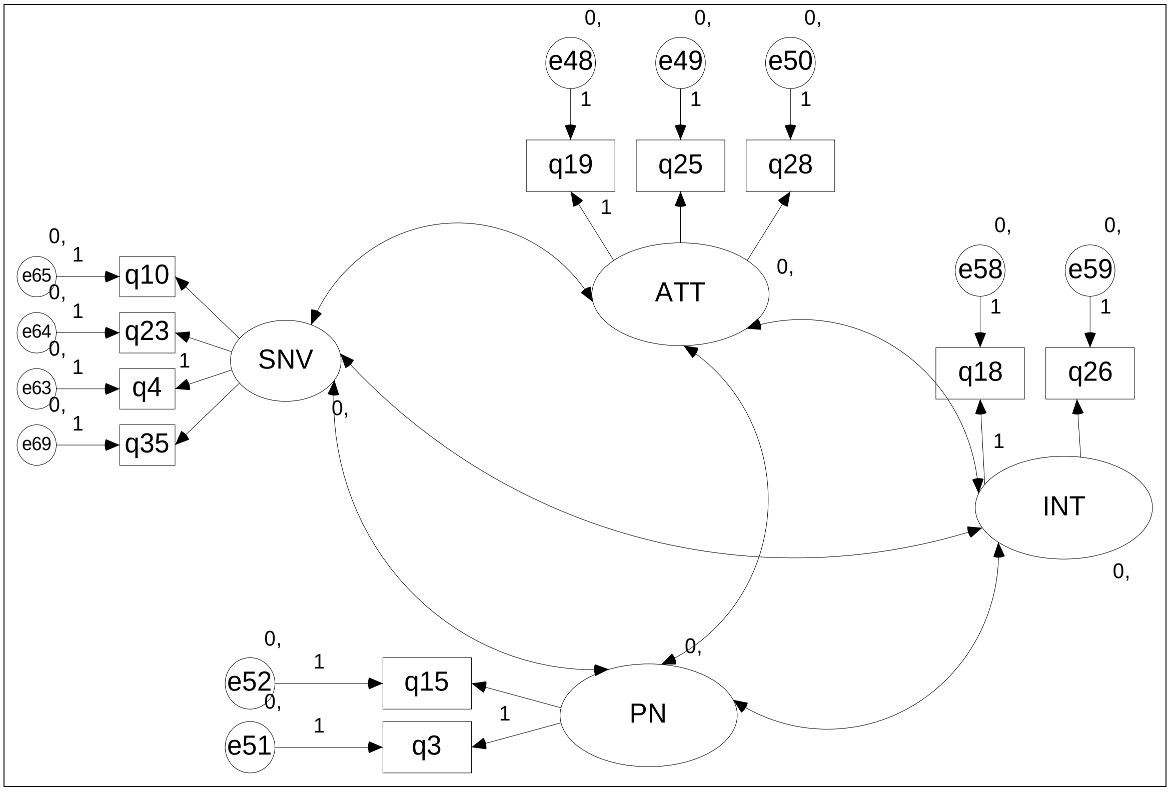
Table D7.12 - Squared Multiple Correlations

	Estimate
ATT	.679
INT	.746
q20	.694
q27	.412
q35	.516
q10	.287
q23	.498
q4	.300
q26	.718
q18	.726
q15	.495
q3	.383
q28	.455
q25	.541
q19	.603

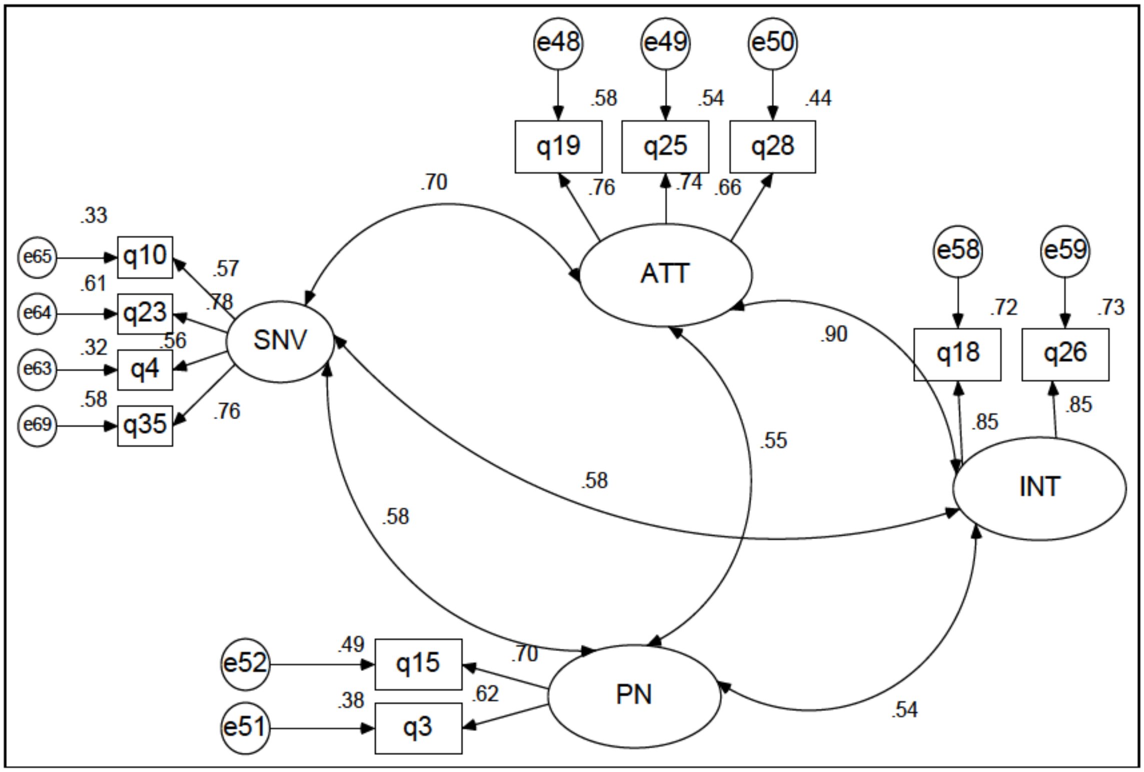
Results of the Analysis of the Revised Measurement Model

The model was revised by eliminating PBC.

The revised measurement model is represented by the diagram below:



Revised Measurement Model with Standardised Coefficients



Below are indices and estimated values in tables as per AMOS - Version 16.

Measurement Model Fit Indices

Table D7.13 - CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	39	157.868	38	.000	4.154
Saturated model	77	.000	0		
Independence model	22	2401.761	55	.000	43.668

CMIN/DF should be between 2 and 3 for an acceptable fit and <2 for a good fit.

Table D7.14 - CFI

Model	NFI	RFI	IFI	TLI	CFI
Default model	.934	.905	.949	.926	.949
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

CFI should be>.9 for an acceptable fit and >.95 for a good fit.

Table D7.15 - RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.076	.064	.088	.000
Independence model	.278	.268	.287	.000

RMSEA should be <.10 for a good fit and <.05 for a very good fit.

The fit indices for the model are:

The ratio of χ^2 (157.8) to the degrees of freedom (38) was 4.154. Since this value is >3, it indicates that the data does not fit the model globally.

However, this statistic does suffer from limitations and a non-significant value may be unlikely even though the model may be a close fit to the data (Weston and Gore 2006: 742).

The comparative fit index (CFI) was 0.949 and the root mean square residual of approximation (RMSEA) was 0.76 (.064; 088 p = .005).

These fit indices indicate that there is an acceptable fit.

Measurement Model Identification

For this measurement model, there are 11 observed variables. The number of distinct sample moments is 77. The number of distinct parameters to be estimated is 39. The degrees of freedom is (77-39) = 38. Probability level = .000 The model is therefore over-identified and it is possible to test the model.

Table D7.16 - Regression Weights

			Estimate	S.E.	C.R.	P	Label
q19	<---	ATT	1.000				
q25	<---	ATT	.871	.055	15.693	***	par_1
q28	<---	ATT	.703	.049	14.337	***	par_2
q3	<---	PN	1.000				
q15	<---	PN	1.027	.120	8.533	***	par_3
q18	<---	INT	1.000				
q26	<---	INT	.937	.044	21.327	***	par_4
q4	<---	SNV	1.000				
q23	<---	SNV	1.610	.134	12.031	***	par_5
q10	<---	SNV	1.230	.121	10.188	***	par_6
q35	<---	SNV	1.416	.119	11.872	***	par_7

Table D7.17 - Standardized Regression Weights

			Estimate
q10	<---	SNV	.573
q23	<---	SNV	.779
q4	<---	SNV	.562
q35	<---	SNV	.762
q19	<---	ATT	.762
q25	<---	ATT	.735
q28	<---	ATT	.662
q15	<---	PN	.700
q3	<---	PN	.620
q18	<---	INT	.851
q26	<---	INT	.852

The estimated standardized factor loadings and the reliability of each measured variable is summarized in the table below:

Table D7.18 - Estimated Standardized Regression Weights and Reliability for the Revised Measurement Model

Factor/Variable		Standardized Regression Weights	Reliability
SNV	q10	.573*	.33
	q23	.779*	.61
	q4	.562*	.32
	q35	.762*	.58
ATT	q19	.762*	.58
	q25	.735*	.54
	q28	.662*	.44
PN	q15	.700*	.49

	q3	.620*	.38
INT	q18	.851*	.72
	q26	.852*	.73

* Statistically significant at α =0.01

The estimated standardised regression weights reflect the validity of each observed variable as a measure of the latent variable. Ideally, these should be at least 0.5. The figures listed above are all good. These loadings are all significantly different from zero at the 0.001 level.

The estimated correlations between latent variables are all positive.

Reliability is calculated as an estimate. The reliability of each observed variable, as a measure of the latent variable, ranged from .32 to .73.

Table D7.19 - Covariances

			Estimate	S.E.	C.R.	P	Label
SNV	<-->	PN	.172	.026	6.642	***	par_8
SNV	<-->	ATT	.236	.028	8.325	***	par_9
PN	<-->	INT	.231	.033	7.018	***	par_10
ATT	<-->	INT	.436	.037	11.911	***	par_11
ATT	<-->	PN	.220	.032	6.834	***	par_12
SNV	<-->	INT	.209	.026	8.033	***	par_13

Table D7.20 - Correlations

			Estimate
SNV	<-->	PN	.577
SNV	<-->	ATT	.701
PN	<-->	INT	.536
ATT	<-->	INT	.898
ATT	<-->	PN	.552
SNV	<-->	INT	.575

Table D7.21 - Squared Multiple Correlations

	Estimate
q35	.581
q10	.328
q23	.607
q4	.316
q26	.726
q18	.724
q15	.489
q3	.384

	Estimate
q28	.438
q25	.541
q19	.580

Table D7.22 - Covariances (Unstandardised)

	INT	PN	ATT	SNV	q35	q10	q23	q4	q26	q18	q15	q3	q28	q25	q19
INT	.525														
PN	.231	.354													
ATT	.436	.220	.449												
SNV	.209	.172	.236	.252											
q35	.296	.244	.334	.357	.871										
q10	.257	.212	.290	.310	.439	1.162									
q23	.337	.277	.380	.406	.575	.499	1.077								
q4	.209	.172	.236	.252	.357	.310	.406	.797							
q26	.492	.216	.408	.196	.278	.241	.316	.196	.635						
q18	.525	.231	.436	.209	.296	.257	.337	.209	.492	.725					
q15	.237	.363	.226	.177	.251	.218	.285	.177	.222	.237	.762				
q3	.231	.354	.220	.172	.244	.212	.277	.172	.216	.231	.363	.922			
q28	.307	.155	.316	.166	.235	.204	.267	.166	.287	.307	.159	.155	.506		
q25	.380	.191	.391	.205	.291	.253	.331	.205	.356	.380	.197	.191	.275	.629	
q19	.436	.220	.449	.236	.334	.290	.380	.236	.408	.436	.226	.220	.316	.391	.774

Table D7.23 - Standardized Residual Covariances

	q35	q10	q23	q4	q26	q18	q15	q3	q28	q25	q19
q35	.000										
q10	-.403	.000									
q23	.211	.488	.000								
q4	-.559	.311	-.240	.000							
q26	.418	-.865	-.681	-.489	.000						
q18	.493	-.048	-.407	2.088	.000	.000					
q15	.592	-.014	-.096	-.342	-.318	-.039	.000				
q3	-.882	-.579	-.183	2.013	-.032	.528	.000	.000			
q28	-.017	-2.271	-1.136	1.156	.285	-1.056	-2.181	-.337	.000		
q25	-1.247	-1.077	-1.660	-.717	1.144	-.136	-.874	-.821	1.908	.000	
q19	1.834	1.667	.988	1.991	-1.016	.617	2.207	.897	-.398	-.918	.000

Table D7.24 - Correlations

	INT	PN	ATT	SNV	q35	q10	q23	q4	q26	q18	q15	q3	q28	q25	q19
INT	1.000														
PN	.536	1.000													
ATT	.898	.552	1.000												
SNV	.575	.577	.701	1.000											
q35	.438	.440	.534	.762	1.000										
q10	.330	.331	.402	.573	.437	1.000									
q23	.448	.449	.546	.779	.594	.446	1.000								
q4	.324	.325	.394	.562	.429	.322	.438	1.000							
q26	.852	.456	.765	.490	.373	.281	.382	.276	1.000						
q18	.851	.456	.764	.489	.373	.280	.381	.275	.725	1.000					
q15	.375	.700	.386	.404	.308	.231	.314	.227	.319	.319	1.000				
q3	.332	.620	.342	.358	.272	.205	.279	.201	.283	.282	.434	1.000			
q28	.595	.365	.662	.464	.354	.266	.362	.261	.507	.506	.256	.226	1.000		
q25	.661	.406	.735	.516	.393	.295	.402	.290	.563	.562	.284	.251	.487	1.000	
q19	.684	.420	.762	.534	.407	.306	.416	.300	.583	.582	.294	.260	.504	.560	1.000

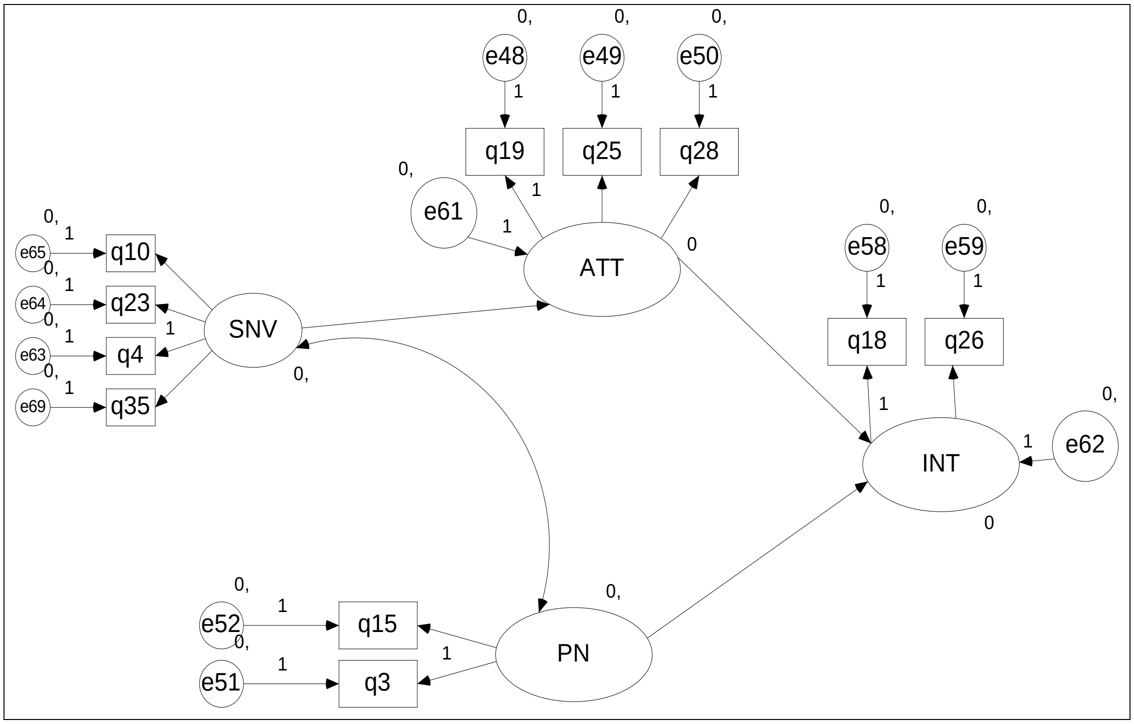
Table D7.25 - Means

INT	PN	ATT	SNV	q35	q10	q23	q4	q26	q18	q15	q3	q28	q25	q19
.000	.000	.000	.000	3.514	3.018	3.439	4.078	3.857	3.751	3.475	3.699	4.144	3.969	3.834

Given the above results from the confirmatory factor analysis, the measurement model may be used as part of the SEM model

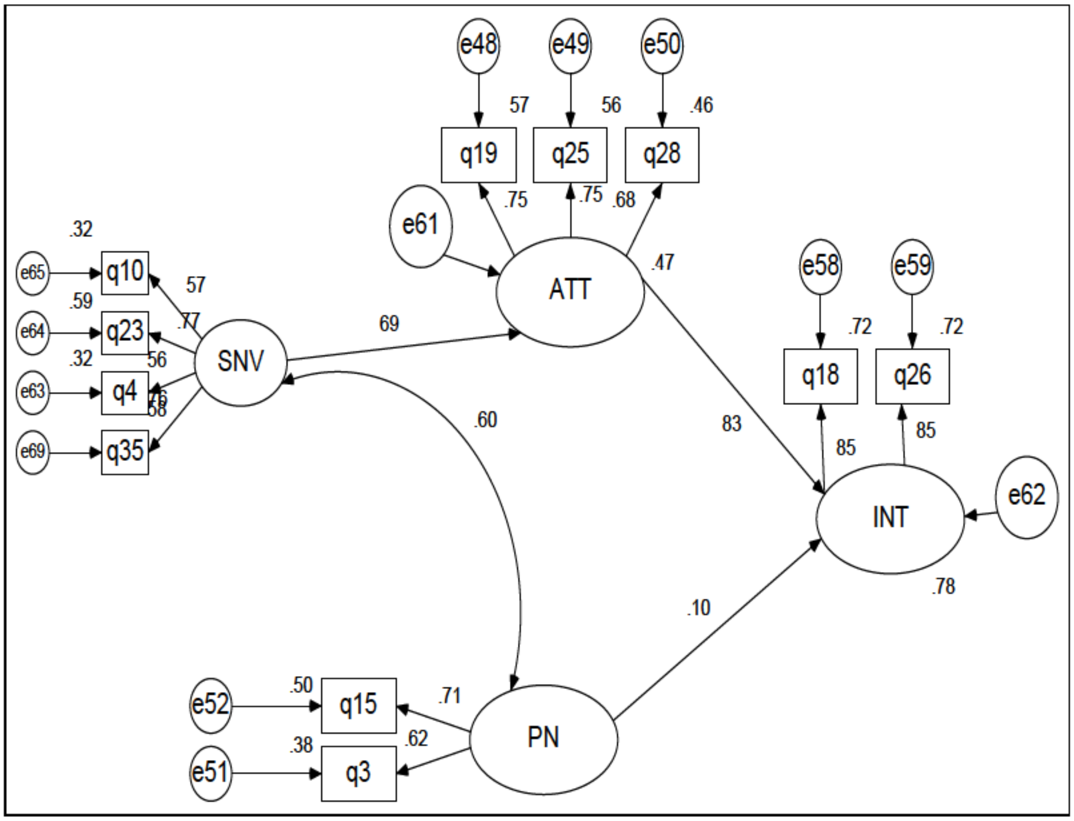
Results of the Analysis of the Revised Structural Model

The revised structural model is represented below:



Results of Structural Model with Standardised Coefficients

The model is analysed using SEM. The path diagram for shared norms and values with standardized coefficients is presented below:



Structural Model Fit Indices

Table D7.26 - CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	37	173.593	40	.000	4.340
Saturated model	77	.000	0		
Independence model	22	2401.761	55	.000	43.668

CMIN/DF should be between 2 and 3 for an acceptable fit and <2 for a good fit.

Table D7.27 - CFI

Model	NFI	RFI	IFI	TLI	CFI
Default model	.928	.901	.943	.922	.943
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

CFI should be>.9 for an acceptable fit and >.95 for a good fit.

Table D7.28 - RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.078	.066	.090	.000
Independence model	.278	.268	.287	.000

RMSEA should be <.10 for a good fit and <.05 for a very good fit.

The fit indices for the model are:

The ratio of χ^2 (173.5) to the degrees of freedom (40) was 4.340. Since this value is >3, it indicates that the data does not fit the model globally.

However, this statistic does suffer from limitations and a non-significant value may be unlikely even though the model may be a close fit to the data (Weston and Gore 2006: 742).

The comparative fit index (CFI) was 0.943 and the root mean square residual of approximation (RMSEA) was 0.78 (.066; 090 p = .005).

These fit indices indicate that there is an acceptable fit.

Table D7.29 - Regression Weights

			Estimate	S.E.	C.R.	P	Label
ATT	<---	SNV	.903	.094	9.646	***	par_9
INT	<---	PN	.125	.062	2.010	.044	par_4
INT	<---	ATT	.909	.062	14.562	***	par_5
q19	<---	ATT	1.000				
q25	<---	ATT	.900	.058	15.427	***	par_1
q28	<---	ATT	.729	.051	14.346	***	par_2
q3	<---	PN	1.000				
q15	<---	PN	1.048	.132	7.924	***	par_3
q18	<---	INT	1.000				
q26	<---	INT	.937	.044	21.254	***	par_6
q4	<---	SNV	1.000				
q23	<---	SNV	1.589	.132	12.058	***	par_7
q10	<---	SNV	1.219	.120	10.170	***	par_8
q35	<---	SNV	1.408	.118	11.905	***	par_10

Table D7.30 - Standardized Regression Weights

			Estimate
ATT	<---	SNV	.686
INT	<---	PN	.103
INT	<---	ATT	.835
q10	<---	SNV	.569
q23	<---	SNV	.771
q4	<---	SNV	.563
q35	<---	SNV	.759
q19	<---	ATT	.753
q25	<---	ATT	.752
q28	<---	ATT	.679
q15	<---	PN	.710
q3	<---	PN	.616
q18	<---	INT	.850
q26	<---	INT	.851

The estimated standardized factor loadings and the reliability of each measured variable is summarized in the table below:

Table D7.31 - Estimated Standardized Regression Weights and Reliability for the Structural Model

Factor/Variable		Standardized Regression Weights	Reliability
SNV	q10	.569	.32
	q23	.771	.59
	q4	.563	.32
	q35	.759	.58
ATT	q19	.753	.57
	q25	.752	.56
	q28	.679	.46
PN	q15	.710	.50
	q3	.616	.38
INT	q18	.850	.72
	q26	.851	.72

* Statistically significant at α =.01

The estimated standardised regression weights reflect the validity of each observed variable as a measure of the latent variable. Ideally, these should be at least 0.5. The figures listed above are all good. These loadings are all significantly different from zero at the 0.001 level.

The estimated correlations between latent variables are all positive.

Reliability is calculated as estimate. The reliability of each observed variable, as a measure of the latent variable, ranged from .32 to .73.

Table D7.32 - Variances

	Estimate	S.E.	C.R.	P	Label
PN	.350	.060	5.812	***	par_23
SNV	.253	.039	6.560	***	par_24
e61	.233	.027	8.538	***	par_25
e62	.116	.021	5.588	***	par_26
e48	.335	.028	12.002	***	par_27
e49	.274	.022	12.206	***	par_28
e50	.273	.020	13.792	***	par_29
e51	.572	.054	10.585	***	par_30
e52	.378	.050	7.484	***	par_31
e58	.200	.021	9.462	***	par_32
e59	.174	.019	9.413	***	par_33
e63	.544	.036	14.913	***	par_34
e64	.437	.039	11.232	***	par_35
e65	.786	.053	14.902	***	par_36
e69	.369	.032	11.664	***	par_37

Table D7.33 - Covariances

			Estimate	S.E.	C.R.	P	Label
SNV	<-->	PN	.179	.027	6.600	***	par_11

Table D7.34 - Correlations

			Estimate
SNV	<-->	PN	.600

Table D7.35 - Squared Multiple Correlations

	Estimate

	Estimate
ATT	.470
INT	.778
q35	.577
q10	.324
q23	.594
q4	.317
q26	.724
q18	.722
q15	.504
q3	.380
q28	.462
q25	.565
q19	.567

Table D7.36 - Standardized Total Effects

	PN	SNV	ATT	INT
ATT	.000	.686	.000	.000
INT	.103	.572	.835	.000
q35	.000	.759	.000	.000
q10	.000	.569	.000	.000
q23	.000	.771	.000	.000
q4	.000	.563	.000	.000
q26	.087	.487	.710	.851
q18	.087	.486	.709	.850
q15	.710	.000	.000	.000
q3	.616	.000	.000	.000
q28	.000	.466	.679	.000
q25	.000	.515	.752	.000
q19	.000	.517	.753	.000

Table D7.37 - Standardized Direct Effects

	PN	SNV	ATT	INT
ATT	.000	.686	.000	.000
ONT	.103	.000	.835	.000
q35	.000	.759	.000	.000
q10	.000	.569	.000	.000
q23	.000	.771	.000	.000
q4	.000	.563	.000	.000
q26	.000	.000	.000	.851
q18	.000	.000	.000	.850
q15	.710	.000	.000	.000
q3	.616	.000	.000	.000
q28	.000	.000	.679	.000
q25	.000	.000	.752	.000
q19	.000	.000	.753	.000

Table D7.38 - Standardized Indirect Effects

	PN	SNV	ATT	INT
ATT	.000	.000	.000	.000
INT	.000	.572	.000	.000
q35	.000	.000	.000	.000
q10	.000	.000	.000	.000
q23	.000	.000	.000	.000
q4	.000	.000	.000	.000
q26	.087	.487	.710	.000
q18	.087	.486	.709	.000
q15	.000	.000	.000	.000
q3	.000	.000	.000	.000
q28	.000	.466	.000	.000
q25	.000	.515	.000	.000
q19	.000	.517	.000	.000

Table D7.39 - Standardized Residual Covariances

	q35	q10	q23	q4	q26	q18	q15	q3	q28	q25	q19
q35	.000										
q10	-.305	.000									
q23	.382	.658	.000								
q4	-.544	.349	-.157	.000							
q26	-.351	-1.431	-1.390	-1.107	.091						
q18	-.279	-.619	-1.120	1.456	.104	.091					
q15	.227	-.272	-.412	-.644	.819	1.099	.000				
q3	-1.073	-.709	-.332	1.840	1.099	1.665	-.089	.000			
q28	-.017	-2.250	-1.079	1.124	.311	-1.037	-.894	.911	.000		
q25	-1.214	-1.028	-1.565	-.726	1.222	-.067	.585	.571	1.396	.000	
q19	2.163	1.944	1.384	2.204	-.570	1.078	3.938	2.510	-.554	-1.041	.000

Table D7.40 - Correlations

	PN	SNV	ATT	INT	q35	q10	q23	q4	q26	q18	q15	q3	q28	q25	q19
PN	1.000														
SNV	.600	1.000													
ATT	.412	.686	1.000												
INT	.446	.634	.877	1.000											
q35	.456	.759	.521	.481	1.000										
q10	.342	.569	.390	.361	.432	1.000									
q23	.463	.771	.529	.489	.585	.438	1.000								
q4	.338	.563	.386	.357	.428	.321	.434	1.000							
q26	.380	.539	.746	.851	.410	.307	.416	.304	1.000						
q18	.379	.539	.745	.850	.409	.307	.415	.304	.723	1.000					
q15	.710	.426	.292	.317	.324	.243	.329	.240	.270	.269	1.000				
q3	.616	.370	.254	.275	.281	.210	.285	.208	.234	.234	.438	1.000			
q28	.280	.466	.679	.596	.354	.265	.359	.263	.507	.506	.199	.172	1.000		
q25	.309	.515	.752	.659	.391	.293	.397	.290	.561	.560	.220	.191	.511	1.000	
q19	.310	.517	.753	.661	.392	.294	.398	.291	.562	.561	.220	.191	.512	.566	1.000

Table D7.41 - Means

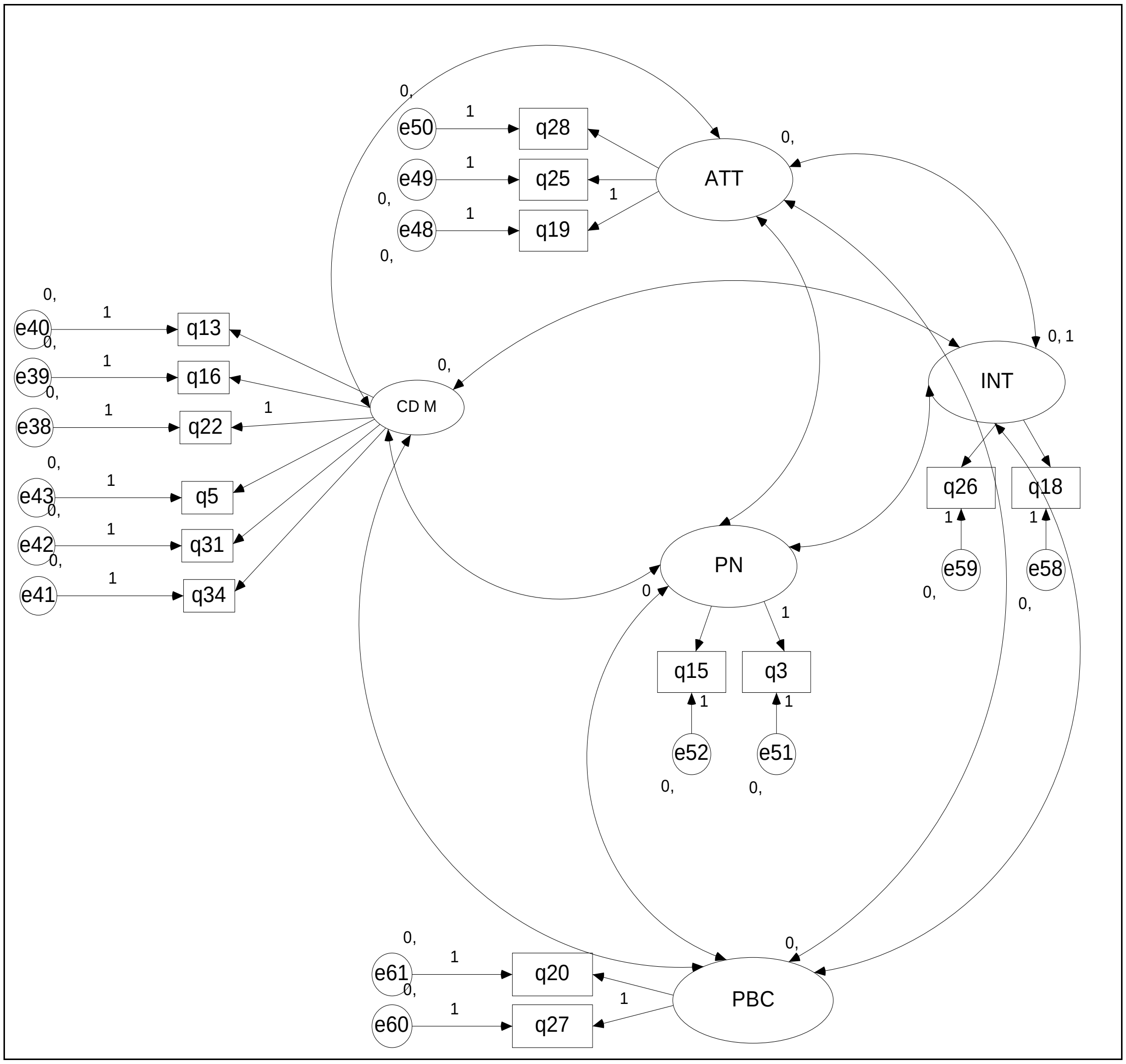
PN	SNV	ATT	INT	q35	q10	q23	q4	q26	q18	q15	q3	q28	q25	q19
.000	.000	.000	.000	3.514	3.018	3.439	4.078	3.857	3.751	3.475	3.699	4.144	3.969	3.834

APPENDIX D8

COGNITIVE DIMENSION OF SOCIAL CAPITAL

STATISTICAL ANALYSIS

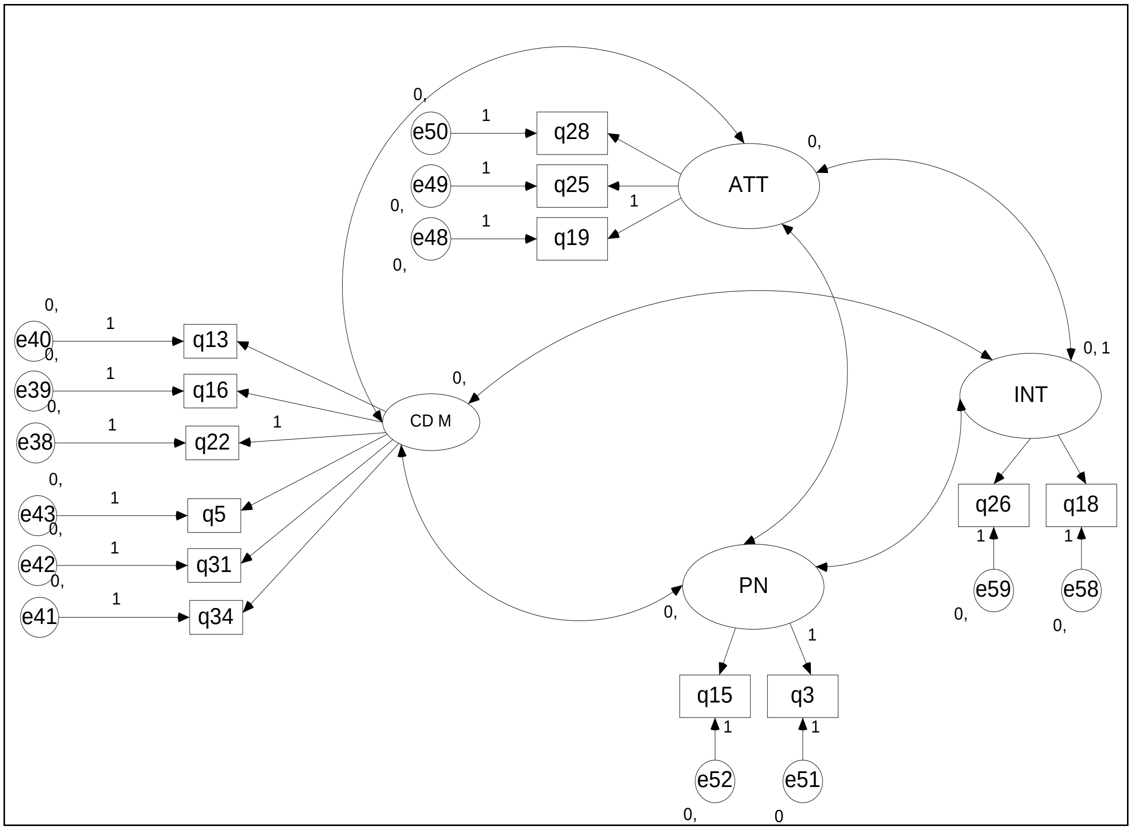
Results of the Analysis of the Initial Hypothesized Measurement Model



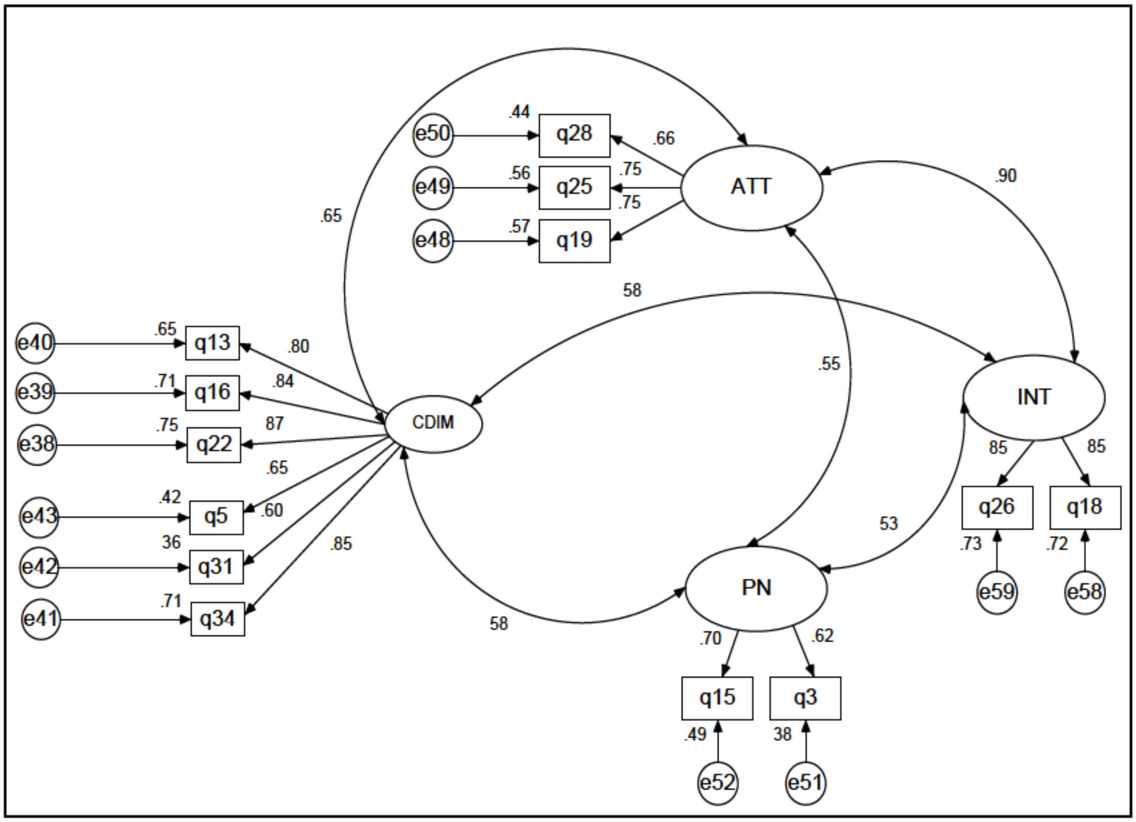
The results of this measurement model did not fit the data and the measurement model was revised by removing perceived behavioural control.

Revised Measurement Model with Standardised Coefficients

The revised measurement model is represented by the diagram below:



Revised Measurement Model with Standardised Coefficients



Measurement Model Fit Indices

Table D8.1 - CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	45	232.744	59	.000	3.945
Saturated model	104	.000	0		
Independence model	26	3842.990	78	.000	49.269

CMIN/DF should be between 2 and 3 for an acceptable fit and <2 for a good fit.

Table D8.2 - CFI

Model	NFI	RFI	IFI	TLI	CFI
Default model	.939	.920	.954	.939	.954
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

CFI should be>.9 for an acceptable fit and >.95 for a good fit.

Table D8.3 - RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.073	.063	.083	.000
Independence model	.295	.288	.303	.000

RMSEA should be <.10 for a good fit and <.05 for a very good fit.

The fit indices for the model are:

The ratio of χ^2 (232.7) to the degrees of freedom (59) was 3.945. Since this value is >3, it indicates that the data does not fit the model globally.

However, this statistic does suffer from limitations and a non-significant value may be unlikely even though the model may be a close fit to the data (Weston and Gore 2006: 742).

The comparative fit index (CFI) was 0.954 and the root mean square residual of approximation (RMSEA) was 0.073 (.063; .083. p = .005).

These fit indices indicate that there is an acceptable fit.

Measurement Model Identification

For this measurement model, there are 13 observed variables. The number of distinct sample moments is 104. The number of distinct parameters to be estimated is 45. The degrees of freedom is (104-45) = 59. Probability level = .000

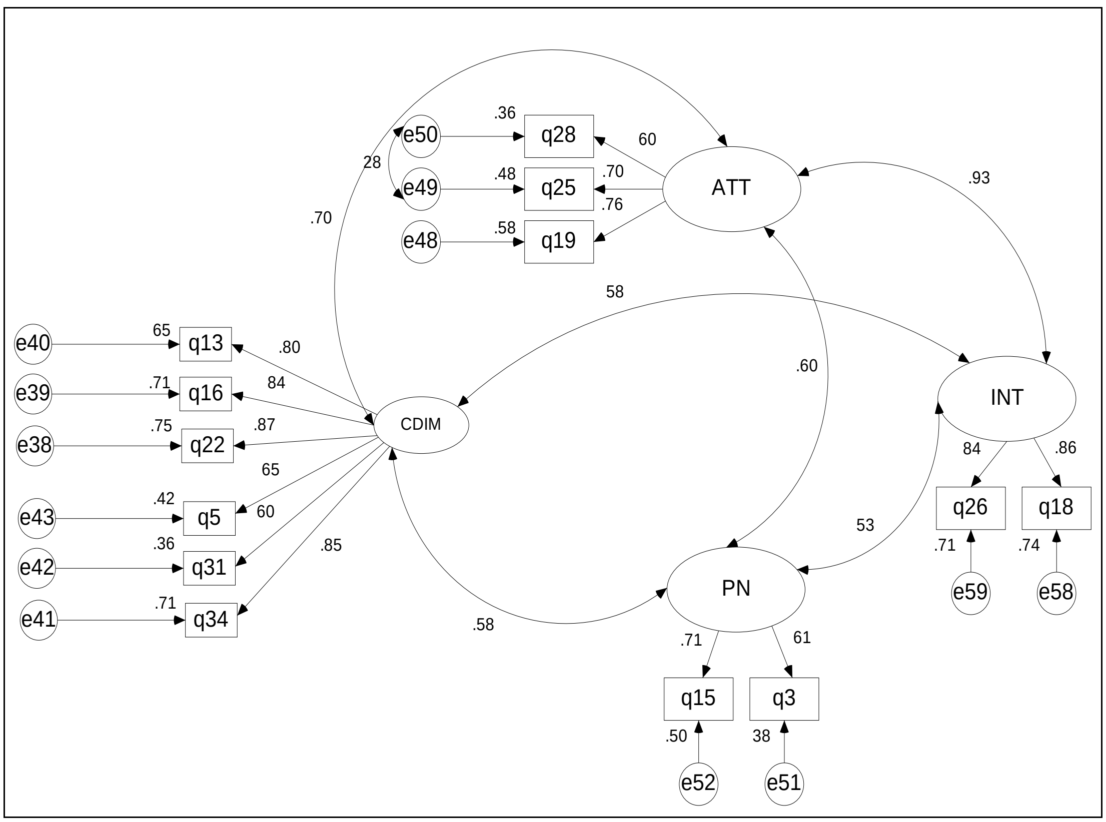
The model is therefore over-identified and it is possible to test the model.

Table D8.4 - Covariances

			Estimate	S.E.	C.R.	P	Label
CDIM	<-->	ATT	.368	.037	9.903	***	par_6
PN	<-->	INT	.317	.041	7.781	***	par_7
ATT	<-->	INT	.597	.035	16.956	***	par_13
PN	<-->	CDIM	.291	.037	7.808	***	par_14
CDIM	<-->	INT	.492	.039	12.594	***	par_15
PN	<-->	ATT	.215	.032	6.792	***	par_16

Measurement Model Revision

Initial measurement model with one adjustment (path added from e49 to e50):



Measurement Model Fit Indices

Table D8.5 - CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	46	203.286	58	.000	3.505
Saturated model	104	.000	0		
Independence model	26	3842.990	78	.000	49.269

CMIN/DF should be between 2 and 3 for an acceptable fit and <2 for a good fit.

Table D8.6 - CFI

Model	NFI	RFI	IFI	TLI	CFI
Default model	.947	.929	.962	.948	.961
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

CFI should be>.9 for an acceptable fit and >.95 for a good fit.

Table D8.7 - RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.067	.057	.077	.002
Independence model	.295	.288	.303	.000

RMSEA should be <.10 for a good fit and <.05 for a very good fit.

The fit indices for the model are:

The ratio of χ^2 (203.2) to the degrees of freedom (58) was 3.505. Since this value is >3, it indicates that the data does not fit the model globally.

However, this statistic does suffer from limitations and a non-significant value may be unlikely even though the model may be a close fit to the data (Weston and Gore 2006: 742).

The comparative fit index (CFI) was 0.947 and the root mean square residual of approximation (RMSEA) was 0.073 (.057; .077. p = .005).

These fit indices indicate that there is an acceptable fit.

Measurement Model Identification

For this measurement model, there are 1 observed variables and X variances and covariance's. There are 46 parameters to be estimated. Degrees of freedom calculated as (X+13) – 46 = 113. The model is therefore over-identified and it is possible to test the model.13*14/2+13 – 46 = 58

Table D8.8 - Regression Weights

			Estimate	S.E.	C.R.	P	Label
q22	<---	CDIM	1.000				
q16	<---	CDIM	1.055	.041	25.729	***	par_1
q13	<---	CDIM	1.025	.044	23.116	***	par_2
q19	<---	ATT	1.000				
q25	<---	ATT	.822	.054	15.296	***	par_3
q28	<---	ATT	.634	.048	13.240	***	par_4
q26	<---	INT	.670	.029	22.790	***	par_5
q5	<---	CDIM	.913	.054	16.939	***	par_8
q31_recoded	<---	CDIM	.817	.054	15.201	***	par_9
q34	<---	CDIM	.969	.038	25.636	***	par_10
q15	<---	PN	1.046	.118	8.830	***	par_11
q3	<---	PN	1.000				
q18	<---	INT	.734	.031	23.544	***	par_12

Table D8.9 - Standardized Regression Weights

			Estimate
q13	<---	CDIM	.805
q16	<---	CDIM	.843
q22	<---	CDIM	.866
q5	<---	CDIM	.649
q31_recoded	<---	CDIM	.599
q34	<---	CDIM	.845
q28	<---	ATT	.598
q25	<---	ATT	.696
q19	<---	ATT	.763
q26	<---	INT	.841
q18	<---	INT	.862
q15	<---	PN	.706
q3	<---	PN	.614

The estimated standardized factor loadings and the reliability of each measured variable is summarized in the table below.

Table D8.10 - Estimated Standardised Factor Loadings and Reliability for the Measurement Model

Factor/Variable		Standardized Loading	Reliability
CDIM	q13	.805*	.65
	q16	.843*	.71
	q22	.866*	.75
	q5	.649*	.42
	q31_recoded	.599*	.36
	q34	.845*	.71
ATT	q28	.598*	.36
	q25	.696*	.48
	q19	.763*	.58
INT	q26	.841*	.71
	q18	.862*	.74
PN	q15	.706*	.50
	q3	.614*	.38

* Statistically significant at $\alpha = 0.01$

The estimated standardised regression weights, reflect the validity of each observed variable as a measure of the latent variable. Ideally, these should be at least 0.5. The figures listed above are all good. These loadings are all significantly different from zero at the 0.001 level.

The estimated correlations between latent variables, are all positive.

Reliability is calculated as estimate. The reliability of each observed variable, as a measure of the latent variable, ranged from .36 to .74.

Table D8.12 - Covariances

			Estimate	S.E.	C.R.	P	Label
CDIM	<-->	ATT	.398	.038	10.529	***	par_6
PN	<-->	INT	.315	.041	7.745	***	par_7
ATT	<-->	INT	.622	.034	18.408	***	par_13
PN	<-->	CDIM	.289	.037	7.769	***	par_14
CDIM	<-->	INT	.493	.039	12.636	***	par_15
PN	<-->	ATT	.237	.033	7.199	***	par_16
e49	<-->	e50	.091	.018	5.021	***	par_17

Table D8.13 - Correlations

			Estimate
CDIM	<-->	ATT	.702
PN	<-->	INT	.535
ATT	<-->	INT	.926
PN	<-->	CDIM	.581
CDIM	<-->	INT	.583
PN	<-->	ATT	.598
e49	<-->	e50	.280

Table D8.14 - Squared Multiple Correlations

	Estimate
q26	.707
q18	.742
q15	.499
q3	.377
q28	.358
q25	.485
q19	.583
q5	.421
q31_recoded	.359
q34	.714
q13	.647
q16	.710
q22	.750

Table D8.15 - Standardized Residual Covariances

	q26	q18	q15	q3	q28	q25	q19	q5	q31rec	q34	q13	q16	q22
q26	.000												
q18	.000	.000											
q15	-.282	-.187	.000										
q3	.120	.518	.000	.000									
q28	1.163	-.457	-2.114	-.181	.000								
q25	1.580	-.004	-1.102	-.915	.000	.000							
q19	-1.250	.062	1.550	.441	.617	-.335	.000						
q5	.630	1.383	.263	2.486	-1.279	.006	2.179	.000					
q31rec	-.676	1.152	-.968	1.290	-1.541	-1.275	1.023	.996	.000				
q34	-.215	-.212	-.516	-1.058	-.402	-.515	.523	-.703	.209	.000			
q13	-.739	.303	.809	.348	-.899	-2.032	1.248	.659	1.219	.376	.000		
q16	-1.052	-.251	.687	-.269	-1.722	-1.486	.628	.162	-.299	-.384	-.271	.000	
q22	.664	.198	-.210	-.645	-.432	-.342	.776	-.638	-1.017	.336	-.620	.628	.000

Table D8.16 - Correlations

	INT	ATT	CDIM	PN	q26	q18	q15	q3	q28	q25	q19	q5	q31rec	q34	q13	q16	q22
INT	1.000																
ATT	.926	1.000															
CDIM	.583	.702	1.000														
PN	.535	.598	.581	1.000													
q26	.841	.779	.490	.450	1.000												
q18	.862	.798	.502	.461	.725	1.000											
q15	.378	.423	.410	.706	.318	.325	1.000										
q3	.328	.367	.356	.614	.276	.283	.434	1.000									
q28	.554	.598	.420	.358	.466	.477	.253	.220	1.000								
q25	.645	.696	.489	.416	.542	.556	.294	.256	.577	1.000							
q19	.707	.763	.536	.457	.595	.609	.323	.280	.456	.531	1.000						
q5	.378	.456	.649	.377	.318	.326	.266	.231	.272	.317	.348	1.000					
q31rec	.349	.421	.599	.348	.294	.301	.246	.214	.251	.293	.321	.389	1.000				
q34	.493	.593	.845	.491	.414	.424	.347	.301	.355	.413	.453	.549	.506	1.000			
q13	.469	.565	.805	.467	.394	.404	.330	.287	.338	.393	.431	.522	.482	.680	1.000		
q16	.491	.591	.843	.489	.413	.423	.346	.300	.354	.412	.452	.547	.505	.712	.678	1.000	
q22	.505	.608	.866	.503	.424	.435	.355	.309	.363	.423	.464	.562	.519	.732	.697	.730	1.000

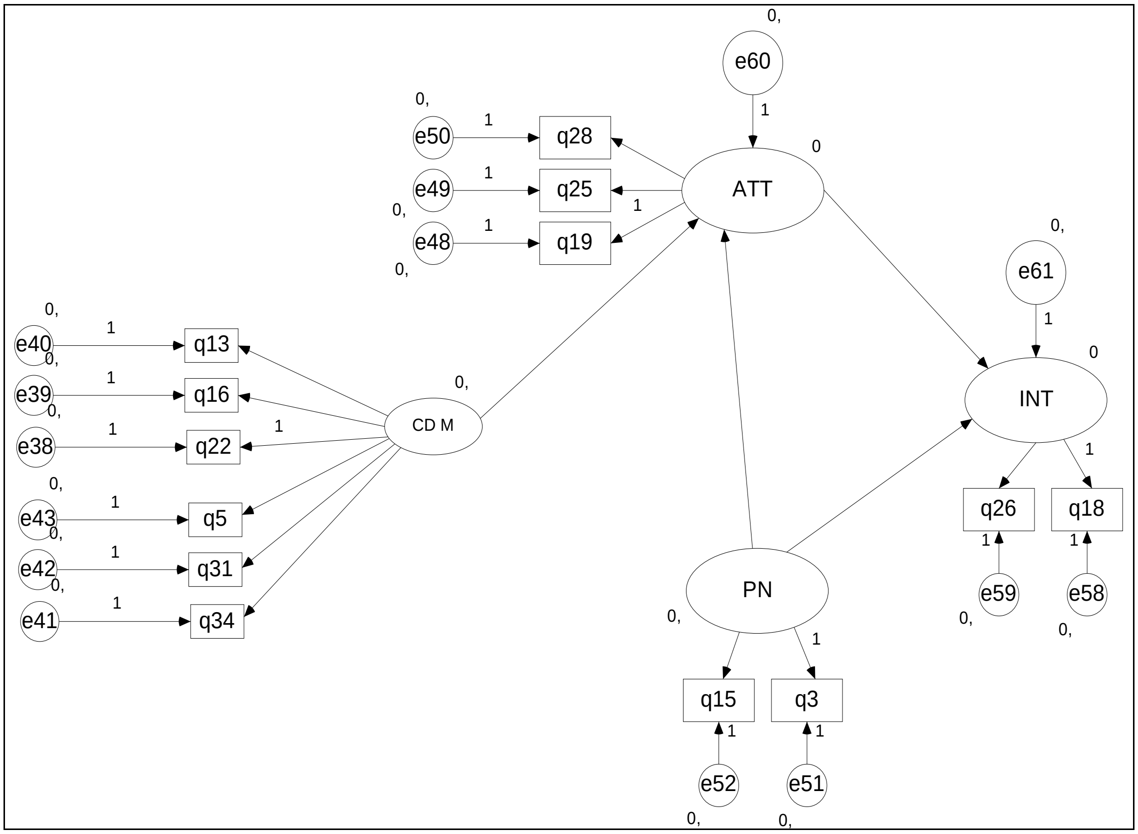
Table D8.17 - Means

INT	ATT	CDIM	PN	q26	q18	q15	q3	q28	q25	q19	q5	q31rec	q34	q13	q16	q22
.000	.000	.000	.000	3.857	3.751	3.475	3.699	4.144	3.969	3.834	3.047	3.444	3.569	3.473	3.511	3.684

Given the above results from the confirmatory factor analysis, the measurement model may be used as part of the SEM model.

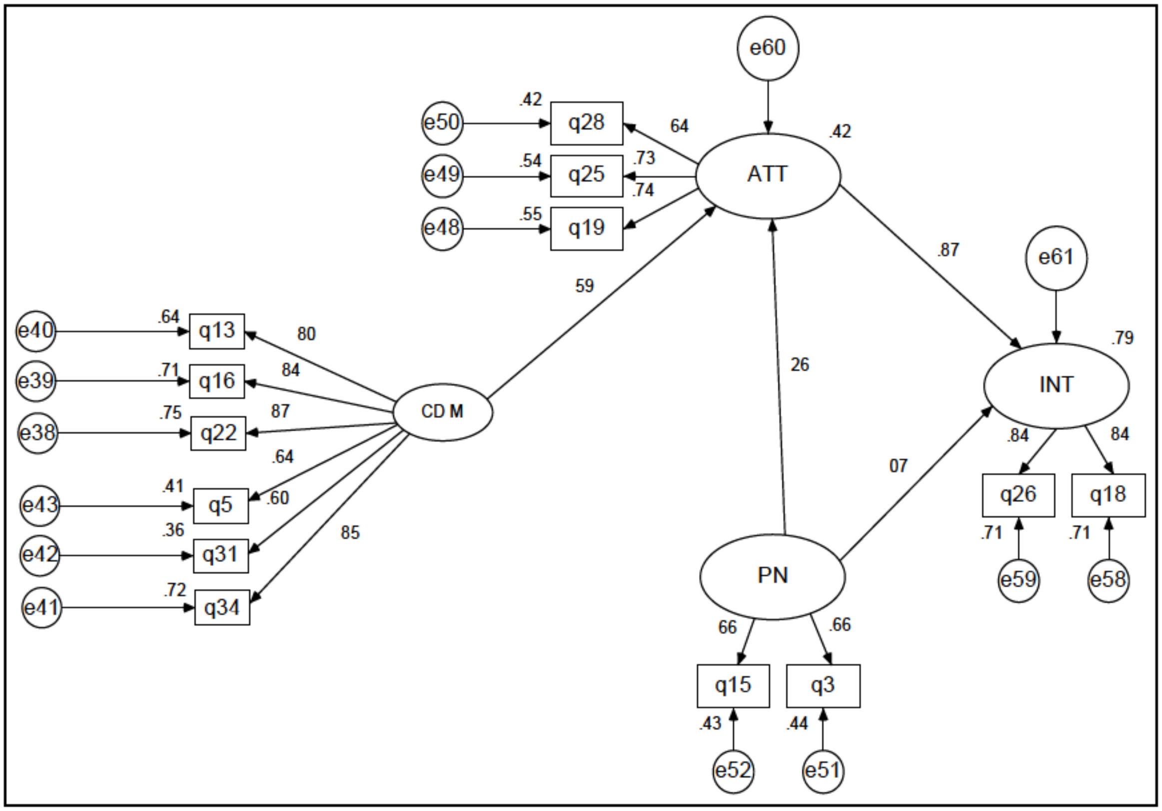
Results of the Analysis of the Structural Model

The revised structural model is represented below:



Results of the Structural Model with Standardised Coefficients

The revised model is analysed using SEM:



Structural Model Fit Indices

Table D8.18 - CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	43	348.845	61	.000	5.719
Saturated model	104	.000	0		
Independence model	26	3842.990	78	.000	49.269

CMIN/DF should be between 2 and 3 for an acceptable fit and <2 for a good fit.

Table D8.19 - CFI

Model	NFI	RFI	IFI	TLI	CFI
Default model	.909	.884	.924	.902	.924
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

CFI should be>.9 for an acceptable fit and >.95 for a good fit.

Table D8.20 - RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.092	.083	.102	.000
Independence model	.295	.288	.303	.000

RMSEA should be <.10 for a good fit and <.05 for a very good fit.

The fit indices for the model are:

The ratio of χ^2 (348.8) to the degrees of freedom (61) was 7.719. Since this value is >3, it indicates that the data does not fit the model globally.

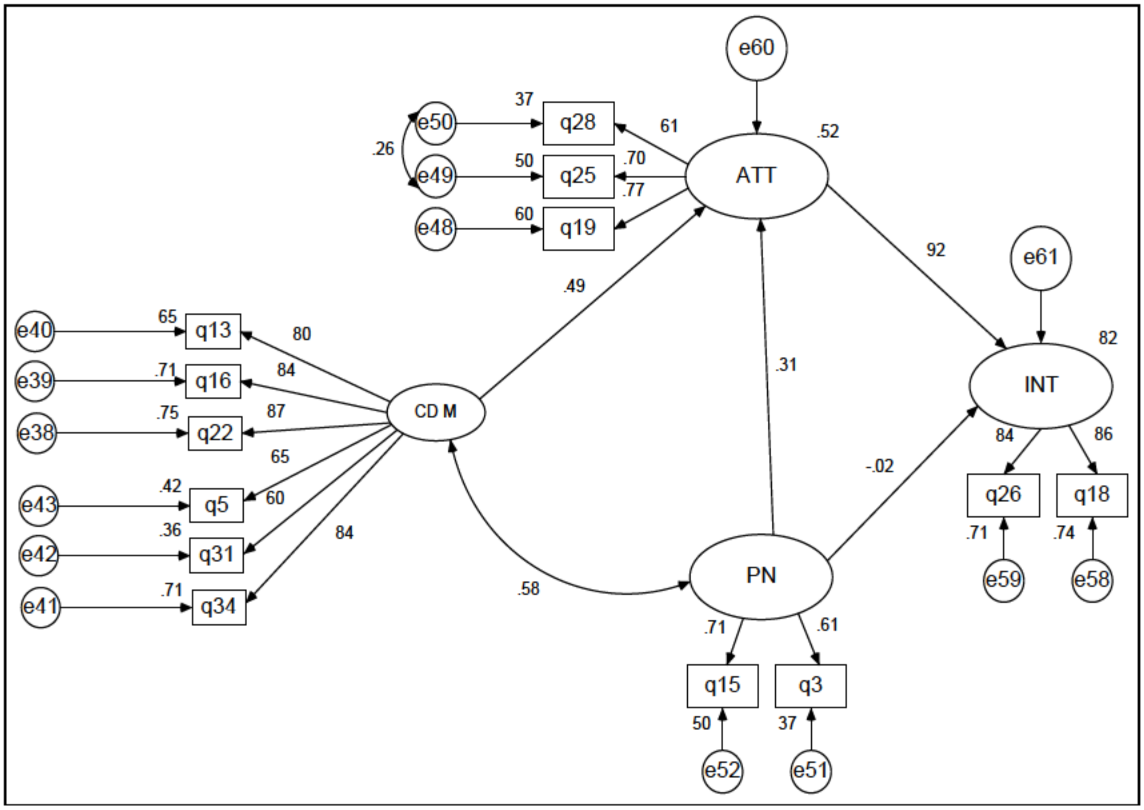
However, this statistic does suffer from limitations and a non-significant value may be unlikely even though the model may be a close fit to the data (Weston and Gore 2006: 742).

The comparative fit index (CFI) was 0.924 and the root mean square residual of approximation (RMSEA) was 0.092 (.083; .102. p = .005).

These fit indices indicate that there is an acceptable fit.

Structural Model Re-Specification

The structural model was respecified by adding a path from CDIM to PN and q28 to q25. There is a significant improvement: CMIN went from 5.719 to 3.507, CFI went from .924 to .961 and RMSEA went from .092 to .067.



Structural Model Fit Indices

Table D8.21 - CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	45	206.936	59	.000	3.507
Saturated model	104	.000	0		
Independence model	26	3842.990	78	.000	49.269

CMIN/DF should be between 2 and 3 for an acceptable fit and <2 for a good fit.

Table D8.22 - CFI

Model	NFI	RFI	IFI	TLI	CFI
Default model	.946	.929	.961	.948	.961
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

CFI should be>.9 for an acceptable fit and >.95 for a good fit.

Table D8.23 - RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.067	.057	.077	.002
Independence model	.295	.288	.303	.000

RMSEA should be <.10 for a good fit and <.05 for a very good fit.

The fit indices for the model are:

The ratio of χ^2 (206.9) to the degrees of freedom (59) was 3.507. Since this value is >3, it indicates that the data does not fit the model globally.

However, this statistic does suffer from limitations and a non-significant value may be unlikely even though the model may be a close fit to the data (Weston and Gore 2006: 742).

The comparative fit index (CFI) was 0.961 and the root mean square residual of approximation (RMSEA) was 0.067 (.057; .077. p = .005).

These fit indices indicate that there is a good fit.

Table D8.24 - Regression Weights

			Estimate	S.E.	C.R.	P	Label
ATT	<---	CDIM	.396	.051	7.776	***	par_10
ATT	<---	PN	.360	.088	4.086	***	par_11
INT	<---	ATT	.991	.080	12.364	***	par_12
INT	<---	PN	-.025	.084	-.298	.766	par_13
q22	<---	CDIM	1.000				
q16	<---	CDIM	1.055	.041	25.730	***	par_1
q13	<---	CDIM	1.025	.044	23.117	***	par_2
q19	<---	ATT	1.000				
q25	<---	ATT	.820	.055	14.998	***	par_3
q28	<---	ATT	.636	.048	13.203	***	par_4
q26	<---	INT	.911	.043	21.211	***	par_5
q5	<---	CDIM	.913	.054	16.939	***	par_6
q31_recoded	<---	CDIM	.817	.054	15.209	***	par_7

			Estimate	S.E.	C.R.	P	Label
q34	<---	CDIM	.968	.038	25.630	***	par_8
q15	<---	PN	1.052	.119	8.845	***	par_9
q3	<---	PN	1.000				
q18	<---	INT	1.000				

Table D8.25 - Standardized Regression Weights

			Estimate
ATT	<---	CDIM	.492
ATT	<---	PN	.311
INT	<---	ATT	.918
INT	<---	PN	-.020
q13	<---	CDIM	.805
q16	<---	CDIM	.843
q22	<---	CDIM	.866
q5	<---	CDIM	.649
q31_recoded	<---	CDIM	.599
q34	<---	CDIM	.845
q28	<---	ATT	.609
q25	<---	ATT	.704
q19	<---	ATT	.774
q26	<---	INT	.840
q18	<---	INT	.863
q15	<---	PN	.708
q3	<---	PN	.612

The estimated standardized factor loadings and the reliability of each measured variable is summarized in the table below.

Table D8.26 - Estimated Standardised Factor Loadings and Reliability for the Structural Model

Factor/Variable		Standardized Regression Weights	Reliability
CDIM	q13	.805*	.65
	q16	.843*	.71
	q22	.866*	.75
	q5	.649*	.42
	q31_recoded	.599*	.36
	q34	.845*	.71
ATT	q28	.609*	.37

	q25	.704*	.50
	q19	.774*	.60
INT	q26	.840*	.71
I	q18	.863*	.74
PN	q15	.708*	.50
	q3	.612*	.37

* Statistically significant at α =0.01

The estimated standardised regression weights, reflect the validity of each observed variable as a measure of the latent variable. Ideally, these should be at least 0.5. The figures listed above are all good. These loadings are all significantly different from zero at the 0.001 level.

The estimated correlations between latent variables are all positive.

Reliability is calculated as estimate. The reliability of each observed variable, as a measure of the latent variable, ranged from .36 to .74.

Table D8.27 - Variances

	Estimate	S.E.	C.R.	P	Label
CDIM	.714	.057	12.523	***	par_29
PN	.345	.056	6.117	***	par_30
e60	.224	.027	8.270	***	par_31
e61	.096	.024	3.983	***	par_32
e38	.238	.020	12.190	***	par_33
e39	.325	.025	13.015	***	par_34
e40	.409	.030	13.839	***	par_35
e41	.269	.021	12.976	***	par_36
e42	.850	.054	15.793	***	par_37
e43	.818	.053	15.552	***	par_38
e48	.310	.028	11.237	***	par_39
e49	.317	.024	13.183	***	par_40
e50	.319	.022	14.454	***	par_41
e51	.577	.050	11.495	***	par_42
e52	.380	.046	8.257	***	par_43
e58	.185	.021	8.771	***	par_44
e59	.187	.019	10.031	***	par_45

Table D8.28 - Covariances

			Estimate	S.E.	C.R.	P	Label
PN	<-->	CDIM	.289	.037	7.756	***	par_14
e49	<-->	e50	.084	.018	4.763	***	par_15

Table D8.29 - Correlations

			Estimate
PN	<-->	CDIM	.581
e49	<-->	e50	.264

Table D8.30 - Squared Multiple Correlations

	Estimate
ATT	.516
INT	.822
q26	.705
q18	.744
q15	.501
q3	.374
q28	.370
q25	.495
q19	.599
q5	.421
q31_recoded	.359
q34	.714
q13	.647
q16	.710
q22	.750

Table D8.31 - Standardized Total Effects

	CDIM	PN	ATT	INT
ATT	.492	.311	.000	.000
INT	.451	.265	.918	.000
q26	.379	.223	.771	.840
q18	.389	.229	.792	.863
q15	.000	.708	.000	.000
q3	.000	.612	.000	.000
q28	.299	.189	.609	.000
q25	.346	.219	.704	.000
q19	.380	.240	.774	.000
q5	.649	.000	.000	.000
q31_recoded	.599	.000	.000	.000
q34	.845	.000	.000	.000
q13	.805	.000	.000	.000
q16	.843	.000	.000	.000
q22	.866	.000	.000	.000

Table D8.32 - Standardized Direct Effects

	CDIM	PN	ATT	INT
ATT	.492	.311	.000	.000
INT	.000	-.020	.918	.000
q26	.000	.000	.000	.840
q18	.000	.000	.000	.863
q15	.000	.708	.000	.000
q3	.000	.612	.000	.000
q28	.000	.000	.609	.000
q25	.000	.000	.704	.000
q19	.000	.000	.774	.000
q5	.649	.000	.000	.000
q31_recoded	.599	.000	.000	.000
q34	.845	.000	.000	.000
q13	.805	.000	.000	.000
q16	.843	.000	.000	.000
q22	.866	.000	.000	.000

Table D8.33 - Standardized Indirect Effects

	CDIM	PN	ATT	INT
ATT	.000	.000	.000	.000
INT	.451	.285	.000	.000
q26	.379	.223	.771	.000
q18	.389	.229	.792	.000
q15	.000	.000	.000	.000
q3	.000	.000	.000	.000
q28	.299	.189	.000	.000
q25	.346	.219	.000	.000
q19	.380	.240	.000	.000
q5	.000	.000	.000	.000
q31_recoded	.000	.000	.000	.000
q34	.000	.000	.000	.000
q13	.000	.000	.000	.000
q16	.000	.000	.000	.000
q22	.000	.000	.000	.000

Table D8.34 - Standardized Residual Covariances

	q26	q18	q15	q3	q28	q25	q19	q5	q31r	q34	q13	q16	q22
q26	.000												
q18	.000	.000											
q15	-.194	-.118	.000										
q3	.229	.612	.009	.000									
q28	1.218	-.430	-2.208	-.238	.000								
q25	1.717	.100	-1.168	-.944	.000	.000							
q19	-1.139	.144	1.457	.394	.306	-.607	.000						
q5	.361	1.084	.242	2.495	-1.124	.232	2.412	.000					
q31r	-.925	.872	-.990	1.297	-1.400	-1.072	1.234	.992	.000				
q34	-.546	-.577	-.539	-1.044	-.200	-.229	.814	-.700	.207	.000			
q13	-1.057	-.053	.784	.359	-.710	-1.767	1.528	.659	1.214	.380	.000		
q16	-1.380	-.617	.661	-.256	-1.526	-1.207	.917	.163	-.303	-.379	-.270	.000	
q22	.316	-.181	-.238	-.634	-.230	-.054	1.069	-.640	-1.023	.337	-.623	.627	.000

Table D8.35 - Correlations

	CDIM	PN	ATT	INT	q26	q18	q15	q3	q28	q25	q19	q5	q31r	q34	q13	q16	q22
CDIM	1.000																
PN	.581	1.000															
ATT	.672	.596	1.000														
INT	.606	.528	.906	1.000													
q26	.509	.443	.761	.840	1.000												
q18	.523	.455	.782	.863	.725	1.000											
q15	.411	.708	.422	.373	.314	.322	1.000										
q3	.356	.612	.365	.323	.271	.279	.433	1.000									
q28	.409	.363	.609	.552	.463	.476	.257	.222	1.000								
q25	.473	.420	.704	.638	.536	.551	.297	.257	.577	1.000							
q19	.520	.461	.774	.701	.589	.605	.327	.282	.471	.545	1.000						
q5	.649	.377	.436	.393	.330	.339	.267	.231	.266	.307	.338	1.000					
q31	.599	.348	.403	.363	.305	.313	.247	.213	.245	.284	.312	.389	1.000				
q4	.845	.491	.568	.512	.430	.441	.348	.301	.346	.400	.439	.548	.506	1.000			
q13	.805	.468	.541	.487	.409	.420	.331	.286	.329	.381	.418	.522	.482	.680	1.000		
q16	.843	.490	.566	.510	.429	.440	.347	.300	.345	.399	.438	.547	.505	.712	.678	1.000	
q22	.866	.503	.582	.524	.440	.452	.356	.308	.354	.410	.450	.562	.519	.732	.697	.730	1.000

Table D8.36 - Means

CDIM	PN	ATT	INT	q26	q18	q15	q3	q28	q25	q19	q5	q31r	q34	q13	q16	q22
.000	.000	.000	.000	3.857	3.751	3.475	3.699	4.144	3.969	3.834	3.047	3.444	3.569	3.473	3.511	3.684

APPENDIX D9

STATISTICAL ANALYSIS

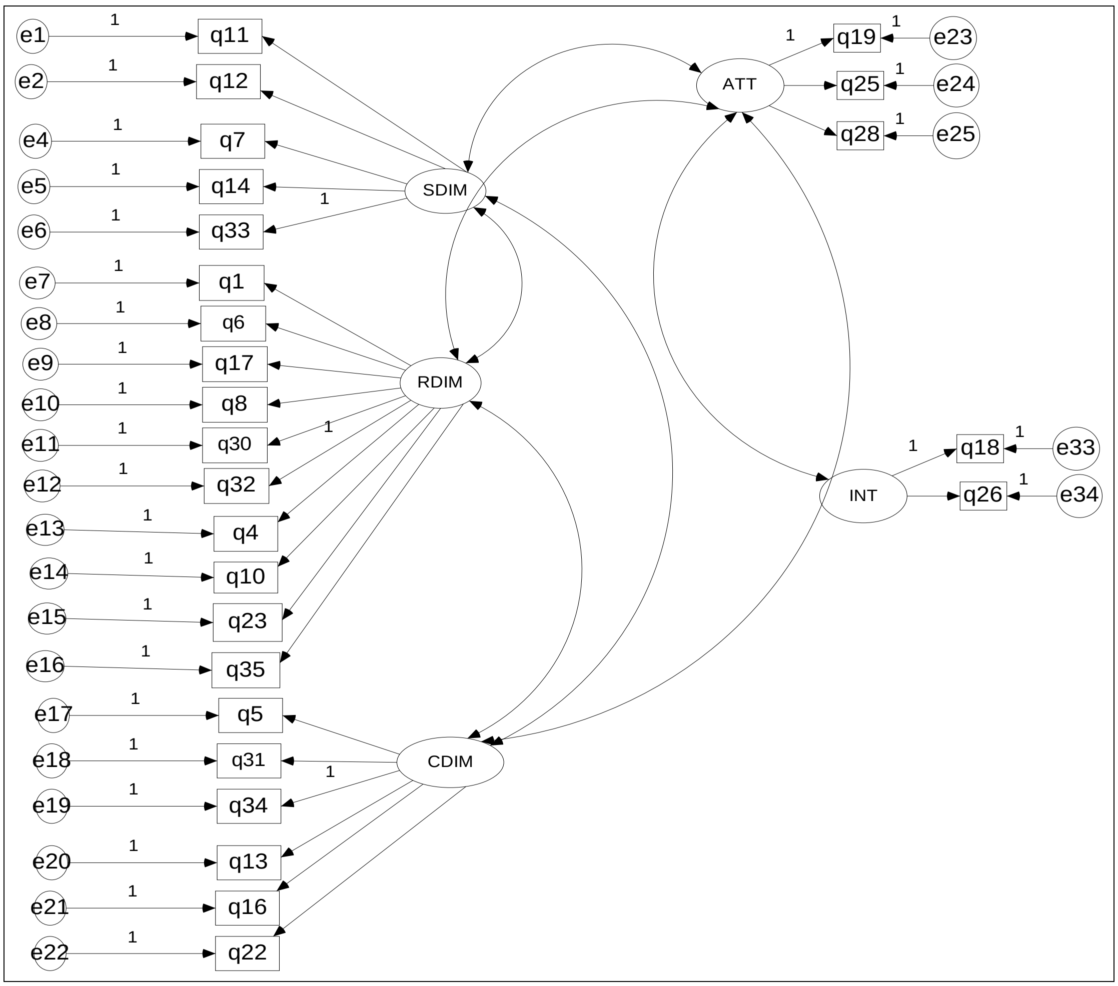
SOCIAL CAPITAL

APPENDIX D9

STATISTICAL ANALYSIS

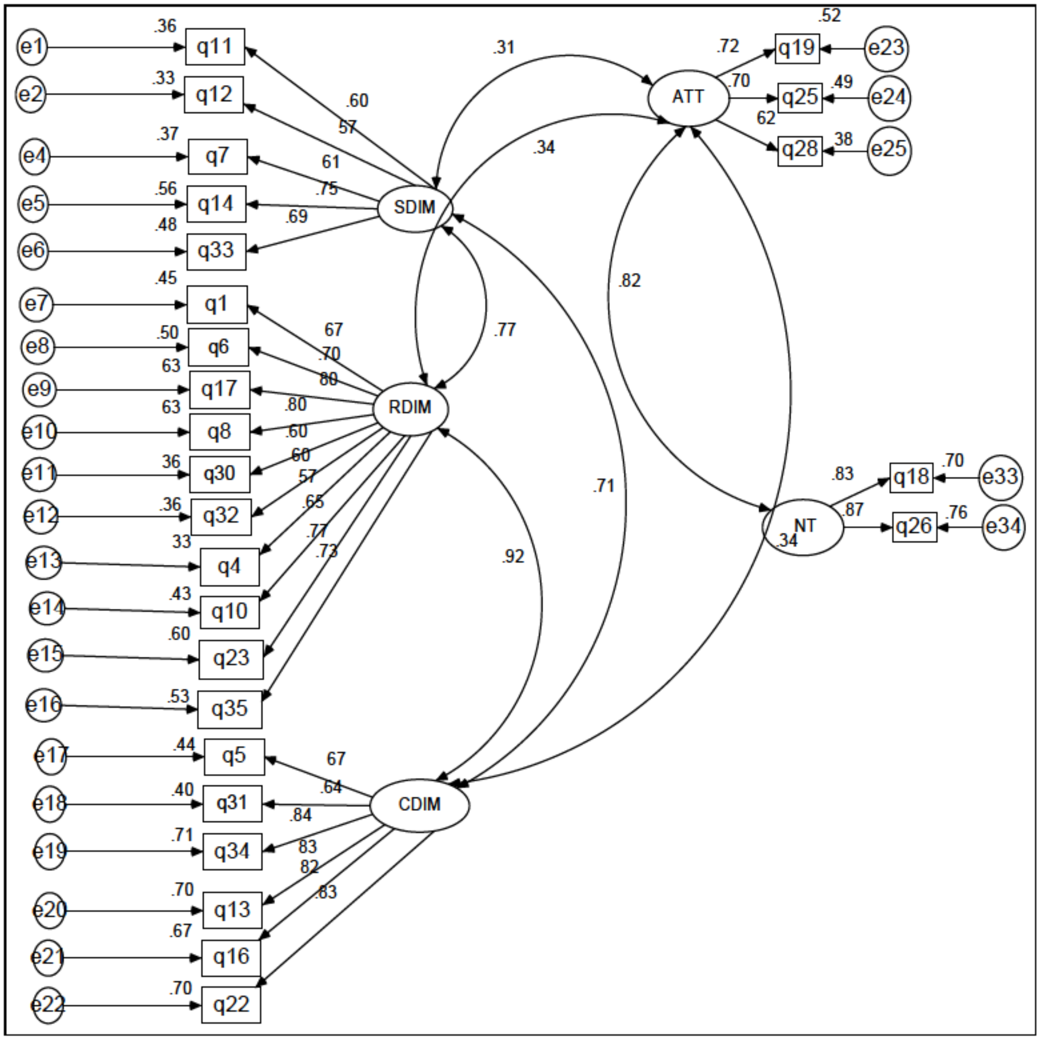
SOCIAL CAPITAL

Results of the Analysis of the Hypothesized Measurement Model



Results of the Analysis of the Measurement Model

The measurement model is represented by the diagram below:



Measurement Model Fit Indices

Table D9.1 - CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	59	1197.287	292	.000	4.100
Saturated model	351	.000	0		
Independence model	26	8461.409	325	.000	26.035

CMIN/DF should be between 2 and 3 for an acceptable fit and <2 for a good fit.

Table D9.2 - CFI

Model	NFI	RFI	IFI	TLI	CFI
Default model	.859	.843	.889	.876	.889
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

CFI should be>.9 for an acceptable fit and >.95 for a good fit.

Table D9.3 - RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.075	.070	.079	.000
Independence model	.213	.209	.217	.000

RMSEA should be <.10 for a good fit and <.05 for a very good fit.

The fit indices for the model are:

The ratio of χ^2 (1197.2) to the degrees of freedom (292) was 4.100. Since this value is >3, it indicates that the data does not fit the model globally.

However, this statistic does suffer from limitations and a non-significant value may be unlikely even though the model may be a close fit to the data (Weston and Gore 2006: 742).

The comparative fit index (CFI) was 0.889 and the root mean square residual of approximation (RMSEA) was 0.075 (.070; .079. p = .005).

			Estimate	S.E.	C.R.	P	Label
q33	<---	SDIM	1.000				
q14	<---	SDIM	1.160	.078	14.836	***	par_1
q7	<---	SDIM	1.024	.082	12.424	***	par_2
q34	<---	CDIM	1.000				
q31_recoded	<---	CDIM	.899	.055	16.438	***	par_3
q5	<---	CDIM	.971	.056	17.463	***	par_4
q32	<---	RDIM	1.000				
q30_recoded	<---	RDIM	1.234	.103	11.938	***	par_5
q8	<---	RDIM	1.535	.105	14.656	***	par_6
q17	<---	RDIM	1.604	.109	14.655	***	par_7
q6_recoded	<---	RDIM	1.543	.114	13.479	***	par_8
q1	<---	RDIM	1.359	.104	13.070	***	par_9
q19	<---	ATT	1.000				
q25	<---	ATT	.876	.061	14.303	***	par_10
q28	<---	ATT	.704	.055	12.805	***	par_11
q18	<---	INT	1.000				
q26	<---	INT	.976	.050	19.568	***	par_12
q12	<---	SDIM	1.012	.086	11.822	***	par_13
q11	<---	SDIM	.973	.079	12.311	***	par_14
q4	<---	RDIM	.951	.082	11.556	***	par_15
q10	<---	RDIM	1.312	.103	12.790	***	par_16
q23	<---	RDIM	1.493	.104	14.387	***	par_17
q35	<---	RDIM	1.261	.091	13.789	***	par_18

q13	<---	CDIM	1.103	.045	24.275	***	par_19
q16	<---	CDIM	1.067	.045	23.661	***	par_20
q22	<---	CDIM	1.000	.041	24.285	***	par_21

These fit indices indicate that there is an acceptable fit.

Measurement Model Identification

For this measurement model, there are 26 observed variables. The number of distinct sample moments is 351. The number of distinct parameters to be estimated is 59. The degrees of freedom is (351- 59) = 292. Probability level = .000

The model is therefore over-identified and it is possible to test the model.

Table D9.4 - Regression Weights

Table D9.5 - Standardized Regression Weights

			Estimate
q11	<---	SDIM	.601
q12	<---	SDIM	.574
q7	<---	SDIM	.607
q14	<---	SDIM	.750
q33	<---	SDIM	.691
q1	<---	RDIM	.674
q6_recoded	<---	RDIM	.704
q17	<---	RDIM	.796
q8	<---	RDIM	.796
q30_recoded	<---	RDIM	.597
q32	<---	RDIM	.597
q4	<---	RDIM	.573
q10	<---	RDIM	.654
q23	<---	RDIM	.774
q35	<---	RDIM	.727
q5	<---	CDIM	.666
q31_recoded	<---	CDIM	.636
q34	<---	CDIM	.841
q13	<---	CDIM	.835
q16	<---	CDIM	.821
q22	<---	CDIM	.835
q19	<---	ATT	.720
q25	<---	ATT	.698
q28	<---	ATT	.616
q18	<---	INT	.834
q26	<---	INT	.869

Table D9.6 - Estimated Standardized Regression Weights and Reliability for the Measurement Model

The estimated standardized factor loadings and the reliability of each measured variable is summarized in the table below:

Factor/Variable		Standardized Regression Weights	Reliability
SDIM	q11	.601*	.36
SDIM	q12	.574*	.33
SDIM	q7	.607*	.37
SDIM	q14	.750*	.56
SDIM	q33	.691*	.48
RDIM	q1	.674*	.45
RDIM	q6_recoded	.704*	.50
RDIM	q17	.796*	.63
RDIM	q8	.796*	.63
RDIM	q30_recoded	.597*	.36
RDIM	q32	.597*	.36
RDIM	q4	.573*	.33
RDIM	q10	.654*	.42
RDIM	q23	.774*	.60
RDIM	q35	.727*	.53
CDIM	q5	.666*	.44
CDIM	q31_recoded	.636*	.40
CDIM	q34	.841*	.71
CDIM	q13	.835*	.70
CDIM	q16	.821*	.67
CDIM	q22	.835*	.70
ATT	q19	.720*	.52

ATT	q25	.698*	.49
ATT	q28	.616*	.38
INT	q18	.834*	.70
INT	q26	.869*	.76

* Statistically significant at α =0. 01

The estimated standardised regression weights reflect the validity of each observed variable as a measure of the latent variable. Ideally, these should be at least 0.5. The figures listed above are all good. These loadings are all significantly different from zero at the 0.001 level.

The estimated correlations between latent variables are all positive.

Reliability is calculated as estimate. The reliability of each observed variable, as a measure of the latent variable, ranged from .33 to .76.

Table D9.7 - Covariances

			Estimate	S.E.	C.R.	P	Label
CDIM	<-->	RDIM	.404	.037	10.960	***	par_22
SDIM	<-->	RDIM	.263	.028	9.377	***	par_23
SDIM	<-->	CDIM	.369	.036	10.329	***	par_24
SDIM	<-->	ATT	.117	.018	6.364	***	par_25
RDIM	<-->	ATT	.109	.016	6.975	***	par_26
CDIM	<-->	ATT	.166	.022	7.532	***	par_27
ATT	<-->	INT	.344	.031	11.125	***	par_28

Table D9.8 - Correlations

			Estimate
CDIM	<-->	RDIM	.922
SDIM	<-->	RDIM	.766
SDIM	<-->	CDIM	.709
SDIM	<-->	ATT	.309
RDIM	<-->	ATT	.340
CDIM	<-->	ATT	.342
ATT	<-->	INT	.815

Table D9.9 - Squared Multiple Correlation

	Estimate
q26	.755
q18	.695
q28	.380
q25	.487
q19	.519
q1	.454
q6_recoded	.495
q17	.633
q8	.633

q30_recoded	.357
q32	.356
q4	.328
q10	.428
q23	.598
q35	.528
q13	.697
q16	.675
q22	.697
q5	.443
q31_recoded	.404
q34	.707
q7	.368
q14	.563
q33	.478
q11	.361
q12	.330

Table D9.10 - Standardized Total Effects

	INT	ATT	RDIM	CDIM	SDIM
q26	.869	.000	.000	.000	.000
q18	.834	.000	.000	.000	.000
q28	.000	.616	.000	.000	.000
q25	.000	.698	.000	.000	.000
q19	.000	.720	.000	.000	.000
q1	.000	.000	.674	.000	.000
q6_recoded	.000	.000	.704	.000	.000
q17	.000	.000	.796	.000	.000
q8	.000	.000	.796	.000	.000
q30_recoded	.000	.000	.597	.000	.000
q32	.000	.000	.597	.000	.000
q4	.000	.000	.573	.000	.000
q10	.000	.000	.654	.000	.000
q23	.000	.000	.774	.000	.000
q35	.000	.000	.727	.000	.000
q13	.000	.000	.000	.835	.000
q16	.000	.000	.000	.821	.000
q22	.000	.000	.000	.835	.000
q5	.000	.000	.000	.666	.000
q31_recoded	.000	.000	.000	.636	.000
q34	.000	.000	.000	.841	.000
q7	.000	.000	.000	.000	.607
q14	.000	.000	.000	.000	.750
q33	.000	.000	.000	.000	.691
q11	.000	.000	.000	.000	.601
q12	.000	.000	.000	.000	.574

Table D9.11 - Standardized Direct Effects

	INT	ATT	RDIM	CDIM	SDIM
q26	.869	.000	.000	.000	.000
q18	.834	.000	.000	.000	.000
q28	.000	.616	.000	.000	.000
q25	.000	.698	.000	.000	.000
q19	.000	.720	.000	.000	.000

q1	.000	.000	.674	.000	.000
q6_recoded	.000	.000	.704	.000	.000
q17	.000	.000	.796	.000	.000
q8	.000	.000	.796	.000	.000
q30_recoded	.000	.000	.597	.000	.000
q32	.000	.000	.597	.000	.000
q4	.000	.000	.573	.000	.000
q10	.000	.000	.654	.000	.000
q23	.000	.000	.774	.000	.000
q35	.000	.000	.727	.000	.000
q13	.000	.000	.000	.835	.000
q16	.000	.000	.000	.821	.000
q22	.000	.000	.000	.835	.000
q5	.000	.000	.000	.666	.000
q31_recoded	.000	.000	.000	.636	.000
q34	.000	.000	.000	.841	.000
q7	.000	.000	.000	.000	.607
q14	.000	.000	.000	.000	.750
q33	.000	.000	.000	.000	.691
q11	.000	.000	.000	.000	.601
q12	.000	.000	.000	.000	.574

Table D9.12 - Standardized Indirect Effects

	INT	ATT	RDIM	CDIM	SDIM
q26	.000	.000	.000	.000	.000
q18	.000	.000	.000	.000	.000
q28	.000	.000	.000	.000	.000
q25	.000	.000	.000	.000	.000
q19	.000	.000	.000	.000	.000
q1	.000	.000	.000	.000	.000
q6_recoded	.000	.000	.000	.000	.000
q17	.000	.000	.000	.000	.000
q8	.000	.000	.000	.000	.000
q30_recoded	.000	.000	.000	.000	.000
q32	.000	.000	.000	.000	.000
q4	.000	.000	.000	.000	.000
q10	.000	.000	.000	.000	.000
q23	.000	.000	.000	.000	.000
q35	.000	.000	.000	.000	.000
q13	.000	.000	.000	.000	.000
q16	.000	.000	.000	.000	.000
q22	.000	.000	.000	.000	.000
q5	.000	.000	.000	.000	.000
q31_recoded	.000	.000	.000	.000	.000
q34	.000	.000	.000	.000	.000
q7	.000	.000	.000	.000	.000
q14	.000	.000	.000	.000	.000
q33	.000	.000	.000	.000	.000
q11	.000	.000	.000	.000	.000
q12	.000	.000	.000	.000	.000

Table D9.13 - Standardized Residual Covariances

	q26	q18	q28	q25	q19	q1	q6rec	q17	q8	q30rec	q32	q4	q10	q23	q35	q13	q16	q22	q5	q31rec	q34	q7	q14	q33	q11	q12
q26	.000																									
q18	.000	.000																								
q28	2.354	1.284	1.682																							
q25	3.440	2.466	4.618	2.154																						
q19	1.213	3.455	2.134	1.717	2.297																					
q1	5.656	7.111	1.956	1.731	5.093	.000																				
q6rec	6.561	7.675	1.108	2.160	6.521	1.019	.000																			
q17	8.69	10.39	2.21	2.58	8.45	-.24	-.46	.000																		

	8	8	1	0	2	9	7																			
q8	7.362	8.940	2.337	1.698	6.611	.891	1.434	-.312	.000																	
q30rec	4.682	5.866	1.318	1.403	4.018	.631	1.511	-.882	.444	.000																
q32	6.472	6.369	3.272	2.047	5.066	-.844	-.525	.021	-.876	2.570	.000															
q4	5.974	8.638	4.842	3.232	6.392	.011	-.751	-.490	.936	.084	.283	.000														
q10	5.704	6.543	.867	2.512	5.695	1.849	.207	-.526	1.318	-.214	-.977	-.852	.000													
q23	8.248	8.530	3.798	3.764	7.000	.021	-.609	.489	-.728	-.320	.529	-.346	-.779	.000												
q35	9.228	9.296	5.074	4.283	8.011	-.846	-.356	.221	-.533	-.533	.079	-.294	-1.224	.859	.000											
q13	8.479	9.829	3.148	2.764	7.274	.149	-.516	1.343	.974	-.230	.636	1.286	1.123	-.015	.400	.000										
q16	8.57	9.68	2.69	3.89	7.15	-.23	-.76	.504	-.85	-1.62	-.75	-.99	-.61	-.38	-.59	-.41	.000									

	6	1	6	7	6	6	3		1	5	2	5	4	8	5	8										
q22	10.701	10.441	4.277	5.384	7.551	-1.424	-.431	-.875	-.483	-.827	-.636	-.952	-.956	-.195	.638	-.627	1.490	.000								
q5	8.143	9.121	2.010	4.144	7.230	1.152	1.202	1.300	1.267	-.167	-.966	-.333	1.208	.748	-.055	-.037	.166	-.513	.000							
q31rec	6.202	8.280	1.372	2.309	5.449	1.475	1.686	.607	.909	5.805	.633	1.353	1.586	.674	.428	.186	-.656	-1.261	.242	.000						
q34	9.509	9.750	4.070	4.908	6.949	-1.164	-.911	-.145	-1.101	.144	1.463	-1.048	-.737	-.083	1.254	-.053	.024	.907	-.932	-.380	.000					
q7	5.655	5.427	.835	.521	3.855	-1.714	-1.002	-1.279	-1.020	-2.081	-.593	1.537	-.517	-.470	-.896	-.432	-2.066	-1.916	-.774	-1.650	-1.238	.000				
q14	6.649	7.737	2.527	2.129	6.423	-1.440	-.751	-.081	-1.518	-1.525	-.049	1.699	-.547	-.278	-1.100	.278	-.323	-1.143	.062	-1.350	-.094	1.672	.000			
q33	7.011	7.412	4.196	3.265	6.024	-1.241	.172	1.157	-1.173	-1.088	2.439	2.107	.511	2.033	3.078	1.111	1.221	1.308	-.216	.681	2.677	.850	-.642	.000		
q11	5.350	6.130	1.774	2.198	4.096	-1.112	-.530	.213	-.410	-1.188	-1.171	1.259	1.898	-.436	-1.196	.293	-.496	-1.254	.945	-.723	-.586	-.547	1.171	-1.216	.000	

q12	3.694	4.155	1.484	.938	5.018	.687	.335	2.622	1.267	-.824	-.194	1.901	2.949	2.482	1.220	2.575	-.177	-.572	1.679	.160	.119	-1.385	-.746	-.739	.987	.000

Table D9.14 - Correlations

	INT	ATT	RDIM	CDIM	SDIM	q26	q18	q28	q25	q19	q1	q6r	q17	q8	q30r	q32	q4	q10	q23	q35	q13	q16	q22	q5	q31rec	q34	q7	q14	q33	q11	q12
INT	1.000																														
ATT	.815	1.000																													
RDIM	.000	.340	1.000																												
CDIM	.000	.342	.922	1.000																											
SDIM	.000	.309	.766	.709	1.000																										
q26	.869	.709	.000	.000	.000	1.000																									

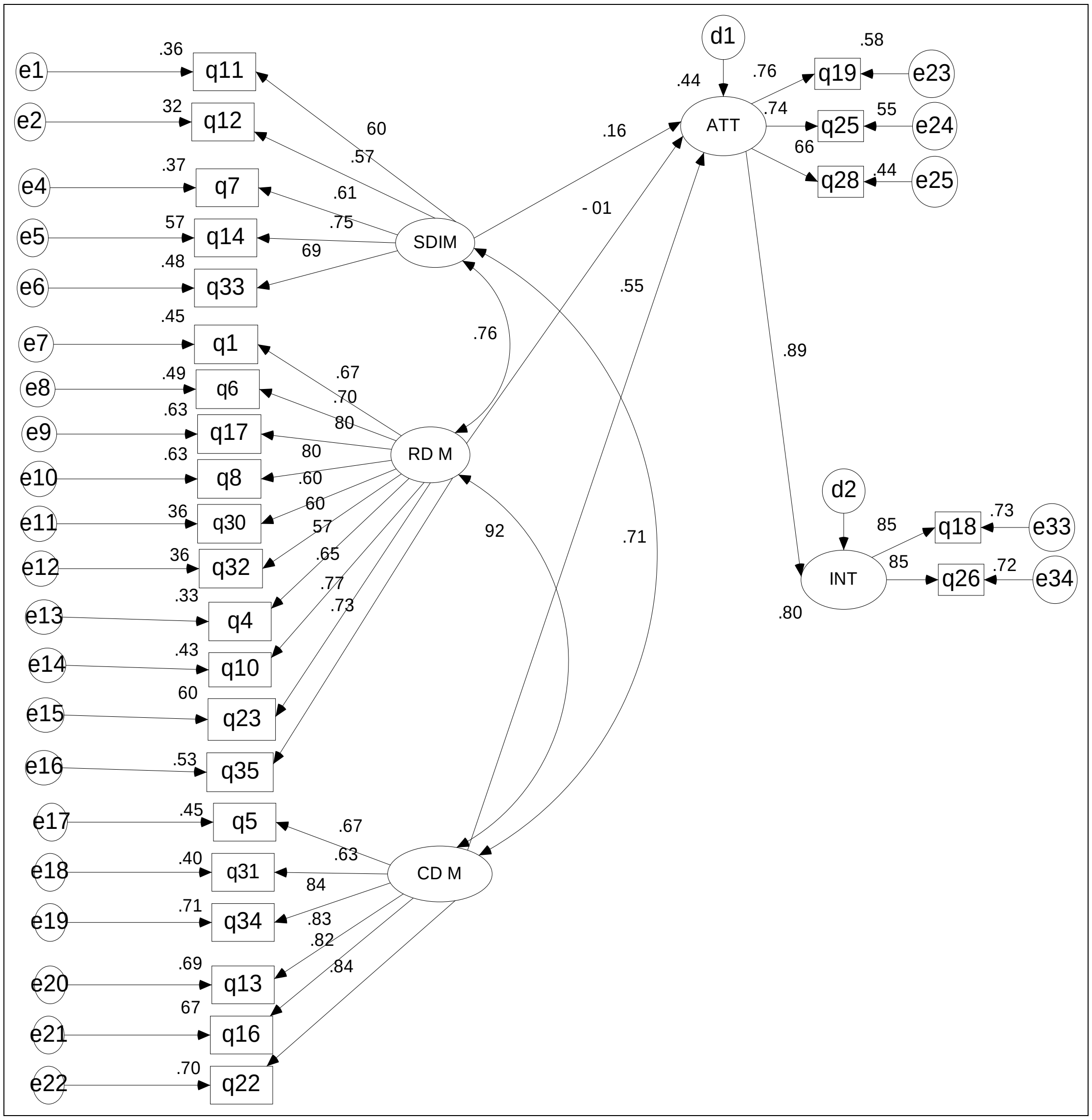
q18	.834	.680	.000	.000	.000	.725	1.000																								
q28	.503	.616	.209	.211	.190	.437	.419	1.000																							
q25	.569	.698	.237	.239	.215	.494	.474	.430	1.000																						
q19	.587	.720	.245	.247	.222	.510	.490	.444	.503	1.000																					
q1	.000	.229	.674	.622	.516	.000	.000	.141	.160	.165	1.000																				
q6r	.000	.239	.704	.649	.539	.000	.000	.147	.167	.172	.474	1.000																			
q17	.000	.270	.796	.734	.609	.000	.000	.167	.189	.195	.536	.560	1.000																		
q8	.000	.270	.796	.734	.609	.000	.000	.167	.189	.195	.536	.560	.633	1.000																	
q30rec	.000	.203	.597	.551	.457	.000	.000	.125	.142	.146	.402	.420	.475	.475	1.000																

q32	.000	.203	.597	.550	.457	.000	.000	.125	.141	.146	.402	.420	.475	.475	.356	1.000															
q4	.000	.195	.573	.528	.438	.000	.000	.120	.136	.140	.386	.403	.456	.456	.342	.342	1.000														
q10	.000	.222	.654	.603	.501	.000	.000	.137	.155	.160	.441	.460	.521	.521	.391	.390	.375	1.000													
q23	.000	.263	.774	.713	.592	.000	.000	.162	.183	.189	.521	.544	.615	.615	.462	.462	.443	.506	1.000												
q35	.000	.247	.727	.670	.556	.000	.000	.152	.172	.178	.490	.511	.578	.578	.434	.434	.416	.475	.562	1.000											
q13	.000	.286	.770	.835	.592	.000	.000	.176	.199	.206	.519	.542	.612	.613	.460	.459	.441	.504	.596	.559	1.000										
q16	.000	.281	.758	.821	.583	.000	.000	.173	.196	.203	.511	.533	.603	.603	.452	.452	.434	.496	.586	.551	.686	1.000									
q22	.000	.286	.770	.835	.592	.000	.000	.176	.199	.206	.519	.542	.613	.613	.460	.460	.441	.504	.596	.560	.697	.686	1.000								
q5	.000	.228	.614	.666	.472	.000	.000	.140	.159	.164	.414	.432	.488	.489	.367	.366	.352	.402	.475	.446	.556	.547	.556	1.000							
q3	.00	.21	.58	.63	.45	.00	.00	.13	.15	.15	.39	.41	.46	.46	.35	.35	.33	.38	.45	.42	.53	.52	.53	.42	1.0						

1	0	8	6	6	1	0	0	4	2	7	5	3	6	7	0	0	6	4	4	6	1	2	1	3	00						
q34	.000	.288	.776	.841	.597	.000	.000	.177	.201	.207	.523	.546	.617	.617	.463	.463	.444	.508	.600	.564	.702	.691	.702	.560	.535	1.000					
q7	.000	.187	.464	.430	.607	.000	.000	.115	.131	.135	.313	.327	.369	.370	.277	.277	.266	.304	.359	.338	.359	.354	.359	.287	.274	.362	1.000				
q14	.000	.232	.574	.532	.750	.000	.000	.143	.162	.167	.387	.404	.457	.457	.343	.343	.329	.376	.444	.417	.444	.437	.444	.354	.338	.448	.455	1.000			
q33	.000	.213	.529	.490	.691	.000	.000	.132	.149	.154	.357	.372	.421	.421	.316	.316	.303	.346	.409	.385	.409	.403	.409	.327	.312	.412	.419	.519	1.000		
q11	.000	.185	.460	.426	.601	.000	.000	.114	.129	.134	.310	.323	.366	.366	.275	.274	.263	.301	.356	.334	.356	.350	.356	.284	.271	.358	.364	.451	.415	1.000	
q12	.000	.177	.440	.407	.574	.000	.000	.109	.124	.128	.296	.309	.350	.350	.262	.262	.252	.288	.340	.319	.340	.335	.340	.271	.259	.343	.348	.431	.397	.345	1.000

Given the above results from the confirmatory factor analysis, the measurement model may be used as part of the SEM model.

Results of the Analysis of the Structural Model



Below are indices and estimated values in tables as per AMOS, Version 16.

Structural Model Fit Indices

Table D9.15 - CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	59	1024.312	292	.000	3.508
Saturated model	351	.000	0		
Independence model	26	8461.409	325	.000	26.035

CMIN/DF should be between 2 and 3 for an acceptable fit and <2 for a good fit.

Table D9.16 - CFI

Model	NFI	RFI	IFI	TLI	CFI
Default model	.879	.865	.910	.900	.910
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

CFI should be>.9 for an acceptable fit and >.95 for a good fit.

Table D9.17 - RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.067	.063	.072	.000
Independence model	.213	.209	.217	.000

RMSEA should be <.10 for a good fit and <.05 for a very good fit.

The fit indices for the model are:

The ratio of χ^2 (1024.3) to the degrees of freedom (292) was 3.508. Since this value is >3, it indicates that the data does not fit the model globally.

However, this statistic does suffer from limitations and a non-significant value may be unlikely even though the model may be a close fit to the data (Weston and Gore 2006: 742).

The comparative fit index (CFI) was 0.910 and the root mean square residual of approximation (RMSEA) was 0.067 (.063; .072. p = .005).

These fit indices indicate that there is an acceptable fit.

Table D9.18 - Regression Weights

			Estimate	S.E.	C.R.	P	Label
ATT	<---	SDIM	.173	.082	2.112	.035	par_13
ATT	<---	CDIM	.453	.120	3.770	***	par_14
ATT	<---	RDIM	-.018	.203	-.091	.928	par_25
INT	<---	ATT	.969	.057	16.877	***	par_15
q33	<---	SDIM	1.000				
q14	<---	SDIM	1.163	.078	14.872	***	par_1
q7	<---	SDIM	1.029	.082	12.478	***	par_2
q34	<---	CDIM	1.000				
q31_recoded	<---	CDIM	.898	.055	16.425	***	par_3
q5	<---	CDIM	.974	.056	17.545	***	par_4
q32	<---	RDIM	1.000				
q30_recoded	<---	RDIM	1.232	.103	11.924	***	par_5
q8	<---	RDIM	1.535	.105	14.652	***	par_6
q17	<---	RDIM	1.606	.110	14.663	***	par_7
q6_recoded	<---	RDIM	1.543	.115	13.475	***	par_8
q1	<---	RDIM	1.358	.104	13.060	***	par_9
q19	<---	ATT	1.000				
q25	<---	ATT	.877	.053	16.703	***	par_10
q28	<---	ATT	.703	.047	14.873	***	par_11
q18	<---	INT	1.000				
q26	<---	INT	.931	.043	21.608	***	par_12
q12	<---	SDIM	1.003	.086	11.733	***	par_16
q11	<---	SDIM	.974	.079	12.333	***	par_17
q4	<---	RDIM	.952	.082	11.561	***	par_18
q10	<---	RDIM	1.310	.103	12.773	***	par_19
q23	<---	RDIM	1.493	.104	14.383	***	par_20
q35	<---	RDIM	1.263	.092	13.798	***	par_21
q13	<---	CDIM	1.100	.045	24.197	***	par_22
q16	<---	CDIM	1.066	.045	23.660	***	par_23
q22	<---	CDIM	1.004	.041	24.464	***	par_24

Table D9.19 - Standardized Regression Weights

			Estimate
ATT	<---	SDIM	.165
ATT	<---	CDIM	.551
ATT	<---	RDIM	-.015
INT	<---	ATT	.894
q33	<---	SDIM	.691
q12	<---	SDIM	.569
q11	<---	SDIM	.601
q14	<---	SDIM	.752
q7	<---	SDIM	.609
q34	<---	CDIM	.841
q31_recoded	<---	CDIM	.635
q5	<---	CDIM	.668
q13	<---	CDIM	.832
q16	<---	CDIM	.821
q22	<---	CDIM	.838
q17	<---	RDIM	.796
q6_recoded	<---	RDIM	.703
q1	<---	RDIM	.673
q4	<---	RDIM	.573
q10	<---	RDIM	.653
q23	<---	RDIM	.773
q35	<---	RDIM	.728
q19	<---	ATT	.762

q25	<---	ATT	.741
q28	<---	ATT	.662
q18	<---	INT	.853
q26	<---	INT	.849

Table D9.20 - Estimated Standardized Factor Loadings and Reliability for the Revised Measurement Model

The estimated standardized factor loadings and the reliability of each measured variable is summarized in the table below:

Factor/Variable		Standardized Loading	Reliability
SDIM	q33	.691*	.48
SDIM	q12	.569*	.32
SDIM	q11	.601*	.36
SDIM	q14	.752*	.57
SDIM	q7	.609*	.37
CDIM	q34	.841*	.71
CDIM	q31_recoded	.635*	.40
CDIM	q5	.668*	.45
CDIM	q13	.832*	.69
CDIM	q16	.821*	.67
CDIM	q22	.838*	.70
RDIM	q17	.796*	.63
RDIM	q6_recoded	.703*	.49
RDIM	q1	.673*	.45
RDIM	q4	.573*	.33
RDIM	q10	.653*	.43
RDIM	q23	.773*	.60
RDIM	q35	.728*	.53
ATT	q19	.762*	.58
ATT	q25	.741*	.55

ATT	q28	.662*	.44
INT	q18	.853*	.73
INT	q26	.849*	.72

* Statistically significant at α =0. 01

The estimated standardised regression weights reflect the validity of each observed variable as a measure of the latent variable. Ideally, these should be at least 0.5. The figures listed above are all good. These loadings are all significantly different from zero at the 0.001 level.

The estimated correlations between latent variables are all positive.

Reliability is calculated as estimate. The reliability of each observed variable, as a measure of the latent variable, ranged from .32 to .73.

Table D9.21 - Variances

	Estimate	S.E.	C.R.	P	Label
SDIM	.407	.048	8.545	***	par_29
CDIM	.664	.055	12.045	***	par_30
RDIM	.289	.038	7.525	***	par_31
d1	.251	.028	9.042	***	par_32
d2	.106	.021	5.161	***	par_33
e2	.855	.057	15.046	***	par_34
e1	.682	.046	14.752	***	par_35
e6	.445	.033	13.575	***	par_36
e5	.423	.035	12.256	***	par_37
e4	.730	.050	14.672	***	par_38
e19	.275	.020	13.810	***	par_39
e18	.792	.050	15.852	***	par_40
e17	.783	.050	15.703	***	par_41
e22	.284	.020	13.876	***	par_42
e21	.365	.026	14.225	***	par_43
e20	.356	.025	13.999	***	par_44
e16	.410	.027	15.335	***	par_45
e15	.433	.029	14.912	***	par_46
e14	.666	.042	15.775	***	par_47
e13	.535	.033	16.069	***	par_48
e12	.523	.033	15.996	***	par_49
e11	.795	.050	15.997	***	par_50
e10	.395	.027	14.637	***	par_51
e9	.430	.029	14.624	***	par_52
e8	.703	.045	15.504	***	par_53
e7	.643	.041	15.677	***	par_54
e23	.325	.026	12.717	***	par_55
e24	.284	.021	13.197	***	par_56
e25	.284	.020	14.462	***	par_57
e33	.197	.021	9.544	***	par_58
e34	.177	.018	9.763	***	par_59

Table D9.22 - Covariances

			Estimate	S.E.	C.R.	P	Label
CDIM	<-->	RDIM	.404	.037	10.958	***	par_26
SDIM	<-->	RDIM	.262	.028	9.372	***	par_27
SDIM	<-->	CDIM	.368	.036	10.319	***	par_28

Table D9.23 - Correlations

			Estimate
CDIM	<-->	RDIM	.922
SDIM	<-->	RDIM	.765
SDIM	<-->	CDIM	.708

Table D9.24 - Squared Multiple Correlations

	Estimate
ATT	.441
INT	.799
q26	.721
q18	.728
q28	.438
q25	.549
q19	.580
q1	.453
q6_recoded	.495
q17	.634
q8	.633
q30_recoded	.356
q32	.356
q4	.329
q10	.427
q23	.598
q35	.529
q13	.693
q16	.674
q22	.702
q5	.446
q31_recoded	.403
q34	.707
q7	.371
q14	.566
q33	.478
q11	.362
q12	.324

Table D9.25 - Standardized Total Effects

	RDIM	CDIM	SDIM	ATT	INT
ATT	-.015	.551	.165	.000	.000
INT	-.013	.493	.147	.894	.000
q26	-.011	.419	.125	.759	.849
q18	-.011	.420	.126	.763	.853
q28	-.010	.365	.109	.662	.000
q25	-.011	.409	.122	.741	.000
q19	-.011	.420	.125	.762	.000
q1	.673	.000	.000	.000	.000

q6 recoded	.703	.000	.000	.000	.000
q17	.796	.000	.000	.000	.000
q8	.795	.000	.000	.000	.000
q30 recoded	.596	.000	.000	.000	.000
q32	.597	.000	.000	.000	.000
q4	.573	.000	.000	.000	.000
q10	.653	.000	.000	.000	.000
q23	.773	.000	.000	.000	.000
q35	.728	.000	.000	.000	.000
q13	.000	.832	.000	.000	.000
q16	.000	.821	.000	.000	.000
q22	.000	.838	.000	.000	.000
q5	.000	.668	.000	.000	.000
q31 recoded	.000	.635	.000	.000	.000
q34	.000	.841	.000	.000	.000
q7	.000	.000	.609	.000	.000
q14	.000	.000	.752	.000	.000
q33	.000	.000	.691	.000	.000
q11	.000	.000	.601	.000	.000
q12	.000	.000	.569	.000	.000

Table D9.26 - Standardized Direct Effects

	RDIM	CDIM	SDIM	ATT	INT
ATT	-.015	.551	.165	.000	.000
INT	.000	.000	.000	.894	.000
q26	.000	.000	.000	.000	.849
q18	.000	.000	.000	.000	.853
q28	.000	.000	.000	.662	.000
q25	.000	.000	.000	.741	.000
q19	.000	.000	.000	.762	.000
q1	.673	.000	.000	.000	.000
q6_recoded	.703	.000	.000	.000	.000
q17	.796	.000	.000	.000	.000
q8	.795	.000	.000	.000	.000
q30_recoded	.596	.000	.000	.000	.000
q32	.597	.000	.000	.000	.000
q4	.573	.000	.000	.000	.000
q10	.653	.000	.000	.000	.000
q23	.773	.000	.000	.000	.000
q35	.728	.000	.000	.000	.000
q13	.000	.832	.000	.000	.000
q16	.000	.821	.000	.000	.000
q22	.000	.838	.000	.000	.000
q5	.000	.668	.000	.000	.000
q31_recoded	.000	.635	.000	.000	.000
q34	.000	.841	.000	.000	.000
q7	.000	.000	.609	.000	.000
q14	.000	.000	.752	.000	.000
q33	.000	.000	.691	.000	.000
q11	.000	.000	.601	.000	.000
q12	.000	.000	.569	.000	.000

Table D9.27 - Standardized Indirect Effects

	RDIM	CDIM	SDIM	ATT	INT
ATT	.000	.000	.000	.000	.000
INT	-.013	.493	.147	.000	.000
q26	-.011	.419	.125	.759	.000

q18	-.011	.420	.126	.763	.000
q28	-.010	.365	.109	.000	.000
q25	-.011	.409	.122	.000	.000
q19	-.011	.420	.125	.000	.000
q1	.000	.000	.000	.000	.000
q6_recoded	.000	.000	.000	.000	.000
q17	.000	.000	.000	.000	.000
q8	.000	.000	.000	.000	.000
q30_recoded	.000	.000	.000	.000	.000
q32	.000	.000	.000	.000	.000
q4	.000	.000	.000	.000	.000
q10	.000	.000	.000	.000	.000
q23	.000	.000	.000	.000	.000
q35	.000	.000	.000	.000	.000
q13	.000	.000	.000	.000	.000
q16	.000	.000	.000	.000	.000
q22	.000	.000	.000	.000	.000
q5	.000	.000	.000	.000	.000
q31_recoded	.000	.000	.000	.000	.000
q34	.000	.000	.000	.000	.000
q7	.000	.000	.000	.000	.000
q14	.000	.000	.000	.000	.000
q33	.000	.000	.000	.000	.000
q11	.000	.000	.000	.000	.000
q12	.000	.000	.000	.000	.000

Table D9.28 - Standardized Residual Covariances

	q26	q18	q28	q25	q19	q1	q6rec	q17	q8	q30rec	q32	q4	q10	q23	q35	q13	q16	q22	q5	q31rec	q34	q7	q14	q33	q11	q12
q26	.000																									
q18	.000	.000																								
q28	.375	-1.031	.000																							
q2	1.1	-.2	1.8	.00																						

5	51	00	32	0																						
q19	-.923	.640	-.394	-1.004	.000																					
q1	-1.705	-.351	-1.393	-1.989	.959	.000																				
q6rec	-1.154	-.130	-2.316	-1.751	2.085	1.031	.000																			
q17	-.100	1.453	-1.718	-1.833	3.305	-.251	-.477	.000																		
q8	-1.341	.098	-1.593	-2.617	1.670	.904	1.440	-.323	.000																	
q30rec	-1.839	-.730	-1.632	-1.900	.399	.651	1.526	-.879	.460	.000																
q32	-.119	-.248	.187	-1.315	1.349	-.834	-.521	.011	-.872	2.583	.000															
q4	-.35	2.19	1.76	-.10	2.68	.012	-.75	-.50	.931	.088	.279	.000														

	0	3	2	9	6		5	8																		
q10	-1.451	-.681	-2.311	-1.174	1.616	1.874	.226	-.520	1.338	-.188	-.961	-.844	.000													
q23	-.283	-.057	-.151	-.649	2.136	.033	-.604	.477	-.724	-.305	.533	-.351	-.760	.000												
q35	1.121	1.148	1.234	.046	3.290	-.849	-.366	.194	-.544	-.532	.070	-.311	-1.220	.847	.000											
q13	-1.146	.059	-1.396	-2.251	1.611	.195	-.477	1.370	1.018	-.185	.670	1.311	1.176	.027	.424	.000										
q16	-.935	.047	-1.759	-1.190	1.565	-.213	-.746	.506	-.834	-1.600	-.739	-.990	-.584	-.371	-.594	-.370	.000									
q22	.844	.561	-.421	.021	1.794	-1.449	-.464	-.928	-.521	-.846	-.666	-.990	-.973	-.233	.585	-.638	1.450	.000								
q5	.329	1.222	-1.649	-.139	2.527	1.139	1.181	1.263	1.244	-.175	-.983	-.357	1.202	.725	-.090	-.036	.143	-.587	.000							
q31rec	-1.156	.792	-2.064	-1.607	1.131	1.499	1.705	.614	.929	5.831	.648	1.361	1.616	.693	.433	.233	-.633	-1.286	.229	.000						

q34	-.287	-.107	-.609	-.401	1.264	-1.148	-.901	-.151	-1.091	.163	1.471	-1.049	-.713	-.074	1.247	-.012	.038	.859	-.961	-.363	.000					
q7	-.252	-.499	-1.727	-2.318	.667	-1.729	-1.022	-1.313	-1.043	-2.092	-.611	1.513	-.527	-.494	-.928	-.430	-2.080	-1.965	-.809	-1.657	-1.257	.000				
q14	-.620	.386	-.706	-1.455	2.349	-1.442	-.759	-.103	-1.527	-1.523	-.056	1.685	-.543	-.287	-1.121	.299	-.321	-1.184	.035	-1.345	-.097	1.603	.000			
q33	.293	.648	1.100	-.141	2.283	-1.221	.188	1.162	-1.156	-1.067	2.453	2.114	.537	2.050	3.082	1.157	1.248	1.295	-.220	.706	2.699	.813	-.664	.000		
q11	-.472	.257	-.808	-.729	.933	-1.107	-.530	.202	-.410	-1.181	-1.171	1.253	1.908	-.437	-1.206	.319	-.487	-1.280	.929	-.712	-.582	-.594	1.133	-1.225	.000	
q12	-1.781	-1.357	-.926	-1.721	1.962	.760	.407	2.694	1.347	-.757	-.133	1.955	3.028	2.562	1.284	2.680	-.092	-.520	1.728	.231	.201	-1.351	-.688	-.660	1.044	.000

Table D9.20 - Correlations

	RDIM	CDIM	SDIM	ATT	INT	q26	q18	q28	q25	q19	q1	q6rec	q17	q8	q30rec	q32	q4	q10	q23	q35	q13	q16	q22	q5	q31rec	q34	q7	q14	q33	q11	q12
RDIM	1.000																														
CDIM	.922	1.000																													
SDIM	.765	.708	1.000																												
ATT	.619	.654	.544	1.000																											
INT	.554	.585	.486	.894	1.000																										
q26	.470	.497	.413	.759	.849	1.000																									
q18	.472	.499	.415	.763	.853	.725	1.000																								
q28	.410	.433	.360	.662	.592	.502	.505	1.00																							

								0																							
q25	.459	.485	.403	.741	.662	.562	.565	.490	1.000																						
q19	.472	.498	.414	.762	.681	.578	.581	.504	.564	1.000																					
q1	.673	.621	.515	.417	.373	.317	.318	.276	.309	.318	1.000																				
q6rec	.703	.648	.538	.436	.389	.331	.332	.288	.323	.332	.474	1.000																			
q17	.796	.734	.609	.493	.441	.374	.376	.326	.365	.376	.536	.560	1.000																		
q8	.795	.733	.608	.493	.440	.374	.376	.326	.365	.375	.536	.560	.633	1.000																	
q30_rec	.596	.550	.456	.369	.330	.280	.282	.244	.274	.281	.402	.419	.475	.474	1.000																
q32	.597	.550	.456	.369	.330	.280	.282	.245	.274	.281	.402	.420	.475	.475	.356	1.000															
q4	.573	.528	.438	.355	.317	.269	.271	.235	.263	.270	.386	.403	.456	.456	.342	.342	1.00														

																	0														
q10	.653	.602	.499	.405	.362	.307	.309	.268	.300	.308	.440	.459	.520	.520	.390	.390	.374	1.000													
q23	.773	.713	.591	.479	.428	.364	.365	.317	.355	.365	.521	.544	.616	.615	.461	.461	.443	.505	1.000												
q35	.728	.671	.556	.451	.403	.342	.344	.298	.334	.343	.490	.512	.579	.579	.434	.434	.417	.475	.563	1.000											
q13	.767	.832	.589	.545	.487	.413	.415	.360	.403	.415	.517	.540	.611	.610	.458	.458	.440	.501	.593	.558	1.000										
q16	.757	.821	.581	.537	.480	.408	.410	.355	.398	.409	.510	.532	.603	.602	.451	.451	.434	.494	.585	.551	.683	1.000									
q22	.773	.838	.593	.548	.490	.416	.418	.363	.406	.418	.520	.543	.615	.615	.461	.461	.443	.505	.598	.562	.698	.688	1.000								
q5	.616	.668	.473	.437	.390	.332	.333	.289	.324	.333	.414	.433	.490	.490	.367	.367	.353	.402	.476	.448	.556	.548	.559	1.000							
q31rec	.585	.635	.450	.415	.371	.315	.317	.275	.308	.316	.394	.412	.466	.466	.349	.349	.336	.382	.453	.426	.528	.521	.532	.424	1.000						
q34	.775	.841	.595	.550	.492	.418	.420	.364	.408	.419	.522	.545	.617	.617	.462	.463	.444	.506	.600	.564	.700	.690	.705	.561	.534	1.000					

q7	.466	.432	.609	.331	.296	.251	.253	.219	.245	.252	.314	.328	.371	.371	.278	.278	.267	.304	.360	.339	.359	.354	.362	.288	.274	.363	1.000				
q14	.575	.533	.752	.409	.365	.310	.312	.271	.303	.311	.387	.404	.458	.457	.343	.343	.330	.376	.445	.418	.443	.437	.446	.356	.338	.448	.458	1.000			
q33	.528	.489	.691	.376	.336	.285	.287	.249	.278	.286	.356	.372	.421	.420	.315	.315	.303	.345	.409	.384	.407	.402	.410	.327	.311	.411	.421	.520	1.000		
q11	.460	.426	.601	.327	.292	.248	.249	.216	.242	.249	.310	.323	.366	.366	.274	.274	.264	.300	.356	.335	.355	.350	.357	.284	.270	.358	.367	.452	.416	1.000	
q12	.435	.403	.569	.309	.277	.235	.236	.205	.229	.236	.293	.306	.347	.346	.260	.260	.249	.284	.337	.317	.335	.331	.338	.269	.256	.339	.347	.428	.393	.342	1.000