



University of Hull Business School

**The relationship between knowledge sharing socialisation mechanisms
structural capital and organisational performance**

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capital and organisational performance**

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Abstract

Globalisation, increasing competition, turbulent economic environments, and technological changes have shifted the significance of traditional assets as primary resources in sustaining competitive advantage for organisations. Whilst traditional assets remain valuable, knowledge sharing has become increasingly recognised as another critically important factor. Arguably, the use of knowledge sharing mechanisms (personal socialisation and electronic socialisation) and structural capital dimensions such as network ties, network configuration, network stability, and centrality will impact organisational performance. Thus hypothetically, knowledge sharing mechanisms are likely to affect organisational performance through the mediating role of structural capital dimensions. However, the existing literature has largely overlooked the association between knowledge sharing mechanisms, structural capital and organisational performance. Subsequently, the holistic integration of the above constructs remains under-explored. As a result, this study examines the direct and indirect effects between knowledge sharing mechanisms and structural capital on organisational performance. In addition, it validates a conceptual framework and tests a range of research hypotheses. Using a hypothetic-deductive approach, a research instrument was developed based on the existing literature. The piloted research instrument was administered to a census of the UK Top 500 companies listed in the FAME database. A useable response from 167 chief executives, chief operating officers and top managers surveyed resulted in a 33.4% response rate. Multivariate analysis results indicate the internal reliability (total Cronbach Alpha values) of retained factors ranging from .72 to .90. Structural equation modelling (SEM) show adequate goodness of fit indices: CMIN/DF=1.11, NFI=.97, GFI=.91, CFI=.98, TLI=.99, and RMSEA=.03. Results demonstrate that structural capital mediates the relationship between knowledge sharing mechanisms and organisational performance: the hypotheses were confirmed. Moreover, electronic socialisation was shown to have a positive significant effect on operations performance. This study successfully validated the conceptual framework derived from a range of relevant theories. The study provides unique insights into how knowledge sharing mechanisms interacted with structural capital which leads to organisational performance: In integrating the aforementioned research constructs this study fills theoretical gaps by broadening the conceptualisation of the structural capital dimensionality and organisational performance facets. As a result, this study advances our understanding of organisational performance determinants. Accordingly, it provides managerial implications based on the results obtained. Limitations of the methodological approach and avenues for further studies are discussed.

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Dedication

Dedicated to: God Almighty (For his love and care and mercy)

My husband and son (for your Love encouragement and support), the support, encouragement love and care received are incomparable. God will bless you and keep you.

To the memory of my Mother Father and Brother (who always believed in my ability to succeed in my academic endeavours – Your belief in me helped to make this journey possible. You're gone but you will never be forgotten -rest in perfect peace. Thank you.

To the memory of my Mother and father inlaws (you're gone but you'll never be forgotten - rest in perfect peace. Thank you)

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Chapter One: Overview-introduction to the study

Chapter one provides a general overview of the study, discusses the theories underpinning knowledge sharing mechanisms constructs. Chapter one is further divided into five sections. The first section introduces the study to the reader, followed by the the purpose and significance of the study in section two. Section three explains the research problem. The fourth section outlines the research aim and objectives. The chapter concludes with a brief summary of the whole chapter.

1.1. Introduction

Knowledge has emerged as the most important resource not just for individuals and organisations but for economies within which organisations function (Porter, 1990; Drucker, 1993, Grant, 1996; Osterloh and Frey, 2000; Kearns and Lederer, 2003; Ding and Huang, 2010; Alexander, Neyer and Huizingh, 2016). Hence, organisations can no longer largely depend on traditional assets (i.e. land, labour, capital) to sustain competitive advantage in the current hypercompetitive and fast-changing business world (Drucker, 1993; Meyer and Sugiyama, 2007; Zhou and Wu, 2010; Antonelli, and Fassio, 2016). Moreover, organisations operate in business environments that are characterise by turbulence, global competition, knowledgeable and demanding consumers; unparallel changes in technology and the globalized access to finance, labour, land and information (Drucker, 1993; Bettis and Hitt; 1995; Grant, 2003; Hoisl, Gruber and Conti, 2017). Accordingly the use of knowledge sharing mechanisms to share knowledge and ideas and experiences to be used and reused within organisations has become fundamental to sustaining the competitive advantage of organisations (Porter, 1990; Porter, and Van der Linde, 1995; Dess and Shaw, 2001; Cabrera, and Cabrera, 2005; Dean, and Kretschmer,

2007; Boudreau, and Lakhani, 2009; Lew, and Sinkovics, 2013; Ritala, Olander, Michailova, and Husted, 2015).

Underpinning the notion of sustainable competitive advantage is the ability of organisations to facilitate innovation in products and services (Porter, 1990; Porter, and Van der Linde, 1995; Barney, 2002; Du Plessis, 2007; Chen, and Huang, 2009; Wang, and Wang, 2012; Camisón, and Villar-López, 2014; Wang, Sharma, and Cao, 2016). Consequently, using knowledge sharing mechanisms to share knowledge within the organisation will enhance the generation and combination of new ideas and improve the quality of goods and services (Tsai and Ghoshal, 1998; Miller, Fern, and Cardinal, 2007; Wang and Wang, 2012; Wang, Rodan, Fruin, Xu, 2014; Luo, and Bu, 2016). In challenging economic times it is important for organisations to support and develop the sharing of ideas, experiences and skills (knowledge) of those who work in the organisation by facilitating the use of knowledge sharing mechanisms to connect experts within the organisation. Moreover facilitating connections to who knows what through knowledge sharing mechanisms will augment and sustain the competitiveness of the organisation (Abrams, Cross, Lesser and Levin, 2003; Allen 2006; Bauer and Erdogan, 2014; Haas, Criscuolo and George, 2016).

Competitive advantage can be sustained by organisations acting on their non imitable knowledge in the heads of individuals within organisations (Barney 2002; Hansen, Mors, and Løvås, 2005; Chow and Chan, 2008; Huang, Davison, and Gu, 2011; Szulanski, Ringov, and Jensen, 2016). Organisations can act by promoting the effective use of knowledge sharing socialisation mechanisms to recombine and reconfigure knowledge for the production of goods and services (Grant, 1999; Zack, 1999; 2003; Dyer and Hatch, 2006; Easterby-Smith, and Prieto, 2008; Wang and Wang, 2012; Chen, and Fong, 2015;

Navimipour, and Charband, 2016). The views expressed in the preceding sentences are crucial as the emphasis on key determinants of competitive advantage is now firmly focused on the knowledge within organisations (Wright, McMahan and McWilliams, 1994; Grant, 1996; Subramanian and Venkatraman, 2001; Foss, Minbaeva, Pedersen, Reinholt, 2009; Reinholt, Pedersen and Foss, 2011; Llopis and Foss, 2015).

Furthermore, the resource based view and the subsequent knowledge based view of the firm on which this study is anchored, focus on the resources of the organisation and the specific knowledge of individuals within the organisation (Penrose, 1959; Wernerfelt, 1984; Barney, 1991; Grant; 1996; Galunic and Rodan, 1998; Collins and Smith, 2006; Wang, He and Mahoney, 2009; Campbell, Coff and Kryscynski, 2012; Qian, Lin, and Wu, 2014; Wang, Geng, and Yu, 2017). Indeed the above scholars advocate the view that resources that are rare, valuable, difficult to imitate and have no direct substitutes will enable organisations to have an advantage in sustaining their competitiveness over other organisations (Dyer and Singh, 1998; Bock, Zmud, Kim and Lee, 2005; Lin and Wu, 2014; Kauppila, 2015; Alexy, West, Klapper, and Reitzig, 2017).

Debatably the effective sharing of this firm specific knowledge using knowledge sharing mechanisms will impact organisational performance (Tsai, 2001; Kogut and Zander, 2003; Lecuona and Reitz, 2014; Antonelli, and Fassio, 2016). Nonetheless, sharing this valuable, unique, imperfectly mobile, imperfectly imitable and not easily substituted tacit knowledge across organisational boundaries remains problematic (Szulanski, 1996; Ambrosini and Bowman, 2001; Tsai, 2002; Hansen Mors and Lovas, 2005; Foss, Husted and Michailova, 2010; Tortorriello, Reagans and McEvily, 2012; Llopis and Foss, 2016). Hence this study presents knowledge sharing socialisation mechanisms to share knowledge that can be

recombined and reconfigured to innovate and sustain the competitive advantage of organisations (Abrams, Cross, Lesser, and Levin, 2003; Berends, van der Bij, Debackere, and Weggeman, 2006; Damanpour, Walker, and Avellaneda, 2009; Carnabuci and Operti, 2013; Hagedoorn, Lokshin, and Zobel, 2017).

Moreover, individuals interacting using knowledge sharing socialisation mechanisms to share knowledge will enable the recombination and reconfiguration of ideas skills and expertise needed in the production of valuable goods and services (Grant, 1996; Smith, Collins and Clark, 2005; Berry, 2014). The recombination and reconfiguration of these ideas, skills and experiences of individuals in various functional and departmental areas of the organisation often result in distinctive products and services (Gulanic and Rodan, 1998; Spencer, 2003; He and Wang, 2009; Wang and Wang, 2012; Dong, Bartol, Zhang, and Li, 2017). Innovation is essential in competitive environments, and facilitating the use of knowledge sharing mechanisms to share knowledge within the organisation will ensure an innovative knowledge base that will enable quick responses to opportunities in a fast changing business environment (Tsoukas 1996; Bartlett and Ghoshal, 2002; Hansen, 2002; He and Wang, 2009; Damanpour, Walker, and Avellaneda, 2009; Ihrig and MacMillian, 2015).

Consequently, scholars recognise knowledge sharing socialisation mechanisms as being crucial in enabling the recombination of expertise, skills and ideas, by managers and executives to enable the performance of organisations (Quigley, Tesluk, Locke, and Bartol, 2007; Hsu, 2008; Foss, Husted, and Michailova, 2010; Estrada, Faems, and de Faria, 2016). Furthermore, managers and executives in organisations should encourage the flexible use of knowledge sharing socialisation mechanisms to facilitate knowledge sharing and enable

quick responses to customer demands in a rapidly changing business environment (Barney, 1991; Prahalad and Hamel, 1990; Barney, 2001; Hancock and Ellsworth, 2013; Lefika and Mearns, 2014; Ihrig and MacMillian, 2015; Szulanski, Ringov and Jensen, 2016).

De Meyer (1991:50) notes that it is essential to have supporting knowledge sharing mechanisms as knowledge sharing involves *the communication of individuals which goes in two or more directions*. Knowledge being shared can be tacit or explicit depending on the needs of the individuals sharing the knowledge, using codification and personalisation mechanisms (Choi and Lee, 2002; Boh, 2007; Storey and Kahn, 2010; Pemsel, Müller, and Söderlund, 2016). Personal socialisation would increase shared understandings and encourage a shared organisational language which in turn will enable direct face to face contact with individuals and valuable tacit knowledge (Hansen, Nohria and Tierney, 1999; Earl, 2001; Oshri, Kotlarsky and Willcocks, 2007; Ahuja, Lampert, and Novelli, 2013; Ellis Bauer, Erdogan and Nifadkar, 2017). Additionally, socialising personally will facilitate the identification of those individuals willing to share their expertise, experiences and ideas, which could in turn help establish what Abrams, Cross, Lesser and Levin, (2003:65), call *benevolence and competence based trust*. Trust is explained as confidence and reassurance in questioning the knowledge provided and in the knowledge provider. Consequently it will lessen the syndrome of not invented here, enhance the absorbing capacity of individuals and increase opportunities for accessing codified knowledge (Cohen and Leventhal, 1990; Szulanski, 1996; Abrams, Cross, Lesser and Levin, 2003, Flanagin and Waldeck, 2004; Oshri Kotlarsky and Willcocks, 2007; Myers and Sadaghiani, 2010; Berry, 2011; Huang, Davison and Gu, 2011; Allen and Shanock, 2013; Powell and Ambrosini, 2017).

On the other hand the codification strategy introduced by Hansen, Nohria and Tierney (1999), entails seeking explicit knowledge in databases with no direct face to face contact with contributors (Lee, 1999; Haas, and Hansen, 2007; Kotlarsky, Scarbrough and Oshiri, 2014; Powell and Ambrosini, 2017). The codification strategy allows for knowledge to be made explicit in language, symbols and numbers that are understood by individuals within the organisation (Hansen, Nohria and Tierney, 1999; Lee, 2001; Newell, Bresnen, Edelman, Scarbrough, and Swan, 2006; Boh, 2007; Wang and Wang, 2012; Ou, Davison and Wong, 2016). Moreover unlike the personalization strategy, codification allows for the storage of this knowledge in databases within the organisation to scale up knowledge sharing (Hansen, Nohria and Tierney, 1999; Dyer and Nobeoka, 2000; Chow and Chan, 2008; Cohen and Olsen, 2015). Furthermore, codification enables the sharing of explicit knowledge, as it involves a procedure that renders personal tacit knowledge explicit (Hansen et al 1999, Schulz, 2001; Choi, Poon, and Davis, 2008; Loebbecke, Fenema and Powell, 2016).

Although, codification as a knowledge sharing mechanism is valuable, the success of a codified knowledge database is dependent on the individuals' willingness to access and contribute to it (Morris, 2001; Haesli, and Boxall, 2005; Easterby-Smith, Lyles, and Tsang, 2008 Liu, Ray, and Whinston, 2010; Cohen and Olsen, 2015; Pemsel, Muller and Soderlund, 2016). Furthermore, codification is not applicable to all knowledge types as exemplified by the consultants, who need their tacit knowledge *to carry out the interpretation in the process of carrying out their jobs* Morris (2001:835). However, Hansen, Nohria and Tierney, 1999's introduction of the two knowledge sharing mechanisms (personalisation and codification) follows the pattern of the categorisation of knowledge into tacit and explicit knowledge types in the literature and seems to be in

opposition of each other (Newell, Bresnen, Edelman, Scarbrough, and Swan 2006; Kasper, Lehrer, Mühlbacher, and Müller, 2013; Loebbecke, and Myers, 2017).

Conversely, Hansen et al (1999)'s personalisation mechanism recognize the role of socialisation as a mechanism to share knowledge. Similarly, Nonaka and Takeuchi's (1995:62)'s socialisation is presented for *the sharing of tacit knowledge between individuals*. However whilst Nonaka and Takeuchi (1995)'s socialisation was focused on face to face socialisation to share tacit knowledge, Hansen et al (1999)'s personalisation mechanism incorporated the socialisation and personal face to face concept, for the ensuing personalisation mechanism. Additionally, Hansen et al (1999) acknowledge using e-mails and video conferencing to socialise electronically and share knowledge. Thus building on the aforementioned scholars we present electronic socialisation mechanism for sharing knowledge. Electronic socialisation mechanism will not only enhance the sharing of knowledge but also connect expertise within the organisation (Ahuja, and Galvin, 2003; Flanagin, and Waldeck, 2004; Tseng, 2008; Wang and Wang, 2012; Islam, Jasimuddin, and Hasan, 2015; Dingler, and Enkel, 2016).

Moreover, electronic socialisation will enhance and scale up the number of individuals that can be reached to share valuable knowledge using the facets of structural capital. Consequently this study presents the facets of structural capital: *the overall pattern of connections; who you reach and how you reach them* (Nahapiet and Ghoshal, 1998:244). Additionally; Wang, Sharma, and Cao, (2016: 4651) define structural capital as *the valuable knowledge assets embedded within the organisation*. Thus structural capital is not just about the overall pattern of connections but also the knowledge embedded in those connections (Nahapiet and Ghoshal, 1998; Tsai, 2001; Wasko and Faraj, 2005; Wu, 2008;

Wang, Sharma, and Cao, 2016). the facets of structural capital; network ties, network centrality, network stability and network configuration reflect that individuals in the organisation can be in strong or weak network ties (Granovetter, 1973, 1983; Friedkin, 1982; Nelson, 1989; Pickering, and King, 1995; Hansen, 1999; Levin and Cross, 2004; Antcliff, Saundry, and Stuart, 2007; Baer, 2010; Michelfelder, and Kratzer, 2013; Wang, Fang, Qureshi, and Janssen, 2015; Wang, Sung, Chen, and Huang, 2017); occupy a central position (Friedkin, 1991; Ibarra, 1993; Marsden, 2002; Barsness, Diekmann, and Seidel, 2005; Pappas, and Wooldridge, 2007; Rossman, Esparza, and Bonacich, 2010; Vardaman, Amis, Dyson, Wright, and Van de Graaff Randolph, 2012; Erdogan, Bauer. and Walter, 2015; Paruchuri, and Awate, 2017); or have been in the organisation over a period of time (Tichy, Tushman, and Fombrun, 1979; Sherman, Smith, and Mansfield, 1986; Snow, Miles, and Coleman, 1992; Borgatti and Foster, 2003; Inkpen and Tsang, 2005; Dhanaraj, and Parkhe, 2006; Chow and Chan, 2008; Nambisan, and Sawhney, 2011; Chatterjee, Moody, Lowry, Chakraborty, and Hardin, 2015; Zhang, Duan, and Zhou, 2017).

However studies integrating knowledge sharing socialisation mechanisms and the facets of structural capital are sparse. Additionally, Hansen, Nohria and Tierney, (1999), concluded that organisations should either focus on one or the other of the knowledge sharing mechanisms (personalisation or codification). Nevertheless, Scheepers et al (2004), note that organisations have to alternate the use of knowledge sharing mechanism, making the choice of knowledge sharing mechanism dependent on the type of knowledge shared. In addition, Jasimuddin, Klein and Connell, (2005), recognize that knowledge sharing mechanisms are used in support of each other in sharing knowledge within the organisation. Furthermore, Bordia, Imer and Alousah, (2006) examine differences in sharing knowledge through personalisation of codification and found higher apprehension and lower

knowledge sharing using the codification mechanism. Moreover, Lakshman, and Parente, (2008) report a positive impact on product and financial performance when both knowledge sharing mechanisms were used to share knowledge. Moreover, Boh and Wong (2013:144) ascertain *that having a warm and cooperative climate has a positive influence on individuals' perceptions of all KSMs.*

In the same vein, Wiewiora, Murphy, Trigunaryah, and Brown (2014) found that trust played a major role in the choice of knowledge sharing mechanism used to share knowledge. Subsequently, Cohen and Olsen (2015) found support for the complimentary use of knowledge sharing socialisation mechanisms. In essence knowledge sharing is a dynamic process and knowledge sharing socialisation mechanisms should reflect this dynamism, as sustaining a 80/20 or 20/80 use of knowledge sharing mechanisms is complex and ineffective (Jasimuddin et al, 2005; Boh, 2007; Fiedler, and Welp, 2010; Denford and Chan, 2011; Boh and Wong, 2013; Venkitachalam, and Willmott, 2015). Berends, van der Bij, Debackere and Weggeman, (2006), identified four knowledge sharing mechanisms, diffusion, information, retrieval and pooling and collaborative problem solving. Similarly Boh (2007) in examining knowledge sharing mechanisms for project based organisations present personalization in opposition to codification and individualization in opposition to institutionalization as two divergent dimensions of knowledge-sharing mechanisms. Whilst the above studies are valuable in the conceptualization of the mechanisms for sharing knowledge, it illustrates the fragmented state of knowledge sharing mechanisms in the literature. Moreover the above studies fail to consider social capital and particularly structural capital and organisational performance.

Therefore this study introduces structural capital as a way of examining the facets of structural capital and organisational performance. The use of knowledge sharing socialisation mechanisms and facets of structural capital will enable individuals within the organisation to connect to other individuals. These connections will foster mutual reliance and trust of other individuals and provide access to the knowledge skills, experiences and expertise of those individuals (Bourdieu, 1986; Coleman, 1988, 1990; Oh Chung and Labianca, 2004; Walter, Lechner, and Kellermanns, 2007; Björk, and Magnusson, 2009; Tortoriello, Reagans, and McEvily, 2012; Dong, and Yang, 2015; Argote, and Fahrenkopf, 2016). Moreover, structural capital (network ties, centrality stability and configuration) is fundamental to organisational performance as it enables access to, and the combination and reconfiguration of valuable knowledge resources to create value for the organisation (Tsai and Ghoshal, 1998; Inkpen and Tsang, 2005; Krause, Handfield, and Tyler, 2007; Karahanna, and Preston, 2013; Fonti, and Maoret, 2016).

In addition, Nahapiet and Ghoshal (1998) recognise network ties as being the most important amongst the facets of structural capital. Also, in his exploratory work Granovetter, (1973), points out the importance of weak ties to individuals in seeking resources and in the integration of knowledge within the organisation. Additionally Granovetter (1973) notes that strong ties while valuable in providing information, might lead to rejection of knowledge from other areas of the organisation. Weak ties are also important because of their ability to be bridges to other network segments (Granovetter, 1983; Bian, 1997; Hansen, 1999; Yakubovich, 2005; Tortoriello, and Krackhardt, 2010; Michelfelder, and Kratzer, 2013; Aral, 2016). Moreover, Hansen, (2002), illustrates the ability of weak ties to be effective for sharing useful knowledge but not complex

knowledge. Reagans, and McEvily, (2003), concur with the latter and report that it is more effective to share tacit knowledge using strong ties and weak ties for explicit knowledge.

However, Jack (2005) ascertains the importance of strong ties in sharing knowledge and in enabling connections to weak ties. Indeed Tiwana, (2008), in her work determine that strong ties compliment weak ties and facilitate the sharing and integration of knowledge at a project level. Additionally, Michelfelder, and Kratzer, (2013) find the combination of weak and strong ties yield higher levels of innovation especially at the individual level. Filieri McNally, O'Dwyer, and O'Malley, (2014), also support the combination view and its ability to augment knowledge sharing and innovation. Moreover, Kowlaser, and Barnard, (2016) found tie strength and tie breath to be complematry in team innovation. Thus we adopt the complementary view of network ties and the opportunities they present for connecting individuals to other network configurations and especially centrally located individual within the organisation to share knowledge, ideas, skills and experiences.

Subsequently, Burt (1992) illustrates the benefits that can be accumulated in opportunities and access to resources by individuals in central positions. Tsai, (2001), examine the central position of units; and found that a central network position had a significant and positive impact on business performance. Similarly, Ahuja Galetta and Carley (2003), establish centrality to be a strong predictor of performance. Pappas, and Wooldridge, (2007) also demonstrate a relationship between a managers' network centrality and strategic renewal. Centrally located individuals were also found to provide high quality innovative ideas, than those not centrally located (Björk, and Magnusson, 2009). In the same vein high network centrality interacting with autonomous motivation and ability yielded high levels of knowledge sharing (Reinholt, Pedersen, and Foss, 2011). Arroyabe, Arranz and Arroyabe

(2015),’s findings show structural variables are good predictors of project performance. Degree centrality also positively impact new product development (Dong and Yang, 2016).

Additionally, stable networks create opportunities for knowledge sharing within organisations (Inkpen and Tsang, 2005). Moreover, (Dhanaraj and Parkhe, 2006), note that stable networks can have variation and flexibility of membership. Also Chow and chan, (2008), reveal that network stability may influence the willingness of individuals to share knowledge. On the other hand Turrini, Cristofoli, Frosini, and Nasi, (2010), reveal the importance of other structural factors in making networks stable. Dhanaraj and Parkhe, (2006); Berglund, and Sandström, (2013) point out that isolation, migration, attrition and the formation of cliques within the network would make a network unstable and negatively impact on the sharing of knowledge and ideas. In their study of knowledge diffusion scholars also recognise that stability can be persistence (improving what you already have and know) or resistance (stay clear of new knowledge or new knowledge sources Schulze, Paul MacDuffie, and Täube, (2015).

Inkpen and Tsang, (2005); and Caberera and Caberera, (2005), all consider different network configurations and their abilities to bring flexibility and easy of knowledge sharing. Network configuration is also the focus of scholars in their quest to know why and how individuals share knowledge and the important role it plays in the connectivity of individuals (Boschma, and Ter Wal, 2007, Rychen, and Zimmermann, 2008). In addition, Cheng, Farooq, and Johansen, (2011), recognise the strength and weaknesses of different structures and that a given network cannot do everything equally well. The above view is express by Yu, Hao, Dong, and Khalifa, (2013), who report the significance of moderate facets of structural capital that make up the network configuration to enable the sharing of

knowledge. Similarly Gieske, van Buuren, and Bekkers, (2016:10), note that new ideas are often the result of configuring strong and weak ties; *by combining what is already known and what is new, novelty is created*. Based on the above discussion, scholars have attempted to explore knowledge sharing socialisation mechanisms; facets of structural capital and organisational performance. However, scholars fail to integrate the aforementioned constructs. In addition, few studies present a holistic view of knowledge sharing socialisation mechanisms and the facets of structural capital and organisational performance. Thus, there is a call to integrate these three conceptual pillars into a single study. Consequently, the current study examines the relationship among knowledge sharing mechanisms, facets of structural capital and organisational performance.

1.2. Rationale for this study

Organisations operate in an environment where there is a *knowledge boom*, where smart products and services are becoming the norm (Davis and Botkin, 1994; Davenport, and Prusak, 1998; Powell and Snellman, 2004; Allmendinger, and Lombreglia, 2005; Chen, Yen, and Chen, 2009; Porter, and Heppelmann, 2015). Additionally, the life cycle of these products and services is becoming progressively shorter (Davenport and Prusak, 1998; Harter, Krishnan, and Slaughter, 2000; Fixson, 2005; Chesbrough, 2007; Lee, Olson, and Trimi, 2012; Chatterji, and Fabrizio, 2014; Palacios Fenech, and Tellis, 2016). Thus organisations now have to have the capabilities to respond quickly by producing valuable goods and services to sustain performance (Wiklund, and Shepherd, 2003; Teece, 2007; Bhatt, Emdad, Roberts, and Grover, 2010; Chen, 2012; Piening, and Salge, 2015; Forés, and Camisón, 2016).

In complex and fast changing business environments organisations need to be flexible and capable to produce innovative goods and services to sustain their competitive advantage (Peteraf, 1993; McGrath, Tsai, Venkataraman, and MacMillan, 1996; Roberts, and Amit, 2003; Ireland, and Webb, 2007; Weerawardena, and Mavondo, 2011; Lew, and Sinkovics, 2013; Herrera, 2015). In essence, organisations operating in dynamic environments need dynamic capabilities to survive in such environments (Dyer, and Nobeoka, 2000; Zahra, Neubaum, and Larrañeta, 2007; Easterby-Smith, Lyles, and Peteraf, 2009; Teece, 2014; Fidel, Schlesinger, and Cervera, 2015). Easterby-Smith, and Prieto, (2008), reveal the focus of dynamic capabilities to be the renewal of resources through configuration into new capabilities and competences.

Correspondingly knowledge sharing socialisation mechanisms enable the sharing of explicit and tacit knowledge to enable the combination of knowledge into new ideas and augment expertise (Kogut, and Zander, 1992; Van Den Bosch, Volberda, and De Boer, 1999; Postrel, 2002; Verona, Prandelli, and Sawhney, 2006; Carnabuci, and Operti, 2013; Ritala, Olander, Michailova, and Husted, 2015). Additionally dynamic capabilities depend on the sharing of knowledge to yield new ideas (Teece Pisano Shuen, 1997; Eisenhardt and Martin, 2000; Lee, 2001; Sher, and Lee, 2004; Easterby-Smith et al, 2008; Foss, Husted, and Michailova, 2010; Zhou, and Li, 2012; Villar, Alegre, and Pla-Barber, 2014; Donate, and de Pablo, 2015). Thus, organisations' competitive advantage will result from the capability to combine and reconfigure knowledge through the use of knowledge sharing socialisation mechanisms and facets of structural capital (Kogut and Zander, 1992; Leonard-Barton, 1992; Makadok, 2001; Cepeda, and Vera, 2007; Wang and Wang, 2012; Nieves, and Haller, 2014; Cohen, and Olsen, 2015).

Proponents of the knowledge based view of the firm argue that the most valuable input in the production of goods and services is knowledge (Grant, and Baden-Fuller, 1995; Grant, 1996; 1997; Galunic and Rodan, 1998; Collins and Smith, 2006; Wang, He and Mahoney, 2009; Campbell, Coff and Kryscynski, 2012; Qian, Lin, and Wu, 2014; Wang, Geng, and Yu, 2017). More importantly the sharing of knowledge will help sustain the competitiveness of organisations as it can enable the potential of creating new ideas through recombination and reconfiguration, as knowledge also increases in value when shared (Nonaka, 1994; Davenport and Prusak, 1998; Sveiby, 2001; Chiu, Hsu, and Wang, 2006; Wang and Noe, 2010; Wang, Noe and Wang, 2014; Ritala et al, 2015). Indeed scholars reveal the comprehensive absorption of knowledge into products and services across industries, resulting from research and development from within organisations (Drucker, 1993; Miles, and Snow, 2007; Chen, and Huang, 2009; Zott, and Amit, 2010; Colombo-Mendoza, Valencia-García, Rodríguez-González, Alor-Hernández, and Samper-Zapater, 2015). Moreover, scholars note, the advent of smart connected products and their role in changing the way organisations compete. Additionally these scholars also acknowledge that countries with individuals who have the core required skills and information technology will benefit from this change (Davis and Botkin, 1994; Berthon, Hulbert, and Pitt, 1999; Prahalad, and Ramaswamy, 2003; Allmendinger, and Lombreglia, 2005; Bughin, Chui, and Manyika, 2010; Yoo, Boland Jr, Lyytinen, and Majchrzak, 2012; Porter and Heppelmann 2014).

However, these core skills and expertise are often dispersed within organisations, indeed Tsoukas, (1996:13) describe firms as a *distributed knowledge systems*. He went on to explain that knowledge within organisations is dispersed in bits within the heads of individuals and contradictory (Tsoukas, 1996; Lam, 2000; Newell, Tansley, and Huang,

2004; Nonaka, Von Krogh and Voelpel, 2006; Maurer, Bartsch, and Ebers, 2011; Haas, Criscuolo, and George, 2015). In addition, scholars note that individuals tacitly improvise as they carry out their task; expressing this tacit knowledge is often difficult, and that these jobs are inherently social (Brown and Duguid, 2000; Leybourne, and Sadler-Smith, 2006; Kennedy, and Leybourne, 2012; Haldin-Herragard, 2016). Orlikowski (2002) explains the act of knowing as a continuously socially interactive practice that can yield new ideas, skills and expertise. Thus, knowledge sharing socialisation mechanisms are essential in facilitating the sharing of knowledge and getting dispersed bits of knowledge to converge for combination and reconfiguration to benefit individual and subsequently the organisation's performance (Kogut, and Zander, 1992; Nickerson, and Zenger, 2004; Hargadon, and Bechky, 2006; Bartel, and Garud, 2009; Carnabuci, and Operti, 2013; Dingler, and Enkel, 2016).

Additionally facilitating the use of knowledge sharing socialisation mechanisms to enhance knowledge sharing of its experts within the organisation, will enhance the organisations capability in responding to the rapid changes required in their products and services to sustain competitive advantage (Zack, 1999; Cummings, 2004; Haas, and Hansen, 2007; Chen, Huang, and Hsiao, 2010; Wang and Wang, 2012; Leonardi, 2014; Ritala, Olander, Michailova, and Husted, 2015). Arguably knowledge sharing reduces the reinvention of the wheel, shortens cycle time, and enhances decision making processes that include getting the product and services to market before the competition (Szulanski, 1996; Gupta, and Govindarajan, 2000; Boh, 2007; Haung, 2009; Wang and Wang, 2012; Park and Lee, 2014; Wang and Hou, 2015). Moreover scholars support the view that knowledge sharing facilitates the integration of ideas and skills, experience and best practices (Lin and Lee 2006; Hau, Kim, Lee, and Kim, 2013; Haas, Criscuolo, and George, 2015). Subsequently,

decision making is quicker, opportunities are acted upon and the quality of goods and services is enhanced (Earl, 2001; Abrams, Cross, Lesser, and Levin, 2003; Jones, Cline, and Ryan, 2006; Willem, and Buelens, 2009; Johansson, Hicks, Larsson, and Bertoni, 2011; Wang, Wang, and Liang, 2014; Antons, and Piller, 2015). Scholars also note that high quality knowledge will only reach those able to engage in sharing it first using knowledge sharing socialisation mechanisms and facets of structural capital (Burt 1992; 2000; Wasko and Faraj, 2005; Cabrera, Collins, and Salgado, 2006; Reinholt, Pedersen, and Foss, 2011; Carmeli, Gelbard, and Reiter-Palmon, 2013; Hashim, and Tan, 2015).

Moreover, Davenport (1997) reveals that knowledge sharing initiatives command up to 7% and 10% of the total revenues of Buckman's laboratories and Mckinsey and company respectively. Additionally potential savings of 20 million was made by Chevron by adopting best practices and energy costs were minimise by sharing ideas on the use of energy (O'Dell and Grayson, 1998). Sharing knowledge effectively and efficiently was shown to enhance the performance of units and subsequently the organisation (O'Dell and Grayson, 1998; Argote and Ingram, 2000; Tsai, 2001; Kearns, and Lederer, 2003; Dyer, and Hatch, 2006; Wang, He, and Mahoney, 2009; Gebauer, Gustafsson, and Witell, 2011; Chen, Lin, and Yen, 2014; Donate, and de Pablo, 2015). Also, Bock and Kim, (2002), reveal that in a survey of 260 CEOs and directors in European multinational organisations, by the Financial Times, 94% of respondents acknowledge the importance of knowledge sharing. Knowledge sharing is fundamental to organisations as the assimilation of knowledge into product and services plays a crucial role in sustaining the competitive advantage of the organisation (Davenport and Prusak, 1998; Hansen, 2002; Cummings, 2004; Wang and Noe, 2010; Wang and Wang, 2012; Wang, Wang, and Liang, 2014; Lazzarini, 2015). Scholars also reveal the role of knowledge sharing in bridging the gap

between the individual and the organisation, where it is incorporated into product and services to enhance organisational performance (Hendriks, 1999; Bock and Kim, 2002; Ipe, 2003; Chowdhury, 2005; Wang and Noe, 2010; Zhou, and Li, 2012; Carmeli, Gelbard, and Reiter-Palmon, 2013; Mueller, 2015). Moreover, knowledge sharing is essential in knowledge creation and organisational learning and performance (Nonaka, 1994; Von Krogh, 1998; Nonaka, Toyama, and Konno, 2000; Bartol and Srivastava, 2002; Chiu, Hsu, and Wang, 2006; Van den Hooff, and Huysman, 2009; Wang and Noe, 2010; Zhou, and Li, 2012; Ritala, Olander, Michailova, and Husted, 2015).

However, a survey by KPMG, (2000/2003) find that while 80% of top 500 companies in the United Kingdom, France, Germany and the Netherlands attach strategic importance to knowledge, a majority do not facilitate its sharing and utilisation to influence organisational performance. Furthermore, Zack, (2003) note the lack of understanding or capability by organisations to facilitate the use of knowledge sharing socialisation mechanisms to enhance knowledge sharing. Additionally, scholars reveal the multifaceted nature of knowledge sharing (Hendriks, 1999; Dyer, and Nobeoka, 2000; Tsai, 2002; Cummings, 2004; Hansen, Mors, and Løvås, 2005; Renzl, 2008; Lam, and Lambermont-Ford, 2010; Kuo, 2013; Wang, and Hou, 2015). Indeed knowledge is reveal to be multifaceted, with tacit and explicit being the most commonly used in its portrayal; with tacit knowledge describe as very sticky and explicit knowledge leaky (Wernerfelt, 1984; von Hippel, 1994; Liebeskind, 1996; Szulanski, 1996; Griffith, Sawyer, and Neale, 2003; Sambamurthy, and Subramani, 2005; Becerra, Lunnan, and Huemer, 2008; Anand, Ward, and Tatikonda, 2010; Wang, Noe and Wang, 2014; Sergeeva and Andreeva, 2016).

1.3. Research Problem

Organisations striving to sustain competitiveness in today's economic and business environment are increasingly aware of the need to become knowledge oriented (Kim and Mauborgne, 1999; Zack, 2003; Spender, 2007; Björk, and Magnusson, 2009; Carmeli et al, 2013; Donate et al, 2015). It is an economic environment where knowledge based organisations range from organisations in consultancy to cement manufacturers; knowledge is implicit in the production of goods and services across organisations (Zack, 2003; Amara, and Landry, 2005; Edmondson, 2008; Ulaga and Reinartz, 2011; Nikolova, 2016). Moreover, the ability of the organisation *to generate new combinations of existing knowledge and to exploit its knowledge of the unexplored potential of the technology* is what Kogut and (Zander, 1992:391) explain as combinative capabilities. In essence it is the ability of the firm to facilitate the use of knowledge sharing socialisation mechanisms to enable knowledge sharing within the organisation (Grant, 1991; Nonaka, 1994; Alavi, and Leidner, 2001; Boh, 2007; Lawson, Petersen, Cousins, and Handfield, 2009; Boh and Wong, 2013; Dingler and Enkel, 2016). The use of knowledge sharing socialisation mechanisms to enable knowledge sharing will ensure that the organisations' most valuable asset is recombine and reconfigured to create more valuable products and services (Nahapieth and Ghoshal, 1998; Grant and Baden-Fuller, 2004; Ardichvili, 2008; López-Nicolás, and Meroño-Cerdán, 2011; Boh et al, 2013; Dingler et al, 2016).

However, knowledge sharing mechanisms in the literature reflects the view of knowledge being two separate categories of tacit and explicit knowledge types (Nonaka, 1994; Hansen et al, 1999; Lawson, Petersen, Cousins and Handfield, 2009; Boh and Wong, 2013; Ritala, Olander, Michailova, and Husted, 2015). Indeed, Tsoukas (2002:3) report that *tacit knowledge is examined as in opposition to explicit knowledge*. Consequently, scholars

advocate either personalisation (direct person-to-person contact) or the codification (carefully codified knowledge in databases) strategy for sharing knowledge within organisations (Hansen et al, 1999; Earl, 2001; Scarbrough, 2003; Wu, 2008; López-Nicolás, and Meroño-Cerdán, 2011; Boh and Wong, 2013; Cohen, and Olsen, 2015). Subsequently scholars focus on the separation of knowledge sharing mechanisms into personalisation for complex tacit knowledge and codification for explicit knowledge (Hansen, et al, 1999). Furthermore, Hansen et al, (1999:2), reveal the above strategies to be a *central choice facing virtually all companies*. Moreover, the above scholars note that trying to pursue a codification and personalisation strategy at the same time can *quickly undermine a business* (Hansen et al, 1999:2). The aforementioned strategies are based on the view of knowledge as categories, where tacit knowledge is distinct from explicit knowledge (Jasimuddin, Klein and Connell, 2005; Becerra, Lunnan, and Huemer, 2008; Anand, Ward, and Tatikonda, 2010; Hau, Kim, Lee, and Kim, 2013; Ritala et al, 2015). Furthermore, it is a view that describes knowledge types in opposition to each other, and as separate knowledge types (Nonaka, 1994; Pan, and Scarbrough, 1999; Lam, 2000; Levin, and Cross, 2004; Becerra, et al, 2008; Anand, et al, 2010; Hau et al, 2013; Ritala et al, 2015).

The preceding explanations view knowledge as stock which can be accrued for later use in databases; or the experiences accumulated in the heads of employees (Kogut and Zander, 1992; Decarolise and Deeds, 1999; Bartol, and Srivastava, 2002; Smith, Collins, and Clark, 2005; Lee, and Huang, 2012; Chatterji, and Fabrizio, 2014; Roper, and Hewitt-Dundas, 2015). Whilst accumulating experiences and knowledge in databases is valuable, scholars neglect the dynamic interaction of tacit and explicit knowledge (different facets of the same knowledge) that are recombined and reconfigured to sustain the competitiveness of the organisation (Grant, 1996; Smith, Collins and Clark, 2005; Ambrosini, and Bowman, 2009;

Nieves, and Haller, 2014). Moreover, scholars neglect the multiple entities within which knowledge is embedded within organisations (Alavi and Leidner, 2001; Griffith, Sawyer, and Neale, 2003; Chiva, and Alegre, 2005; Kang, Morris, and Snell, 2007; Argote, and Miron-Spektor, 2011; Von Krogh, Nonaka, and Rechsteiner, 2012). These entities range from *organisational culture, identity, routines, and policy systems to the individuals* within the organisation (Nelson and winter, 1982, Grant 1996a, 1996b; Spender, 1996a, 1996b Alavi and Leidner, 2001:108; Lemon, and Sahota, 2004; Turner, and Makhija, 2006; Zheng, Yang, and McLean, 2010; Schneckenberg, Truong, and Mazloomi, 2015). Consequently individuals socialise and learn about the organisational tasks, share tacit knowledge of routines, policy systems and culture using knowledge sharing socialisation mechanisms (Cabrera and Cabrera, 2005; Nonaka, and Von Krogh, 2009; Von Krogh et al, 2012; Wang, Kammeyer-Mueller, Liu, and Li, 2015).

Additionally, viewing knowledge types as being in opposition (tacit and explicit) result in the emphasis of fitting knowledge type to knowledge sharing mechanisms (Nonaka, 1994; Tsoukas, 1996; Hansen, 1999; Lawson, Petersen, Cousins and Handfield, 2009; Boh and Wong, 2013; Marques, Leal, Marques, and Cardoso, 2016). Therefore scholars focus on the separation of knowledge sharing mechanisms into personalisation for complex tacit knowledge and codification for explicit knowledge (Hansen, 1999; Connell, Klein, and Powell, 2003; Handzic, 2011; Boh and Wong, 2013; Venkitachalam, and Willmott, 2016).

Although the aforementioned scholars acknowledge the personal nature of knowledge the codification mechanisms taps into the prevailing view of explicit knowledge being separate from tacit knowledge (Grant, 1996; Hansen, 1999; Dhanaraj, Steensma, and Tihanyi, 2004; Becerra, Lunnan, and Huemer, 2008; López-Nicolás et al, 2011; Schoenherr, Griffith, and Chandra, 2014; Ritala et al, 2015). On the contrary, Tsoukas (1996:14) report that tacit and

explicit knowledge should not be separated, and that they are *mutally constituted*. Indeed, he goes on to reveal that *even the most explicit form of knowledge is underlain by tacit knowledge* (Tsoukas and Vladimirou, 2001; Tsoukas, 2002:15).

Consequently the focus should be on the adoption of the knowledge sharing mechanisms to facilitate knowledge sharing within the organisation. Thus knowledge sharing mechanisms should reflect knowledge as being one type of knowledge with two sides (Tsoukas, 1996; 2002; Nonaka et al 2009; Leonard, and Sensiper, 2011; Newell, 2015). Knowledge sharing using knowledge sharing socialisation mechanisms entails interaction between or amongst individuals personally or using electronic mail (Bock, Zmud, Kim, and Lee, 2005; Quigley, Tesluk, Locke, and Bartol, 2007; Chiu, Wang, Shih, and Fan, 2011; Nissen, Evald, and Clarke, 2014; Ritala et al, 2016). Indeed Alavi, Kayworth and Leidner, (2005) note that knowledge sharing is inherently social. Additionally, Boh and Wong (2013:123) explicate that *electronic systems represent channels that possess different capacity for carrying rich information*.

Researchers have examined personalisation and codification (Hansen, 1999); formal and informal socialisation (Lawson, Petersen, Cousins and Handfield, 2009); informal and formal personalisation and formal codification (Boh and Wong, 2013) as mechanisms that will enhance knowledge sharing. While these are valuable contributions to the literature, they remain fragmented and do not portray a holistic picture of knowledge sharing socialisation mechanisms to enhance knowledge sharing within the organisation. Moreover few empirical studies have examined the relationship between knowledge sharing socialisation mechanisms and structural capital. Therefore this study examines knowledge sharing socialisation mechanisms structural capital and organisational performance.

1.4. Research Aim and objectives

This study aims to investigate the relationship between knowledge sharing socialisation mechanisms structural capital and organisational performance

To achieve the above aim this study outlines the following objectives:

- a. To examine the relationship between knowledge sharing socialisation mechanisms and structural capital
- b. To investigate the relationship between knowledge sharing socialisation mechanisms and organisational performance
- c. To assess the relationship between structural capital and organisational performance
- d. To develop a conceptual framework that integrates knowledge sharing mechanisms, structural capital and organisational performance
- e. To empirically validate the above conceptual framework
- f. To provide recommendations to managers

1.5. Summary

This chapter provides an overview of the study and introduces the constructs knowledge sharing socialisation mechanisms, structural capital (facets) and organisational performance. Additionally the importance of knowledge and especially knowledge sharing which are precursors to knowledge sharing mechanisms are explored. This chapter also presents the resource base and the knowledge based views of the firm, socialisation and social capital as theories underpinning the study. Additionally the chapter discussed the dichotomies of knowledge and the resulting opposing knowledge sharing mechanisms in the literature. Additionally this study is informed by the complimentary view of knowledge sharing mechanisms, which combine personalisation and electronic socialisation, rather than opposing personalisation and codification mechanisms. Furthermore the aforementioned view is informed by our reliance on the expressed view in the complementary literature of tacit and explicit knowledge being inseparable. This study aims

to investigate the relationship between knowledge sharing socialisation mechanisms, structural capital and organisational performance. In order to achieve the aim and objectives of the study a review of the literature of the key constructs knowledge sharing socialisation mechanisms, structural capital (facets) and organisational performance is undertaken.

Chapter Two: Literature Review and Conceptual Framework Development

Chapter two presents a review of the literature in the examination and introduction of knowledge sharing socialisation mechanisms, structural capital and organisational performance. Additionally chapter two provides theoretical perspectives on knowledge sharing socialisation mechanisms structural capital and organisational performance. It examines the preexisting concepts of knowledge, knowledge sharing and knowledge management, socialisation and social capital. Also chapter two explores the above concepts and introduces the other facets of social capital. This is followed by an exploration of the literature and identification of gaps and deficiencies in the literature. This chapter further explores the integrative concept of Knowledge sharing socialisation mechanisms. A model on integrating knowledge sharing socialisation mechanisms structural capital and organisational performance is also presented. A summary concludes the chapter.

2.1. Knowledge Management

Knowledge management has become the focus of individuals in both the business and academic worlds as knowledge has gained prominence in the production and delivery of products and services (Davenport, De Long, and Beers, 1998; Earl, 2001; Adenfelt and Lagerstrom, 2006; Dalkir, and Liebowitz, 2011; Lai, Hsu, Lin, Chen, and Lin, 2014; Donate et al, 2015; de Vasconcelos, Kimble, Carreteiro, and Rocha, 2017). In the academic world the interest in knowledge management is across disciplines, namely: computer science, sociology, and management science, psychology and philosophy (Argote, McEvily and Reagans, 2003; Lee, Lee and Kang, 2005; Zack, McKeen, and Singh, 2009; Fuller, 2012; Mao, Liu, Zhang, and Deng, 2016). Resulting not only in a large volume of published articles, but also spawning a variety of descriptions and explanations of the

knowledge management concept (Swan, Newell, Scarbrough and Hislop, 1999; Lanteenmaki, Toivonen and Mattila, 2001; Easterby-Smith, and Prieto, 2008; Easterby-Smith, and Lyles, 2011; Mariano and Yukika, 2016; Kane 2017)

Consequently definitions of knowledge management reflect the different views of how to manage knowledge (Davenport, De Long, and Beers, 1998; Alavi and Leidner, 2001; Darroch, 2005; Chen, and Huang, 2009; Zhou, and Li, 2012; Khodakarami, and Chan, 2014; Donate et al, 2015). For example knowledge management is capturing and storing information (Inkpen and Dinur, 1998; Liebowitz, 2004; Poon, Choy, Chow, Lau, Chan, and Ho , 2009; Von Krogh, 2012; Stapel, and Schneider, 2014; Efthymiou, Sipsas, Mourtzis, and Chryssolouris, 2015); knowledge management is facilitating sharing, storage and reuse of knowledge (Zander and Kogut, 1995; Schultze, and Leidner, 2002; Herschel, and Jones, 2005; Cepeda, and Vera, 2007; Choi, Lee, and Yoo, 2010; McIver, Lengnick-Hall, Lengnick-Hall, and Ramachandran, 2013; Cohen et al, 2015).

Additionally, knowledge management is the identification and harnessing of knowledge (Caraynnnis, 1999; Snowden, 2003; Goh, 2005; Liao, and Wu, 2010; Shankar, Mittal, Rabinowitz, Baveja, and Acharia, 2013; Chen and Fong, 2015) or supporting people and structuring technology (Malhotra, 1998; Marwick, 2001; Schultze et al, 2002; Huysmand and De witt, 2004; Cabrera, and Cabrera, 2005; Lin, and Huang, 2008; Sultan, 2013; Ghobadi, 2015). For the purpose of this study knowledge management is facilitating knowledge sharing to ensure the right knowledge reaches the right people at the right time (Demarest, 1997; Alavi and Leidner, 2001; Bock et al, 2005; Renzl, 2008; Wang and Wang, 2012; Wang et al, 2014; Ritala et al, 2015). Managing knowledge and facilitating sharing to enhance its incorporation into goods and services will sustain the organisations'

quest to stay competitive and ahead of the competition (Hendriks, 1999; McEvily, Das, and McCabe, 2000; Grant and Baden-Fuller, 2004; Hu, Horng, and Sun, 2009; Zhou, and Li, 2012; Ooi, 2014; Lusch, and Nambisan, 2015).

Globalisation, increasing competition and technological change has knowledge, know-how and social capital referred to as the *coal, oil and diamonds of the 21st century* (Stonehouse and Pemberton, 1999; Carayannis, Popescu, Sipp, and Stewart, 2006: 420; Rezgui, 2007; Johannessen, and Olsen, 2010; Boschma Heimeriks, and Balland, 2014; Navimipour, and Charband, 2016). Managers are urged to revisit, acknowledge and exploit valuable dispersed knowledge within organisations to deliver goods and services with unique characteristics to ensure sustainable competitive advantage (Barney, 1986; 1991; Grant, 1991; Barney, 2002; Bogner, and Bansal, 2007; Björk, and Magnusson, 2009; Birasnav, 2014; Fidel, Schlesinger, and Cervera, 2015). Moreover, knowledge is the most important strategic resource of organisations that can impact organisational performance (Grant, 1996; Zack, 1999; Nickerson, and Zenger, 2004; Nonaka, and Von Krogh, 2009; Zheng, Yang, and McLean, 2010; Arend, Patel, and Park, 2014; Cohen et al, 2015). However, there is no commonly agreed definition of knowledge in the literature; the next section discusses knowledge and the various offerings of definitions in the literature.

2.2. Knowledge

Knowledge is problematic, multifaceted, multilayered and variously defined and described in the management literature (Nonaka, 1994; Nonaka and Takeuchi, 1995; Spender, 1996; Alavi et al, 2001; Argote, McEvily, and Reagans, 2003; Srivastava, Bartol, and Locke, 2006; Hsu and Lin, 2008; Wang and Noe, 2010; Alexy, George, and Salter, 2013; Ritala et al, 2015). Knowledge is also sometimes muddled with information (Kogut and Zander,

1992; Leonard and Sensiper, 1998; Birkinshaw, Nobel and Ridderstale, 2002; Smith, Collins, and Clark, 2005; Nonaka and von Krogh, 2009; Tsui, Wang, Cai, Cheung, and Lee, 2014; Tortoriello, 2015).

Furthermore, scholars note the differences between knowledge and information; they explain that knowledge is the interaction of intuitions, insights, experiences and skills that come to bear when individuals want to solve particular problems at particular moments in time (McDermott, 1999; David and Fahey, 2000; Matzler, Bailom, and Mooradian Nonaka, 2008; Von Krogh et al, 2012; Eling, Griffin, and Langerak, 2014). Additionally, knowledge is engaging with the act of knowing and connecting with other individuals' ideas, experiences and expertise. Moreover, Knowledge is dynamic private and unlike information which is object and static (McDermott, 1999; Sveiby, 2001; Alavi, Kayworth, and Leidner, 2005; Ringberg, and Reihlen, 2008; Khodakarami, and Chan, 2014).

Moreover knowledge is different from information because knowledge is context specific (Nonaka, 1994; Bhatt, 2001; Nonaka et al, 2006; Khodakarami, and Chan, 2014). Also information needs to interact with prior knowledge and be interpreted by individuals to become knowledge (Nonaka, Toyama, and Konno, 2000; Alavi and Leidner, 2001; Nonaka et al, 2009; Nonaka, Kodama, Hirose, and Kohlbacher, 2014). Data also differs from knowledge as illustrated by Tsoukas et al who note that *data are an ordered sequence of given items; information is a context-based arrangement of items; knowledge depends upon the ability to draw distinctions and exercise judgement, based on an appreciation of context or theory or both* (Tsoukas and Vladimirou 2001, 979) Arguably, scholars acknowledge that knowledge and information are interchangeable (Holsapple, 2005; Morrison, and Rabellotti, 2009; Amayah, 2013; McIver, McIver, Wang, and Wang, 2016). However,

Masood, Roy, Harrison, Xu, Gregson and Reeve (2015:60) report that knowledge is derived from information, which is based on data.

Data are described as bits of unstructured facts, which have the potential to become information through human input and analysis (Nonaka and Takeuchi, 1995; Brown and Duguid, 2000; Tsoukas et al, 2001; Lee, Lee and Kang, 2005; McAfee, Brynjolfsson, and Davenport, 2012). Data are discrete, can be processed and the output becomes information (Boisot, 1998; Tsoukas et al, 2001; Massey, Montoya-Weiss, and O'Driscoll, 2002; Easterby-Smith, and Prieto, 2008; Lohr, 2012; Ihrig, and MacMillian, 2015). Moreover, data and especially big data: *enormous datasets* are being linked to *improved decision making*, in-depth understanding and *discoveries of hidden values*, and the creation of opportunities (Chen, Mao, and Liu, 2014:171). However, the enormity of these datasets means organisations require data strategies and computer hardware to realise any potential gains (Ang and Teo, 2000; Davenport, 2006; He, Li, and Zhang, 2010; Chen, Chiang, and Storey, 2012; Chen et al, 2014). Additionally, big datasets provide evidence based decisions for managers with the prospect of rendering big changes to management (Stank, Keller, and Daugherty, 2001; Pfeffer, and Sutton, 2006; Brown, Chui, and Manyika, 2011; McAfee, Brynjolfsson, and Davenport, 2012; George, Haas, and Pentland, 2014; Wamba, Akter, Edwards, Chopin, and Gnanzou, 2015).

However, scholars caution that the potential of big data can only be realised if employees have the knowledge to examine, evaluate and incorporate it in their decision making (Mayo, 2001; Fugate, Sahin, and Mentzer, 2006; LaValle, Lesser, Shockley, Hopkins, and Kruschwitz, 2011; Shah, Horne Capella, 2012; Ramos, Machado, and Cordeiro, 2015). In view of the above discussion this study adopts the perspective of knowledge, information

and data as being different. Knowledge includes the experiences and insights from learning that we use to make sense of information and data (Davenport and Prusak, 1998; McDermott, 1999; Alavi et al, 2001; McFadyen, and Cannella, 2004; Zheng, Yang, and McLean, 2010; Pemsel, and Wiewiora, 2013; Mahr, Lievens, and Blazevic, 2014; 2015).

Numerous definitions and descriptions of the knowledge concept are acknowledged in the management literature (Blackler, 1995; Alavi and Leidner, 2001; Jasimuddin et al, 2005; Rowley, 2007; Nonaka et al, 2009; Hau, Kim, Lee, and Kim, 2013; Park, Vertinsky, and Becerra, 2015). Knowledge that is important to individuals' decision making and how they work resides in the minds of individuals (Grover and Davenport, 2001; Jasimuddin et al, 2005; Nonaka et al, 2009; Cohen et al, 2015). Although it is generally agreed that knowledge plays an important role in organisational sustainability a definition of this value adding knowledge is hard to pin down in the management literature (Prahalad and Hamel, 1990; Grant, 1996b; Spender, 1996; Davenport, De Long and Beers, 1998; Alavi et al, 2001; Rowley, 2007; Venkitachalam, and Busch, 2012; Chiva, Ghauri, and Alegre, 2014; Duffield, and Whitty, 2015). Furthermore, debates about the knowledge concept are historically linked to Greek philosophers and continue in the management literature (Nonaka, 1994; Tsoukas, 1996; Alavi and Leidner, 2001; Armstrong, and Shimizu, 2007; Foss, Husted, and Michailova, 2010; Oborn, Barrett, and Racko, 2013; Antons, and Piller, 2015).

Knowledge defined as *justified true belief* or *tenable* knowledge as opposed to opinions is a description of knowledge being a *dynamic human process of justifying personal belief towards the truth*. Accordingly this definition credits the individual with the deliberate *act of creating meaning* (Nonaka and Takeuchi, 1995:58; Spender, 1996:47; Von Krogh, 1998;

Nonaka, Toyama, and Konno, 2000; Gourlay, 2006; Nonaka et al, 2009; Razmerita, Kirchner, and Nabeth, 2014; Aven, 2016). Additionally, knowledge is defined as *the capacity to act* Sveiby, (2001:345; Nonaka, Von Krogh, and Voelpel, 2006; Nonaka and Von Krogh, 2009; Von Krogh, Nonaka, Rechsteiner, 2012; Ramaswamy, and Ozcan, 2016). Knowledge is accordingly, being able to understand, being intuitive and having the know-how that can manifest into abilities and skills to perform problem solving tasks within organisations. In this instance, action taken to share knowledge may or may not be deliberate depending on how the individual decides to share knowledge (Sveiby, 2001; Nonaka, et al, 2006; Nonaka et al, 2009; Von Krogh, et al, 2012; Maier, and Schmidt, 2015).

Furthermore, *knowledge is a flux mix of framed experiences, values, contextual information and expert insight that provides a framework for evaluating and incorporating new experiences and information* (Davenport and Prusak, 1998:5; Tsoukas et al, 2001; Popadiuk, and Choo, 2006; Choi, Lee, and Yoo, 2010; Davenport, 2015). The preceding definition notes the dynamic nature of knowledge and at the same time equates knowledge with information. Moreover, the above definitions allude to the explicit and tacit knowledge types in the management literature. Additionally, the various definitions above illustrate why the knowledge concept lack a commonly agreed description in the literature and is vindicated by yet more depictions of knowledge in the next paragraph.

Knowledge is described as soft and hard, sticky and leaky, tacit and explicit (Szulanski, 1996; Nonaka and Konno, 1998; Hansen, Nohria, and Tierney, 2005; Tagliaventi, Bertolotti, and Macri, 2010; Khoo, and Hall, 2013; Frank, Ribeiro, and Echeveste, 2015). Explicit knowledge is relatively easily codified, articulated and is objective, in contrast tacit

knowledge is subjective, difficult to codify and express, it is also reported to include ideas, experiences, skills and expertise (Nonaka, 1994; Hansen et al, 2005, Boh and Wong, 2013; Frank et al, 2015). The classic phrase made popular by Polanyi, (1966), cited in Kogut and Zander, (1992:383), *we know more than we can tell*, captures the essence of tacit knowledge. The above descriptions of knowledge suggest separate knowledge types. However, Scholars acknowledge they are all descriptions of one type of knowledge with different characteristics; being multifaceted; both valid knowledge types; two parts of the same coin; cannot be separated; do not exist in isolation (Blackler, 1996; Tsoukas, 1996; Teece 1998; Herrgard, 2000; D'eredita, and Barreto, 2006; Yang, Zheng, and Viere, 2009; Lee, Gillespie, Mann, and Wearing, 2010; Park, Dulambazar, and Rho, 2015).

However, knowledge categorisation and classification persist, explicit knowledge form the bulk of databases, they can be formulas or firm specifications or manuals reports and handbooks (Hansen, 1999; Alavi et al, 2001; Hansen et al, 2005; Jasimuddin et al, 2005; Popadiuk et al, 2006; Nonaka et al, 2009; Park, LiPuma, and Prange, 2015). Tacit knowledge on the other hand is said to be the accumulated experiences, it is highly personal and hard to formalise, as it resides in individual's heads Thus, this type of knowledge is often very hard to articulate and share and also contain mental model, values and know-how (Nonaka, 1994; Lee, 2001; Alavi et al, 2001; Nonaka et al, 2006; Nonaka et al, 2009; Huang, Davison, and Gu, 2011; Boh and Wong, 2013; Cohen et al; 2015).

Tsoukas in contrast argues that knowledge should not be divided into two different knowledge types, *tacit knowledge is the necessary component of all knowledge it is not made up of discrete beans which may be grounded, lost or reconstituted. The two are inseparably related* (1996 p14). Drawing on Tsoukas (1996)'s and Jasimuddin et al,

(2005)'s argument this study adopts the view that tacit knowledge is a necessary component in all knowledge; that knowledge exists on a continuum and not categorised. However, this knowledge is asymmetrically distributed and dispersed within organisations (Tsoukas, 1996, Lam, 2000; Nonaka et al, 2006; Maurer, Bartsch, and Ebers, 2011; Ellison, Gibbs, and Weber, 2015). Moreover, scholars report that actual work practices are full of *tacit improvisations* that happen as work is carried out (Brown and Duguid, 2000; Augier, Shariq, and Thanning Vendelø, 2001; Leybourne, and Sadler-Smith, 2006; Hmieleski, and Corbett, 2006; Leonard, and Sensiper, 2011; Leybourne, and Kennedy, 2015).

Similarly, knowledge residing within the organisation in the heads of individuals is dispersed within organisational functional, departmental and hierarchical boundaries (Tsoukas, 1996; Hansen, 1999; Lee and Kim, 2001; Ipe, 2003; Bock, Zmud, Kim, and Lee, 2005; Chow and Chan, 2008; Wang and Noe, 2010; Wang, Wang, and Liang, 2014; Huang and Zhang, 2016). The above notion is illustrated by Tsoukas (1996:22) who *note the utilization of knowledge which is not, and cannot be, known in its totality by a single mind*. Organisations are distributed knowledge systems. (Tsoukas 1996; 2005; Hansen, 1999; Cummings, 2004; Kim and Lee, 2006; Siemsen, Roth, and Balasubramanian, 2008; Wang and Wang, 2012; Haas, Criscuolo, and George, 2015; Tippmann, Sharkey Scott and Parker, 2017) These are systems with independent experts or individuals with specialisations that should act collectively to enhance the performance of the organisation (Galunic and Rodan, 1998; Tsoukas, and Vladimirou, 2001; Alavi, Kayworth, and Leidner, 2005; Laursen, and Salter, 2006; Choi, Poon, and Davis, 2008; Wang and Noe, 2010; Tortoriello, 2014; Lai, Lui and Tsang, 2016). Conversely, Brown and Duguid (1998:91), acknowledge the difficulties in making knowledge *cohere*. The next section will explain the importance of

knowledge sharing to make knowledge cohere, for the organisation to incorporate into goods and services for improved performance.

2.3. Knowledge sharing

Organisations are described as fragmented and multifaceted entities with *limited time* and *questions* (Daft, and Weick, 1984:284; Tsoukas, 1996, Willem, and Buelens, 2009; Pemsel et al, 2013; Ghobadi, 2015). However, Wang and Noe, (2010) citing Babcock (2004) report the yearly loss of \$31.5 billion by fortune 500 companies for failing to share knowledge. Accordingly, the potential of the valuable knowledge within organisations can only be realised, and the competitive advantage of the firm sustained, when knowledge is effectively shared and incorporated into products and services (Grant, 1996;, Nonaka and Aben, 2001; Husted and Michailova, 2002; Hendriks, 1999; Bock and Kim, 2002; Ipe, 2003; Chowdhury, 2005; Wang and Noe, 2010; Zhou, and Li, 2012; Carmeli, Gelbard, and Reiter-Palmon, 2013; Mueller, 2015).

Moreover, individual knowledge becomes organisational knowledge through knowledge sharing (Grant, 1996; Bartol, and Srivastava, 2002; Chiu, Hsu, and Wang, 2006; Wang and Noe, 2010; Li, 2012; Carmeli, et al, 2013; Mueller, 2015). Furthermore, knowledge sharing is linked to innovation; from combining and reconfiguring knowledge that is dispersed in different parts of the organisation (Davenport et al, 1998; Hansen, 2002; Cummings, 2004; Wang et al, 2010; Wang and Wang, 2012; Wang, Wang, and Liang, 2014; Lazzarini, 2015). Individuals are experts and specialists in their respective fields and thus cannot possess all the different types of knowledge that the new products and services would require (Simon, 1991; Grant, 1996; Wiklund, and Shepherd, 2003; Du, Ai and Ren, 2007; Liao, and Wu, 2010; Zhou, and Li, 2012; Masood, Roy, Harrison, Xu, Gregson, and Reeve, 2015). Therefore, knowledge sharing will facilitate the combination and recombination of ideas skills and expertise by individuals within organisations (Nonaka, 1994; Grant, 1996;

Tsoukas, 1996; Hansen, 2002; Cummings, 2004; Wang et al, 2010; Wang and Wang, 2012; Wang, Wang, and Liang, 2014; Lazzarini, 2015).

Knowledge sharing which entails interactions sustained over a period of time will improve ideas, skills and experiences and shared experiences that could enhance the absorbing capacity of individuals and augment knowledge sharing within the organisation (Cohen and Levinthal, 1990; Tsai, 2001; Malhotra, Gosain, and Sawy, 2005; Liao, Fei, and Chen, 2007; Foss, Husted and Michailova, 2010; Liu, Ke, Wei, and Hua, 2013; Seo, Chae, and Lee, 2015). Moreover, scholars acknowledge organisations as ideal for knowledge sharing as they are social communities with higher order organising principles that facilitate interaction for knowledge sharing within the organisation (Brown and Duguid, 1991; Kogut and Zander, 1992; Cohen, Prusak, and Prusak, 2001; Chiu, Hsu, and Wang; 2006; Chang, and Chuang, 2011; Hau, Kim, Lee, and Kim, 2013; Duffield, and Whitty, 2015).

However, scholars note that organisations are also capable of creating what they label *mental manual divisions* that make knowledge sharing across the organisation problematic (Brown and Duguid, 1996:100; Brown, and Duguid, 2001; Yanow, 2004; Nonaka, 2008; van den Berg, 2013; Krylova, Vera, and Crossan, 2016). Knowledge sharing within functions and or departments may be less sticky, but the varying norms, ways other individuals work and their ways of doing things may differ across the organisation in other functions and departments, making knowledge sharing difficult (Brown and Duguid, 1991; Szulanski, 2000; Hansen, and Nohria, 2004; Garvin, Edmondson, and Gino, 2008; Argote, 2012; Ellison et al, 2015). In addition although the tacit characteristics of knowledge and its subsequent causal ambiguity may help sustain competitive advantage, it also make it's sharing across the organisation challenging (Reed and Defillippi 1990; Szulanski, 1996;

King, and Zeithaml, 2001; Tallman, Jenkins, Henry, and Pinch, 2004; Hoetker, and Agarwal, 2007; Law, 2014; Szulanski, Ringov, and Jensen, 2016).

Nevertheless, scholars aptly note that individual and subsequent firm specific and unique knowledge warrants sharing to positively influence organisational performance (Spender 1996; Tsai, 2001; Collins et al, 2006; Chen, and Huang, 2009; Wang and Wang, 2012; Cohen et al, 2015). Moreover, the consequences of not sharing knowledge may prove costly, and may slow organisational innovation (Mueller and Dyerson, 1999; Tsai, 2001; Jantunen, 2005; Lin, 2007; Chen, Huang, and Hsiao, 2010; Zhou and Li, 2012; Donate et al, 2015). Knowledge that is not shared in organisations loses its value to the organisation (Grant and Baden-Fuller, 2004). Whilst this may be the case getting individuals to share knowledge within the organisation is often problematic (Szulanski, 1996; Tsai, 2000; Szulanski, 2000; Bock, Zmud, Kim, and Lee, 2005; Boh, 2007; Boer, Berends, and van Baalen, 2011; Llopis, and Foss, 2016).

However, in the knowledge economy sustaining competitive advantage warrants sharing knowledge within the organisation (Von Krogh, Nonaka and Aben, 2001; Swart, and Kinnie, 2003; Chiu, Hsu, and Wang, 2006; Gagné, 2009; Wang and Wang, 2012; Leonardi, 2014; Lăzăroiu, 2015). Moreover, knowledge increases in value when it is shared (O'Dell and Grayson 1998; Bartlett and Ghoshal, 2002; Chiu, Hsu, and Wang, 2006; Huang, 2009; Hau, Kim, Lee, and Kim, 2013; Obeidat, Al-Suradi, Masa'deh, Tarhini, 2016). Similarly, scholars also reports that when individuals share knowledge through the facets of structural capital the search for knowledge is quicker; and there is access to potential new knowledge (Wasko, and Faraj, 2005; Cabrera and Cabrera, 2005; Yang 2007; Van den Hooff, and Huysman, 2009; Chang, and Chuang, 2011).

Moreover, experts are identified through structural capital dimensions (e.g. network ties, network centrality and network stability); strong ties are utilised for sharing tacit knowledge, weak ties present opportunities to share new ideas knowledge with centrally located individuals that have been in the organisation for a while (Granovetter, 1973; Levin, and Cross, 2004; Huysman, and Wulf, 2006; Siemsen, Roth, Balasubramanian, and Anand; 2009; Reinholt, Pedersen, and Foss, 2011; Tseng, and Kuo, 2014; Pan, Xu, Wang, Zhang, Ling, and Lin, 2015). Moreover, individuals may share knowledge using the knowledge sharing socialisation mechanisms linking and connecting face-to-face or electronically with individuals in the different facets of structural capital to share differential knowledge and have access to differential opportunities (McDermott, and O'Dell, 2001; Chai, Gregory, and Shi; 2003; Wasko and Faraj, 2005; Liao, Fei, and Chen, 2007; Korte, and Lin, 2013; Estrada et al, 2016).

2.3.1. Knowledge sharing mechanisms

Dispersed knowledge in organisational and functional departments within the organisation should be combined and recombined through the use of knowledge sharing mechanisms for it to be useful (Hansen et al 1999; Tsai, 2002; Berends Bij, Debackere, and Weggeman, 2006; Boh, 2007; Foss, Husted, and Michailova, 2010; Bock et al, 2013; Frank, Ribeiro, and Echeveste, 2015). Thus, Boh (2007:28) define knowledge sharing mechanisms as formal and informal mechanisms for sharing *know-what know-how, and know-why of individuals*. Whilst this definition is valuable it does subscribe to the notion that tacit and explicit are two separate knowledge types. Additionally, knowledge sharing mechanisms are often described along the distinctions of public versus private, personal versus impersonal Personalisation versus codification, individualisation versus institutionalisation, and personalisation expressed (as person to person contact) and codification described as (databases for many) (Appleyard, 1996; Hansen et al, 1999; Alavi and Leidner, 2001; Boh, 2007; Bock et al, 2013; Frank et al, 2015).

However, such separate groupings stem from the perception built on the premise that there are two separate types of knowledge; and the difficulty in expressing tacit knowledge (Grant, 1996; Spender, 1996; Nonaka and Takeuchi, 1995; Davenport and Prusak, 1998; Jasimmuddin et al, 2005; Arnett, and Wittmann, 2014; Ritala et al, 2015). While this is the commonly expressed view Tsoukas (1996), argue that tacit and explicit make up one knowledge type. Furthermore, he described how tacit knowledge can be articulated, and how explicit knowledge is part of tacit knowledge. And as Tsoukas (1996), illustrated in his example the stock controller's actions like knowledge sharing are practical activities that require the use of both language and tools. Thus we argue that knowledge sharing

socialisation mechanisms enables the use of language and electronic tools to share both tacit and explicit knowledge.

Additionally, tacit knowledge is described as intuitive, technical skills, know-how, highly context specific, personal and difficult to articulate, verbalize; or communicate (Haldin-Herrgard, 2000; Nonaka et al, 2009;). However, scholars argue that tacit and explicit knowledge are different sides of the same coin and are *poles of a knowledge continuum* (Inkpen and dinur, 1998; Griffith, Sawyer, and Neale, 2003; Jasimuddin et al, 2005:104; Cohen et al, 2015). Thus scholars note that tacit knowledge is the essence of all knowledge and all acts of knowing, and within the knowledge spectrum implicit knowledge can be can be expressed and shared (Wilson, 2002; Lee, 2001; Bock et al, 2005; Frappaolo, 2008; Lindner, and Wald, 2011; Shehzad, Khan, and Naeem, 2013; Zhang, De Pablos, and Xu; 2014; Ou, Davison, and Wong, 2016). Furthermore, tacit and explicit knowledge interact dynamically along the continuum in the course of individuals doing their work and thus tacit knowledge can be communicated and can be shared in face-to- face or person-to-person interactions (Tsoukas, 1996; Hansen et al, 1999; Stenmark, 2000; Nonaka et al, 2009; Chuang, Jackson, and Jiang, 2016).

Nevertheless, whilst scholars acknowledge the valuable role of knowledge sharing mechanisms in augmenting the organisation's innovative knowledge base, they are presented in the literature as a choice of either personalisation or codification (Grant, 1996; Scheepers, Venkitachalam, and Gibbs, 2004; Gammelgaard, and Ritter, 2005; Boh, 2007; Powell and Ambrosini, 2012; Shujahat, Sousa, Hussain, Nawaz, Wang, and Umer, 2017). Indeed, the extensively cited Hansen, Nohria and Tierney, (1999) recommend an 80/20 split on the use of codification and personalisation as knowledge sharing mechanisms.

According to the scholars above organisations must use either personalisation or codification mechanisms. Moreover, these mechanisms are along the lines of categorising knowledge as two distinct types: tacit and explicit (Nonaka, 1994; Hansen et al, 1999; Nonaka, Toyama, and Konno, 2000; Anand, Ward, and Tatikonda, 2010; Scully, Buttigieg, Fullard, Shaw, and Gregson, 2013; Park, Vertinsky, and Becerra, 2015; Rosas, Rodriguez, Henneberry, and Sandoval, 2017).

Conversely, this study relies on the view of tacit and explicit knowledge being on a continuum, where knowledge goes from tacit to explicit whilst being shared (Brown, and Duguid, 1991; Leonard and Sensiper, 1998; Nonaka and von Krogh, 2009; Hautala, and Jauhiainen, 2014; Chuang et al, 2015; Nair, Demirbag, Mellahi, and Pillai, 2017). Moreover, knowledge sharing can take place through personal socialisation (e.g. p-socialisation) and electronic socialisation (e.g. e-socialisation) (Hansen et al, 1999; Haldin-Herrgard, 2000; Choi and Lee, 2002; Riege, 2005; Wasko and Faraj, 2005; Hsu and Lin, 2008; Lawson Petersen, Cousins, and Handfield; 2009; Khodakarami, and Chan, 2014; Donate et al, 2015). Selected examples of knowledge sharing socialisation mechanisms are illustrated in Table 1.

Table 1 Selected definitions of knowledge sharing Mechanisms

Author	Knowledge Sharing Mechanisms
Bartol, K.M., and Srivastava, A., (2002:64)	Tools that enhance knowledge sharing within the organisation <u>Types of Knowledge sharing mechanisms</u> Databases Formal Interactions Informal Interactions Communities of Practice
Haas, M., and Hansen M.T. (2005)	Knowledge sharing mechanisms are processes through which knowledge is translated into positive outcome. <u>Knowledge sharing Mechanisms</u> Personal advice usage: Direct person-to-person contact: Meetings, phones, emails Electornic Documents: Codified knowledge in databases
Boh, W.F. (2007:29)	Knowledge-sharing mechanisms are defined as the formal and informal mechanisms for sharing, integrating, interpreting and applying know-what, know-how, and know-why embedded in individuals and groups that will aid in the performance of project tasks. <u>Knowledge Sharing Mechanism</u> Codification versus Personalisation Individualisation versus Institutionnalisation
Boh, W.F. and Wong, S.S., (2013:123)	KSMs are organizational practices adopted to facilitate the sharing, integrating, interpreting, and applying of know-what, know-how, and know-why embedded in individuals and groups

Source: Author (2016).

Table 1 above shows selected definitions of and different types of knowledge sharing mechanisms in the literature. Moreover, are the formal and informal knowledge sharing mechanisms mentioned in Table one, are among a variety of other mechanisms like emails and person to person contact. The various knowledge sharing mechanisms are underpinned by the dynamic nature of knowledge and organisational life.

2.3.1.1. Socialisation

Socialisation remains a necessity for both organisations and individuals in terms of roles and jobs (Sole, and Wilson, 2002; Cabrera et al; 2005; Bauer, et al 2007; Lawson, Petersen, Cousins, and Handfield, 2009; Khodakarami et al, 2014; Kaewkitipong, Chen, and Ractham, 2016). Socialisation in organisations is an enabling process for new individuals to *learn the ropes, learn the way things are done, and learn what is necessary* to function effectively in a particular department, subunit or organisation (Schein, 1968:2; Fisher, 1986; Klein and Weaver, 2000). Generally definitions of organisational socialisation tend to accommodate the above description explaining what newcomers need to gain the knowledge of how to do things to be able to work in the organisation (Morrison, 1993; 2002; Bryant, 2005; Bauer, Bodner, Erdogan, Truxillo, and Tucker, 2007; Bauer, and Erdogan, 2014; Wang, Kammeyer-Mueller, Liu, and Li, 2015). Moreover, the above definition focuses on individuals engaging with others in knowledge sharing to facilitate their work in the organisation (Van Maanen and Schein, 1979; Schein, 1984; Chatman, 1989; Denison, and Mishra, 1995; Cable, and Parsons, 2001; Bauer et al, 2007; Tseng, 2010; Wang et al, 2015).

Furthermore connecting with other individuals to share knowledge involves socialising with others face to face or using electronic communication within the organisation. Socialisation in the context of this study *refers to the level of interaction between, and communication of, various actors that leads to the building of personal familiarity, improved communication, and problem solving* (Morrison, 2002; Bryant, 2005; Cousins and Menguc, 2006:607; Fang, Duffy, and Shaw, 2011; Wang et al, 2015). Accordingly, knowledge sharing socialisation

mechanisms enable individuals to interact and build a shared language, and shared firm specific knowledge that will enhance their absorptive capacity and enable knowledge sharing beyond departments and functions (Jansen, Van Den Bosch, and Volberda, 2005; Björkman, Stahl, and Vaara, 2007; Roberts, Galluch, Dinger, and Grover, 2012; Martinkenaite, and Breunig; 2016).

Moreover socialisation will minimize the not invented here syndrome as individuals within organisations will be able to use their prior firm specific knowledge to engage in sharing knowledge from other departments and functional areas of the organisation (Michailova, and Husted, 2003; Lichtenthaler, and Ernst, 2006; Lawson, et al 2009; de Araújo Burcharth, Knudsen, and Søndergaard, 2014; Martinkenaite et al, 2016). Although the focus of this is on individuals socialising to share knowledge within organisations scholars also note the use of electronic communication in socialising individuals in virtual teams (Roberts, 2000; Hislop, 2002; Flanagin Waldeck, 2004; Wasko and Faraj, 2005; Oshri, Kotlarsky, and Willcocks, 2007, Taylor, and Murthy, 2009; Majchrzak, Faraj, Kane, and Azad, 2013; Ellison, Gibbs, and Weber, 2015). The next section discusses personal and socialisation.

2.3.1.1.1. Personal socialisation (P socialisation)

Socialisation describes a process of new individuals acquiring a sense of shared values, beliefs and organisational objectives necessary for assimilating into a department, function or network (Morrison, 2002; Bryant, 2005; Cousins et al, 2006; Fang, Duffy, and Shaw, 2011; Wang et al, 2015). Away days meetings workshops and brainstorming sessions are means through which individuals socialize and share knowledge (Cousins, Handfield, Lawson, and Petersen, 2006; Cousins and Menguc, 2006; Hsu, Ju, Yen, and Chang, 2007;

Lawson, Petersen, Cousins, and Handfield, 2009; Leonard and Sensiper, 2011; Park and Lee, 2014; Ghobadi, and Mathiassen, 2016).

Moreover, where the tacit characteristic of knowledge is dominant, socialisation occurs through apprenticeships; learning by doing, getting a feel of how the craft is done and informal meetings (Nonaka, Toyama and Konno, 2000; D'eredita, and Barreto, 2005; Nonaka and von Krogh, 2009; Breton-Miller and Miller, 2015). In addition, personal socialisation will enable new individuals to develop shared norms and ways of doing things within the organisation (Orlikowski, 2002; Boh, 2007; Pinjani, and Palvia, 2013; Tangaraja, Mohd Rasdi, Ismail, and Abu Samah, 2015).

2.3.1.1.2. Personal socialisation (P socialisation) and network ties

In knowledge sharing socialisation and subsequent interactions enable the effective sharing of tacit knowledge Nonaka (1994; Haldin-Herrgard, 2000; Riege, 2005; Lawson, Petersen, Cousins, and Handfield, 2009; Hau, Kim, Lee, and Kim, 2013; Tangaraja et al, 2015). Moreover through personal socialisation individuals within the organisation will enhance their personal communication with other individuals, this will likely increase the richness of the communication to enhance the sharing of valuable complex knowledge (Daft and Lengel, 1986, Hansen, 1999; Boh and Wong, 2013; Grichnik, Brinckmann, Singh, and Manigart, 2014; Peltokorpi, 2015). Additional personal socialisation through face to face visits to other departments will enable the creation of networks ties within the organisation (Hansen et al, 1999; Lesser, and Storck, 2001; Morrison, 2002; Mehra, Dixon, Brass, and Robertson, 2006; Chow and chan, 2008; Tortoriello, Reagans, and McEvily, 2012; Schilling, and Fang, 2014; Fang, Landis, Zhang, Anderson, Shaw, and Kilduff, 2015).

Moreover, unlike the classification of strong tie weak tie perspective that focuses on the tacit and explicit variations of knowledge that can be shared through these ties (Granovetter, 1973; Morrison, 2002; Cummings, and Higgins, 2006; Anderson, 2008; Fang, Duffy, and Shaw, 2011; Grichnik, Brinckmann, Singh, and Manigart, 2014; Hollenbeck and Jamieson, 2015). This study adopts a dynamic view of ties created through personal socialisation, and argues that through personal socialisation individuals will encounter opportunities to form weak or strong ties (Tsai 1998; Jia, Shaw, Tsui, and Park, 2014; Hollenbeck, and Jamieson, 2015).

Moreover maintaining a stable pattern of ties would be difficult to sustain as in organisational life individuals change organisations, functions and departments, creating and deactivating ties as and when required (Tsai, 2000; 2001; Kossinets, and Watts, 2006; Chow and Chan, 2008; Ahuja, Soda, and Zaheer, 2012; Casciaro, Barsade, Edmondson, Gibson, Krackhardt, and Labianca, 2015). Moreover according to Ahuja, Soda and Zaheer (2009), ties are formed, they morph and can be dissolved leading to a change in the structural capital or pattern of ties. Hansen (1999) also notes that weak and strong ties have their advantages and disadvantages in their use for sharing knowledge across the organisation. Personal socialisation will ensure individuals interact to create strong or weak ties that will enable the sharing of knowledge (both tacit and explicit), that is required for work. In view of the above discussions we proposed that:

H_{1a} Personal socialisation will positively relate to network ties working relationship

H_{1b} Personal socialisation will positively relate to network ties working Advice

2.3.1.1.3. Personal socialisation (P socialisation) and network centrality

Personal socialisation involves person to person interactions to learn the ropes, and to share knowledge (Hansen et al, 1999; Hansen and Nohria, 2004; Korte, 2009; Bauer et al, 2014; Hollenbeck, and Jamieson, 2015). Personal socialisation enhances the social contexts within organisation and facilitates the sharing of tacit knowledge among members in the networks within organisations (Hislop, 2002; Takeuchi, and Takeuchi, 2009; O'Brien, and Drost, 2011; Korte, Brunhaver, and Sheppard, 2015; Benzinger, 2016). Tacit knowledge is inherently social and its sticky characteristics dictate it's sharing by direct person to person socialisation through participation in projects, workshops and presentations (Nonaka, 1994, Brown and Duguid, 1998, Hansen et al, 1999; Nonaka, Toyama, and Konno, 2000; Nonaka, and Von Krogh, 2009; Arnett, and Wittmann, 2014; Benzinger, 2016). A notion concurred by Tsoukas (1996), who report that tacit knowledge can be conveyed linguistically if individuals endeavour to do so. Sharing tacit knowledge is dynamic with individuals constantly reconfiguring and creating meaning from theirs and other individuals' experiences often through learning by doing, sharing experiences and through observing others at work (Orr, 1998; Hislop, 2002; Orlikowski, 2002; Lin 2007; Yang and Farn, 2009; Hau, Kim, Lee, and Kim, 2013; Cohen and Olsen, 2015; Oyemomi, Liu, Neaga, and Alkhuraiji, 2016). Also Orlikowski (2002:259) in her study demonstrates the advantage of person to person socialisation that *constitutes a sense of knowing their colleagues, their credibility and commitment.*

Moreover socialising with an individual that is central in the organisation who has direct and immediate access to other individuals would enhance the sharing of valuable knowledge through direct personal socialisation (Tsai, 2001; Teigland, and Wasko, 2009;

Kane, and Borgatti, 2011; Aalbers, Dolfsma, and Koppius, 2014; Singh Kryscynski, Li, and Gopal, 2016). Additionally a centrally located individual will be able to directly access valuable knowledge in a timely manner (Burt, 1992, Tsai, 2001; Dhanaraj, and Parkhe, 2006; Kane, and Borgatti, 2011; Durmuşoğlu, 2013; Lin and Lo 2015). Also, centrally located individual will not find it difficult to raise concerns about access to critical knowledge in the organisation and will be sought for advice by other colleagues within the organisation (Tsai, 2001; Dhanaraj, and Parkhe, 2006; Teigland, and Wasko, 2009; Kilduff, and Brass, 2010; Aalbers, Dolfsma, and Koppius, 2013; Erdogan, Bauer, and Walter, 2015).

In view of the above discussions we proposed that:

H_{1c} Personal socialisation will positively relate to network centrality direct contact

H_{1d} Personal socialisation will positively relate to network centrality immediate access

2.3.1.1.4. Personal socialisation (P socialisation) and Electronic socialisation

Nonaka (1994) note that tacit knowledge is converted through shared experiences and socialisation and that knowledge is exchanged through joint activities. This exchange (e.g. socialisation) can occur electronically (e-mailing, video conferencing, chat rooms) or personally (face-to-face, conversations, meetings, workshops). It can thus be argued that there are two types of socialisation: electronic socialisation and personal socialisation). Electronic socialisation on the other hand entails individuals using various information and communications technology to share knowledge (Wasko and Faraj, 2005; Boh, 2007; Davison, Ou, and Martinsons, 2013; Ellison, Gibbs, and Weber, 2015; Soto-Acosta, and Cegarra-Navarro, 2016).

Furthermore individuals can share knowledge through personal socialisation or in conjunction with electronic socialisation (Flanagin and Waldeck, 2004; Haas and Hansen, 2007; Ou, Davison, and Wong, 2016; Kane, 2017). Moreover, electronic socialisation will scale up and foster the growth of interpersonal ties that will enhance knowledge sharing within the organisation (Van Maanen and Schein, 1977; Hendriks, 1999; Bloodgood, and Salisbury, 2001; Ahuja and Galvin, 2003; Flanagin and Waldeck, 2004; Lin, 2007; Tan 2016). Moreover, scholars note that, electronic socialisation in enabling electronic interaction using various media will minimise *temporal and physical interaction constraints* and increase *vertical and horizontal communication* (Flanagin and Waldeck, 2004:142)

Social interactions through electronic socialisation that are frequent and occur over a period of time could take place across organisational boundaries (Brown and Duguid, 1991; Lam, 1997; Leonard and Sensiper, 1998; Boh, 2007; Whiddett, Tretiakov, and Hunter, 2012; Panagiotopoulos, Shan, Barnett, Regan, and McConnon, 2015). Also these electronic socialisation interactions may lead to individuals developing a sense of common organisational identity, common knowledge and be able to access and absorb the expertise, ideas and knowledge of other individuals wherever they are located in the organisation (Finholt and Sproull, 1990; Howard, 2002; Schoemaker, and Jonker, 2005; Kietzmann, Hermkens, McCarthy, and Silvestre, 2011; Treré, 2015).

Thus, P-socialisation used in conjunction with electronic socialisation will cut across organisational boundaries and will to a large extent minimise the problems of the not invented here syndrome, credibility of source and the tacit nature of knowledge and subsequently positively impact organisational performance (Kirkman, Rosen, Tesluk, and

Gibson, 2004; Wilson, Straus, and McEvily, 2006; Boh, 2007; Hill, Bartol, Tesluk, and Langa, 2009; Stryker, and Santoro, 2012; Park and Lee, 2014). In addition electronic socialisation will enable individuals to access relevant expertise, ideas and knowledge to solve problems effectively and efficiently and subsequently impacting organisational performance (Finholt and Sproull, 1990; Alavi and Leidner, 2001; Lee, Lee and Kang, 2005; Haas, M.R. and Hansen, 2007; Soto-Acosta, Colomo-Palacios, and Popa, 2014; Hamari, Sjöklint, and Ukkonen, 2016).

In view of the above discussions we proposed that:

H_{1e} Personal socialisation will positively relate to electronic socialisation systems

H_{1f} Personal socialisation will positively relate to operations performance

H_{1g} Personal socialisation will positively relate profit performance

2.3.1.1.5. Electronic socialisation (E socialisation)

Scholars reveal the importance of social interactions, which result in communities of interaction and its role in the creation and sharing of organisational knowledge (Nonaka, 1994; Wenger, 2004; Dholakia, Bagozzi, and Pearo, 2004; Chiu, Hsu, and Wang, 2006; Noorderhaven, and Harzing, 2009; Chang, and Chuang, 2011; Tsai, and Bagozzi, 2014; Pan, Xu, Wang, Zhang, Ling, and Lin, 2015). Also Interactions through e-socialisation of individuals with others within the organisation enhance the accumulation of social capital that will facilitate knowledge sharing (Wasko, and Faraj, 2000; Wasko and Faraj, 2005; Hau, Kim, Lee, and Kim, 2013; Akhavan, and Hosseini, 2015). Electronic socialisation is where individuals have to use information and communications technology to share knowledge (Wasko and Faraj, 2005; Boh, 2007; Maurer, Bartsch, and Ebers, 2011; Hau, Kim Lee, and Kim, 2013; Islam, Jasimuddin, and Hasan, 2015).

Information and communications technologies in organisations are described as mechanisms individuals use to communicate and link with other individuals and to process large amounts of data (Hitt, and Brynjolfsson, 1997; Dewett and Jones 2001; Sambamurthy, Bharadwaj, and Grover, 2003; Leidner, and Kayworth, 2006; Choi, Lee, and Yoo, 2010; Venkatesh, Thong, and Xu, 2012; Bloom, Garicano, Sadun, and Van Reenen, 2014; Mocetti, Pagnini, and Sette, 2017). Moreover information technologies encompass a variety of technologies that include corporate intranets, extranets, groupware, video and voice conferencing, email and the telephone (Alavi and Leidner, 1995, 2001; Roberts, 2000; Sher and Lee, 2004; Cabrera, Collins, and Salgado, 2006; Hsu and Lin, 2008; Venkatesh, Thong, and Xu, 2012; Bloom, Garicano, Sadun, and Van Reenen, 2014; Mocetti, Pagnini, and Sette, 2017).

Moreover, the fast pace in the change of information and communications technology have resulted in creating a digital environment that presents an increase in opportunities for knowledge sharing within organisations (Liao, 2003; Zammuto, Griffith, Majchrzak, Dougherty, and Faraj 2007; Choi, Lee, and Yoo, 2010; Li, and Herd, 2017). Going digital means *binary code of computers, information and communications become digital ones and zeros* (Tapscott, 2014:15). The digital environment or digital economy is described as one *representing the pervasive use of IT (hardware, software, applications and telecommunications) in all aspects of the economy, including internal operations of organizations* (Atkinson, and McKay, 2007:7).

Additionally it is an economic or business environment that is enabled by falling costs, and increasing speed, quality mobility and reliability in telecommunications (Porter, and Millar, 1985; Milgrom, and Roberts, 1990; Bresnahan, Brynjolfsson, and Hitt, 2002; Atkinson, and McKay, 2007, Moriset, and Malecki, 2009; Li, Da Xu, and Zhao, 2015; Li and Herd, 2017). The ensuing digital and communications technologies are defined as *an all-encompassing term that includes methods, systems, devices and knowledge that use digital and computerized methods to transmit data and deliver information* (Li and Herd, 2017:185). Additionally, digital and communication technologies include but are not limited to social, mobile, analytical and cloud technologies (Suchman, Blomberg, Orr, and Trigg, 1999; Benson, Johnson, and Kuchinke, 2002; Heath, Luff, and Knoblauch, 2004; El-Tayeh, and Gil, 2007; Garcia-Lorenzo, 2010; Bucher, Fieseler, and Suphan, 2013; Allen, 2015; Denner, Püschel, and Röglinger, 2017).

Consequently knowledge sharing socialisation mechanisms will enable knowledge to be shared reliably faster, to a variety of individuals simultaneously across organisational boundaries and augment the capability of the organisation in responding to competition in its dynamic business environment (Sambamurthy, Bharadwaj, and Grover, 2003; Lin, 2007; Lu, and Ramamurthy, 2011; Li and Herd, 2017). Indeed scholars acknowledge the prevalence of the above mechanisms to enable communicate, collaboration and interaction within organisations (Haythornthwaite, 2002; Flanagin and Waldeck, 2004; Valaski, Malucelli, and Reinehr, 2012; Bloom, Garicano, Sadun, and Van Reenen, 2014; Li and Herd, 2017). Furthermore scholars recognize the potential of these technologies to increase the scale, speed and reliability of individuals' communications and interactions in organisations (Sproull and Kiesler, 1995; Townsend DeMarie, and Hendrickson, 1998;

Wagner and Bolloju 2005; Malecki, and Moriset, 2008; Hanna Rohm Crittenden 2011; Tapscott, 2014; Cascio, and Montealegre, 2016).

Nevertheless, *organizations still lack knowledge of digital technologies as well as identifying which technologies they should adopt to impact their business operations and performance* (Arnison, and Miller, 2002; Macher, and Richman, 2004; Lipnack, and Stamps, 2008; Kimmerle, Cress, and Held, 2010; Wu, Straub, and Liang, 2015; Denner, Püschel, and Röglinger, 2017:1). Thus while scholars report a rapid adoption of social media tools for use within organisations, citing an implementation rate of 65% of web 2.0 technologies in a report by the Global consultancy firm McKinsey, understanding the impact of digital technologies on work and life remain the bane of organisations (Mangold, and Faulds, 2009; Treem and Loenardi, 2012:143; Leonardi and Neely, 2017). *Social media, is defined as a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user-generated content* (Lai and Turban, 2008; Kaplan and Haenlein, 2010; Kaplan and Haenlein 2012:101; Leonardi, 2017).

Also, social media are web based mobile technologies that enable interactive communication with one or several individuals simultaneously (Wagner and Bolloju, 2005; Kaplan and Haenlein, 2010; Gibbs, Rozaidi, and Eisenberg, 2013; Leonardi and Neely, 2017). In addition social media is an umbrella term used to describe technologies that include but are not limited to blogs, micro blogs, wikis, virtual worlds, video-sharing and social networking sites (Bertot, Jaeger, and Grimes, 2010; Leonardi, Huysman, and Steinfield, 2013; Dong, and Wu, 2015; Leonardi, and Neeley, 2017). Additionally, they are adopted by organisations to communicate with external stakeholders and for

communication and interaction for employees within the organisation (Culnan, McHugh, and Zubillaga, 2010; Leonardi, Huysman, and Steinfield, 2013; Ngai, Tao, and Moon, 2015). Also, they are often referred to as enterprise social media, with an ideology based on openness (Mangold, and Faulds, 2009; Bertot, Jaeger, and Grimes, 2010; Kietzmann, Hermkens, McCarthy, and Silvestre, 2011; Gibbs, Rozaidi, and Eisenberg, 2013; Leonardi, and Neeley, 2017).

However, while social media is lauded as important for knowledge sharing, and despite the fact that there are glimpses of knowledge sharing using social media, it is yet to fulfil that promise as problems of sharing valuable knowledge still persists (Ardichvili Page and Wentling, 2003; Payne, 2008; Wang and Noe, 2010; Gibbs, Rozaidi, and Eisenberg, 2013; Ellison et al, 2015). Nonetheless, social media enables knowledge sharing by enhancing visibility (acting as pointers to expertise) and retaining messages (that can be referred back to), thus reducing time required to socialise and interact with individuals over time to subsequently share knowledge (Drury, 2008; Leonardi, Huysman, and Steinfield, 2013; Ma and Chan, 2014;).

Information and communications technologies are an integral part of the organisation and the business worlds (Malecki, and Moriset, 2008; Yoo, Culnan, McHugh, and Zubillaga, 2010; Boland Jr, Lyytinen, and Majchrzak, 2012; Li and Herd, 2017). Although the debate on media richness and social presence continues, Lee (1993), reports of findings that include evidence of media richness in communications that use email. Additionally, electronic mail remains the most common form of communication in organisations (Sproull, and Kiesler, 1986; Garton and Wellman, 1995; Baltes, Dickson, Sherman, Bauer, and LaGanke, 2002; Kellogg, Orlikowski, and Yates, 2006; Reinsch, Turner, and Tinsley,

2008; Majchrzak Markus 2012; Jung, and Lyytinen, 2014; Butts, Becker, and Boswell, 2015; Rice, Evans, Pearce, Sivunen, Vitak, and Treem, 2017). Furthermore, Ahuja and Galvin (2003) report the prevalent use of electronic media by virtual groups to socialise new members, inspite of the presence of telephones due to its speed and cost effectiveness.

However, the socialisation literature predominantly focuses on newcomers socialising face to face to acquire knowledge that will enable them to effectively carry out their tasks within organisations (Chao et al, 1994; Anakwe, and Greenhaus, 1999; Flanagin et al, 2004; Bauer et al, 2007; Chu, and Chu, 2011; Bauer and Erdogan, 2014; van der Werff, and Buckley, 2017). In addition, while extended and chance face to face interactions to socialise are important the advent of information and communications technologies, dispersed knowledge and expertise (specialisation); departmental and fuctional barriers are increasing the need for electronic socialisation (Townsend, DeMarie, and Hendrickson, 1998; Flanagin and Waldeck, 2004; Oshri, Kotlarsky, and Willcocks, 2007; Sias, Pedersen, Gallagher, and Kopaneva, 2012; Ellison, Gibbs, and Weber, 2015; Piszczek, 2017).

Furthermore, scholars note that explicit knowledge that is not devoid of meaning can be shared using information and communication technology as individuals will socialise electronically *actively inferring and constructing meaning* form their experiences whilst sharing knowledge within the organisation (Nonaka, 1991; Hislop, 2002:172). Moreover, knowledge labelled as tacit and explicit in the literature and often portrayed as two different types of knowledge can be shared differently either through person to person or using information and communications technology (Nonaka and Takeuchi, 1991; Hansen et al, 1999; Chow and Chan, 2008; Huang, Davison, and Gu, 2011; Panahi, Watson, and Partridge, 2013; Hwang, Singh, and Argote, 2015).

Moreover electronic socialisation will enable socialising with a larger number and variety of strong and weak ties to share knowledge (Haythornthwaite, 2002; Flanagin and Waldeck, 2004; Gupta, Mattarelli, Seshasai, and Broschak, 2009; Wang, Yu, and Wei, 2012; Choi, Kang, Jung, and Bae, 2014; Balaji, Khong, and Chong, 2016). Additionally, Electronic socialisation interactions will enable the forming of different ties that will enhance and create opportunities for access to different knowledge expertise, experiences and ideas in the different departmental and functional areas of the organisation (Morrison, 2002; Cummings, 2004; Pan, Newell, Huang, and Galliers, 2007; Yuan, Rickard, Xia, and Scherer, 2011; Zhou, Zhang, Sheng, Xie, and Bao, 2014; Allen, Eby, Chao, and Bauer, 2017). Furthermore, electronic socialisation will enable faster and cost effective access to several individuals with knowledge ideas and expertise simultaneously (Finholt and Sproull, 1990; Flanagin, and Waldeck, 2004; Chiu, Hsu, and Wang, 2006; Lawson, Petersen, Cousins, and Handfield, 2009; Hwang, Singh, and Argote, 2015). Digitally enabled electronic socialisation (mobile phones; emails) will enable access to numerous individuals that are not highly connected (in strong ties), which will result in sharing knowledge that is unique, diverse and valuable (Roberts, 2000; Sambamurthy, Bharadwaj, and Grover, 2003; El-Tayeh, and Gil, 2007; Gupta, Mattarelli, Seshasai, and Broschak, 2009; Yoo, 2013; Ellison, Gibbs, and Weber, 2015).

However, it is not a given, that knowledge sharing using information and communications technology is a one way street or problem free; it is an interactive process that recurs over a period of time (Leonard Barton, 1995; Lam, 1997; Alavi and Leidner, 1999; Hwang, Singh and Argote, 2015). Moreover scholars report that while the availability of the different information and communications technology is no guarantee for knowledge sharing, they

enable interaction and encourage participation (McDermott, 2000; Pan, and Leidner, 2003; Sambamurthy, and Subramani, 2005; Payne, 2008; Wasko, Teigland, and Faraj, 2009; Gibbs, Rozaidi, and Eisenberg, 2013; Cascio, and Montealegre, 2016; Benitez, Castillo, Llorens, and Braojos, 2018). Therefore, Socialising and interacting over time using electronic socialisation interaction within organisations will enable the building up of a shared language, for establishing and becoming familiar with a shared context, norms, organisational values and trust (Boland and Tenkasi, 1995; Wasko and Faraj, 2000; Flanagin, and Waldeck, 2004; Taylor, and Murthy, 2009; Dingler, and Enkel, 2016).

Subsequently, individuals will through recursive electronic socialisation establish links with individuals in dynamic stable networks (experts who have been in the organisation for a while) within the organisation across organisational and functional boundaries (McDermott, 1999; Nonaka, Toyama, and Konno, 2000; Hsu, Ju, Yen, and Chang, 2007; Wasko, Teigland, and Faraj, 2009; Johnson, 2013; Wang, Tseng, and Yen, 2014). Moreover, Asadifard Tabatabaeian, Sofi, and Taghva, (2017), note the presence of active and dormant ties within stable networks. Electronic socialisation will enhance scaling up the reactivation of dormant ties and widening the scope of interaction for the active ties (Flanagin, and Waldeck, 2004; Wasko, Teigland, and Faraj, 2009; Quintane, Pattison, Robins, and Mol, 2013 Asadifard Tabatabaeian, Sofi, and Taghva, 2017). Also, Wasko, Teigland, and Faraj, (2009) in their study on electronic networks of practice found that individuals in these networks are found to be experts who are likely to form a critical mass that contain both strong and weak ties to share knowledge and maintain the stability of the network. Moreover, a stable network is deemed more valuable as it tends to include individuals that are reliable and dependable (Carley, 1991; Kilduff, Tsai, and Hanke, 2006; Farjoun, 2010; Lefebvre et al, 2016; Asadifard et al, 2017).

According to Butts, Becker, and Boswell, (2015) electronic mail socialisation is now the preferred way of interacting and communicating in the workplace and is perceived to increase with the advent of digital technology. Additionally electronic mail socialisation will enable knowledge sharing and recombination at a faster rate with a variety of people than face to face interaction (Flanagin and Waldeck, 2004; El-Tayeh, and Gil, 2007; Kupritz, and Cowell, 2011; Butts, Becker, and Boswell, 2015). Accordingly, Aral, Brynjolfsson, and Van Alstynne, (2012), note that acquiring diverse knowledge through electronic socialisation is cost effective and will enable multitasking and increase productivity. Additionally, effectively disseminating knowledge through electronic socialisation will ensure knowledge is not outdated or irrelevant in the fast pace business environment (Cooper, 2003; Cepeda, and Vera, 2007; Fugate et al, 2009; Benitez, Castillo, Llorens, and Braojos, 2018). Thus, electronic socialisation to share knowledge affords flexibility to the organisation to be able to respond in a fast changing business environment (Cingöz, and Akdoğan, 2013; Gunasekaran, Papadopoulos, Dubey, Wamba, Childe, Hazen, and Akter, 2017).

In view of the above discussion we propose that:

H_{2a} Electronic socialisation will positively relate to network ties working advice

H_{2b} Electronic socialisation will positively relate to network stability established contact

H_{2c} Electronic socialisation will positively relate to operations performance

2.4. Social capital

The social capital concept has become topical in the economic, political Science, management and sociological fields in recent years (Bourdieu, 1986; Coleman, 1988; Fukuyama, 1995; Nahapiet and Ghoshal, 1998; Portes, 1998; Adler and Kwon, 2002, Lee 2008; Portes and Vickstrom, 2011; Kwon, and Adler, 2014). However the social capital concept and its subscription to the notion of individuals acquiring goodwill from being part of and participating in activities of a group has its origins in works by social theorist scholars Durkheim and Marx (Portes, 1998; Adler, and Kwon, 2000; Arregle, Hitt Sirmon and Very, 2007; Portes, and Vickstrom, 2011; Kwon, and Adler, 2014). The emphasis on the benefits of belonging to and partaking in group activities help form the basis of sociology (Portes, 1998; Fukuyama, 2001; Bakker, Leenders, Gabbay, Kratzer, and Van Engelen, 2006; Gooderham, Minbaeva, and Pedersen, 2011; Kwon, and Adler, 2014).

Indeed, scholars reveal that the social capital concept was essentially coined for repositioning ideas that have long been present in the sociological world (Portes, 1998; Edelman, Bresnen, Newell, Scarbrough, and Swan, 2004; Payne, Moore, Griffis, and Autry, 2011; Kwon, and Adler, 2014). These are often ideas about creating and accumulating goodwill i.e. trust, sympathy and obligations from others that will be beneficial in acquiring knowledge, enabling us to persuade, and having support, as and when required from other individuals within a group (Dore, 1983; Adler and Kwon, 2002; Hsu, 2008; Gooderham, Minbaeva, and Pedersen, 2011; Lin, and Lo, 2015). Central to the social capital concept is the notion of the individual and or members of the community acquiring positive or arguably negative goodwill from being part of and participating in a group (Portes, 1998; Oh, Chung, and Labianca, 2004; Oh, Labianca, and Chung, 2006;

Kawachi, Subramanian, and Kim, 2008; Rothon, Goodwin, and Stansfeld, 2012; de Vries, and Kühne, 2015).

Whilst this has always been the case, its embodiment into the social capital concept can be traced to works by Jacobs, 1961; and Loury, 1977 (Portes 1998; Anderson, and Jack, 2002; Liao, and Welsch, 2005; Algezau, and Filieri, 2010; Lester, 2013; Demartini, 2015). Social capital's appeal stems from the tendency to focus not only on the positive gains from its acquisition, but also the potential to accrue power, privilege and influence to individuals, groups or organisations (Bourdieu, 1986; Coleman, 1988; Portes, 1998; Lin, 1999; Burt, 2001; Ballet, Sirven, and Requier-Desjardins, 2007; Gedajlovic, Honig, Moore, Payne, and Wright, 2013; Aldrich, and Meyer, 2015). Although social capital's numerous benefits to communities, neighbourhoods, clubs associations and networks have been lauded (Portes 1998; Wasko and Faraj, 2005; Ganley, and Lampe, 2009; Ansari, Munir, and Gregg, 2012; Kwon, and Adler, 2014; Aldrich and Meyer, 2015). Bourdieu (1986) reveals the inequalities it creates for individuals that are not privileged in belonging to a particular network, family, sport club or association and to the enduring benefits of accruing social capital from belonging to these clubs and associations. Additionally, the definitions of social capital below essentially describe the resources gained by groups or individuals from belonging to a group, community, or network.

2.4.1. Social capital: Some definitions

As the social capital concept grew in popularity so too did the number of researchers and the perspective from which the concept is examined. As a result, there is no commonly accepted definition of the concept in the literature (Bourdieu 1986; Coleman, 1988; Portes,

1998; Adler and Kwon, 2002; Wasko and Faraj, 2005; Walter, Lechner, and Kellermanns, 2007; Portes and Vickstrom, 2011; Kwon, and Adler, 2014; Zheng, Li, Wu, and Xu, 2014). For example, some definitions focus on the resources gained from being embedded in social relations as social capital: *the ability of actors to secure benefits by virtue of membership in social networks or other social structures* (Portes, 1998:6).

In addition Bourdieu's (1983) characterisation of the social capital concept is that of the potential or actual acquired resources of relationships between groups and classes. Building on Bourdieu's definition Coleman (1988:s98) defines social capital as *not a single entity but a variety of different entities with two elements in common ... aspects of social structures and to facilitate certain actions of actors*. Moreover, others chose to explain social capital as both the resources and the relationships through which these resources are obtained. Schiff (1997:160) explains social capital as *the set of elements of the social structures that affects relations among people and are inputs or arguments of the production and/or utility function*. This definition bears similarities to Burt's who describe social capital as: *friends, colleagues, and more general contacts through which you receive opportunities to use other forms of capital* (Burt, 1992:9).

Furthermore, other scholars define social capital as *the aggregate of the actual potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance or recognition* (Bourdieu 1986, p. 248; Bourdieu and Wacquant 1992). A snap shot of the existing definitions of social capital in the literature underscore the elasticity of the social capital concept and its application to the various areas of research interest (Adler and Kwon, 2002; Wasko and Faraj, 2005;

Walter, Lechner, and Kellermanns, 2007; Portes and Vickstrom, 2011; Kwon, and Adler, 2014).

Additionally, the numerous definitions reveal the many facets of social capital which increases its flexibility, application and appeal in finding answers to various research questions including knowledge sharing socialisation mechanisms, structural capital and organisational performance (Nahapieth and Ghoshal, 1998; Tsai, 2001; Chiu, Hsu, and Wang, 2006; Chang, and Chuang, 2011; Park and Lee, 2014; Lin and Lo, 2015). While Table 2 is not an all encompass list of all the definitions of social capital in the literature it demonstrates the many facets of social capital.

Table 2 Social Capital Definitions

Author	Definitions	Focus
Baker (1990)	A resource that actors derive from specific social structure and then use to pursue their interest; it is created by changes in the relationship among actors (:619)	Structural capital / resources / Relational capital
Bourdieu (1985)	An 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 or recognition (:248)	Structural capital /Resources/Social structure
Bourdieu and Wacquant (1992)	The sum of the resources, actual or virtual, that accrue to an individual or a group by a virtue of possessing a durable network of more or less institutionalized relations of mutual acquaintance and recognition (119)	Resources/social structure
Nahapiet and Ghoshal (1998)	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. Social capital thus comprises both the network and the assets that may be mobilized through that network (:243)	Resources/Social structure
Coleman, (1988a S98; 1990:302)	A variety of entities with two elements in common: they all consist of some aspect of social structure, and they facilitate certain actions of actors, whether persons or corporate actors within the structure	Social structure
Putman (1995)	Features of social organisations such as networks, norms and social trust that facilitate coordination and cooperation for mutual benefits (:67)	Social structural/Relational capital
Fukuyama (1995)	The ability of people to work together for common purposes in groups and organisations (:10).	Relational capital
Fukuyama (1997)	Social capital can be defined simply as the existence of a certain set of informal values or norms shared among members of a group that permit cooperation among them	Relational capital
Woolcock (1998)	The information trust and norms of reciprocity inhering in ones social networks (:153)	Relational capital
Inglehart (1997)	A culture of trust and tolerance, in which extensive networks of voluntary association emerge (188)	Relational capital
Loury (1992)	Naturally occurring social relationships among persons which promote or assist the acquisition of skills and traits valued in the marketplace an assets which may be as significant as financial bequests in accounting for the maintenance of inequality in our society (:100)	Relational capital/resources
Schiff (1992)	The set of elements of the social structures that affects relations among people and are inputs or arguments of the production and/or utility function (:160).	Structural capital
Portes and Sensenbrenner (1993)	Those expectations 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 (1323)	Relational capital
Burt (1992)	Friends colleagues and more general contacts through whom you receive opportunities to use your financial and human capital	Structural capital
Boxman, Graaf and Flap (1991)	The number of people who can be expected to provide support and the resources those people have at their disposal (:52)	Structural capital Resources
Portes (1998)	The ability of actors to secure benefits by virtue of membership in social networks or other social structures (:6)	Structural capital

Source: Adapted from Adler and Kwon (2000).

The definitions in Table 2 of Baker (1990); Bourdieu (1985); Bourdieu and Wacquant (1992); Nahapiet and Ghoshal, (1998); Coleman, (1988a S98; 1990:302), Schiff (1992), Burt (1992); largely seems to focus on structural capital, which is a facet of social capital to acquire resources. Meanwhile Portes (1998); Fukuyama (1995; 1997); Woolcock (1998); Inglehart (1997); Thomas (1996); Loury (1992); Portes and Sensenbrenner (1993)'s definitions demonstrate a focus on the relational capital facet of social capital. Putman (1995), on the other hand included both structural and relational aspects of social capital and the resources that will be accrued.

Moreover what these variations in definitions reveal is the multidimensionality of the social capital concept and the relational, cognitive and structural facets that enable the acquisition of resources (Nahapiet and Ghoshal, 1998; Koka. and Prescott 2002; Valenzuela, Park, and Kee, 2009; Carey, Lawson, and Krause, 2011; Zheng Li, Wu, and Xu, 2014; Fiorillo, and Sabatini, 2015). Hence for the purpose of this study following Nahapiet and Ghoshal, (1998), we 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. Social capital thus comprises both the network and the assets that may be mobilized through that network* (:243) Adler and Kwon (2000), concur with the above view, and in their definition note that social capital is a configuration of the network and the resources therein.

Moreover social capital, financial capital and cultural capital are all easily exchanged in enduring networks where they have been accrued (Bourdieu, 1985; Burt, 1992; Adler and Kwon, 2002; Li, 2004; Drori, Honig, and Wright, 2009; Prashantham, and Dhanaraj, 2010; Light, and Dana, 2013; Tran, 2016). Although these forms of capital make valuable

contributions when effectively utilised in organisations, attaching the capital label to social capital remains debatable for some economists (Di Maggio, 1979; Baron and Hannan, 1994; Robison, Schmid, and Siles, 2002; Manning, 2010; Kwon and Adler, 2014). The above scholars lament the watering down of the term capital, because for these scholars *unless a characteristic is regarded as an investment for which there is a capital market and opportunity cost, we fail to see the value of calling it capital* (Baron and Hannan, 1994:14).

However other scholars view associating the social capital concept with the capital label appropriate and useful and present a more holistic picture of the value of an organisation (Nahapiet and Ghoshal, 1998; Adler and Kwon, 2000; Park and Lee, 2009; Kwon and Adler, 2014; Tran, 2016). Examples include intellectual capital defined as: *the economic value of two categories of intangible assets of a company namely, organisational - structural capital and human capital* (Petty and Guthrie, 2000:158). In addition the social capital concept is equated to other types of capital because it is durable in the sense that time and effort can be spent in making it beneficial to the individual or organisation (Coleman, 1988; Adler and Kwon, 2002).

Moreover social capital is also noted to be “convertible” to economic capital although not as readily as financial capital (Bourdieu, 1985; Burt, 1992; Smart, 1993; Adler and Kwon, 2002; Li, 2004; Drori, Honig, and Wright, 2009; Prashantham, and Dhanaraj, 2010; Light, and Dana, 2013; Tran, 2016). Likewise, Coleman (1988) reveal that like other forms of capital, social capital is also “appropriable”, as it can be used for accessing resources at a later date even if this was not intended when social capital was acquired. Within organisations interacting using knowledge sharing mechanisms and social capital will

enable knowledge sharing (Nahapiet and Ghoshal, 1998; Tsai, 2002; Wasko and Faraj, 2005; Yang, and Farn, 2009; Hau, Kim, Lee, and Kim, 2013; Yao, Tsai, and Fang, 2015).

Additionally, scholars also argue that social capital is useful where financial capital is lacking or inappropriate for acquiring valuable knowledge that will be used effectively to influence the performance of the organisation (Petty and Guthrie, 2000; Adler and Kwon, 2002; Huysman, and Wulf, 2006; Chang and Chuang, 2011; Lin and Lo, 2015). Moreover, social capital increases with use and obligations, does not depreciate in value when acquired or deferred for use at a later date (Bourdieu, 1985; Coleman, 1988; Nahapiet and Ghoshal, 1998; Hansen, Mors, and Lovas, 2005; Walter, Lechner, and Kellermanns, 2007; Bourdieu, 2011; Ellison, Gibbs, and Weber, 2015). Whilst the focus of this study is on structural capital the other dimensions of social capital will be reviewed.

2.4.2. Cognitive capital

The cognitive dimension of social capital refers *to those resources providing shared representation, interpretations and systems of meaning among parties* (Nahapiet and Ghoshal, 1998:244; Bolino, Turnley, and Bloodgood, 2002; Chiu, Hsu, and Wang, 2006; Kwon and Adler, 2014). This aspect of social capital represents the tacit dimension that can include shared language values and norms within the organisation that may enhance knowledge sharing (Lin, and Lee. 2006; Lee, and Ahn 2007; Yang and Farn, 2009; Zheng, Li, Wu, and Xu, 2014; Jiang, and Liu, 2015).

As individual within the organisation interact they may develop the expertise and skills required to work within the organisation and words and jargons with which to express these perspectives within the organisation (Brown and Duguid, 1991; Wasko and Faraj, 2005;

Yang, 2007; Yang and Farn, 2009; Chang and Chuang, 2011; Yu, Hao, Dong. and Khalifa, 2013; Pan, Xu, Wang, Zhang, Ling, and Lin, 2015). Consequently individuals could share their ideas, experiences and expertise with others within the organisation. However, this study will only focus on the structural characteristics of social capital. The next section discusses relational capital.

2.4.3. Relational capital

The social capital concept is different things to many researchers across various research disciplines and policy makers (Prusak and Borgatti, 2001; Adler and Kwon, 2002; Lee, 2008; Chang and Chuang, 2011; Wang, Wang and Liang, 2014). The reason perhaps for Nahapiet and Ghoshal (1998)'s valuable contribution is in tapering the numerous characteristics of social capital into three interrelated dimensions. Namely relational capital explained as the personal relationships that develop amongst individuals through interactions over a period of time (Granovetter, 1973; Cousins et al, 2006; Chow and Chan, 2008; Chang and Chuang, 2011; Park and Lee, 2014).

Moreover, the success of these personal relationships is largely based on trustworthiness, trust, obligations and expectations and commitment amongst others (Coleman, 1988; Burt, 1997; Fukuyama, 1995; Ipe, 2003; Hsu, Ju, Yen, and Chang, 2007; Chen, Lin, and Yen, 2014). However relational capital could only be realised if individuals within the organisation develop a strong common identity with others within the organisation (Adler and Kwon, 2002; Bolino, Turnly and Bloodgood, 2002; Maurer and Ebers, 2006; Hsu and Lin, 2008; Carmeli, Atwater, and Levi, 2011; Pinjani, and Palvia, 2013; Zhang, and Jiang, 2015). Individuals, who see themselves as part of a collective within the organisation, will

over a period of interaction be able to develop trust, obligations and codes of practice that will enhance knowledge sharing within the organisation (Putman, 1995; Li, 2005; Chow and Chan, 2008; Park and Lee, 2014).

Furthermore individuals may arguably be more willing to share knowledge with others because of the relational capital that has been acquired. Although this could be beneficial to the individual and subsequently the organisation, the focus of this study is on the structural aspect of social capital and how it will enable knowledge sharing to influence organisational performance. Thus, the current study is focused on facets of structural capital.

2.4.4. Structural capital

The structural facets of social capital include network configuration, network ties, network stability, and centrality dimensions (Nahapiet and Ghoshal, 1998; Adler and Kwon, 2002; Moran, 2005; Kwon, and Adler, 2014). Moreover, structural capital derives from the social network theory, social exchange theory, and social capital theory (Burt, 1997; Nahapiet and Ghoshal, 1998; Cropanzano and Mitchell, 2005; Kwon, and Adler, 2014). Structural capital refers to social interactions which enhance communication, cooperation, collaboration, affiliation and social support, and sharing knowledge among network members (Nahapiet and Ghoshal, 1998; Chiu, Hsu, and Wang, 2006; Maurer, Bartsch, and Ebers, 2011; Lefebvre et al, 2016). Also structural capital is the patterns of connections between actors – *that is, who you reach and how you reach them* (Nahapiet and Ghoshal, 1998:244; Burt, 1992; Kwon, and Adler, 2014). Thus structural capital involves the pattern or structure of

the overall network of relationships (Granovetter, 1985; Tsai and Ghoshal, 1998; Oh, Choi and Kim, 2006; Lefebvre et al 2016).

The above description is supported by Casanueva and Gallego (2010:107), whose description emphasises the *particular arrangement* of the ties in the network. Accordingly Burt (2000:348) notes that *better connected people enjoy higher returns*. Thus whilst being better connected remains valuable it is the particular arrangement of ties and the structure of the ties that will enable the sharing of valuable useful knowledge (Yli-Renko, 2001; Casanueva and Gallego, 2010; Yu et al, 2013). Moreover, structural capital is the links individuals in organisations make and try to maintain (Adler and kwon, 2002; Lefebvre et al, 2016). Furthermore, structural capital is the structure and patterns of links and ties that an individual has and coordinates to access performance enhancing knowledge (Requena, 2003; Casanueva and Gallego, 2010; Zheng et al, 2014).

Moreover, structural capital facilitates the intensity of connections among network members (Tsai and Ghoshal, 1998; Tsai, 2002; Subramaniam and Youndt, 2005; Tran, 2016). Structural capital is also viewed as the strength of ties that support social interactions, connections, and knowledge sharing (Nahapieth and Ghoshal, 1998; Inkpen, and Tsang, 2005; Prashantham, and Dhanaraj, 2010; Light and Dana, 2013; Aldrich et al, 2015). Additionally, structural capital is critical in the timely sharing of knowledge, ideas and expertise and in fostering cooperation amongst individuals (Podolny and Baron, 1997; Gargiulo and Benassi, 2000; Ballet et al, 2007; Chang and Chuang, 2011, Zheng et al, 2014). However, as Bourdieu (1986:249) notes *the existence of connections is not a natural given or even a social given – it is a product of endless efforts*.

On the other hand Granovetter (1973) notes the usefulness of weak ties in linking members of different groups and the opportunities of sharing new knowledge. While these are no doubt important contributions to the literature, they presume static organisations and individuals and fail to acknowledge the ebb and flow of organisational life, wherein individuals leave and join organisations or move on to other departments/ functions and units (Tsai, 2000; Kilduff, Tsai and Hanke, 2006; Pelling, High, Dearing, and Smith, 2008; Jones, 2010; Ansari et al, 2012; Petrou, Demerouti, and Schaufeli, 2015). Moreover, Ahuja (2000) in examining collaboration networks in inter-firm networks note that no optimal structures exist; rather the objectives should guide the choice of structure in sharing knowledge.

Organisations are characterised by specialities and expertise grouped within different functions, units and departments whose ideas and skills and expertise may well be homogenous (Burt, 2004). Burt's (2004:350)'s work on structural holes and good ideas is intersperse with opinions from Adam Smith (1766; 1982:539) who note that contact with and interacting with others outside departments, functions and units *expands and enlarges the mind and is one of the primary sources of progress*. Therefore there is a need for these individuals to link and connect with others from other departments, functions and units within the organisation to share new knowledge, ideas and expertise that will be recombined and reconfigured for the common good of the organisation (Brass, 1984; Adler and kwon, 2002; Burt, 2004; Walter et al, 2007; Lin and Lo, 2015). Consequently, organisations need to facilitate the efforts of individuals in using the appropriate facets of structural capital (network ties, centrality stability and configuration) to enhance the sharing of knowledge and discourage stagnation and the not invented here syndrome (Katz, and

Allen, 1982; Szulanski, 1996; Agrawal, Cockburn, and Rosell, 2010; Antons, and Piller, 2015).

Nahapiet and Ghoshal (1998)'s seminal work explore network configuration, ties, stability and centrality. Other scholars explore network closure (Coleman, 1988), structural holes (Burt, 1992); network centrality (Ibarra, 1993; Brass and Burkhardt, 1993); and network stability (Carley, 1991). Moreover, Tsai (2001), examine network centrality and knowledge transfer. While Burt (2000) acknowledge that although structural holes are good, network closure is essential in sharing complex tacit knowledge. However, few studies examined the above constructs holistically. Moreover few studies link knowledge sharing socialisation mechanisms the facets of structural capital and organisational performance.

The next sections are a review of the facets of structural capital that are the focus of the study. The facets of structural capital mediate between knowledge sharing mechanisms and organisational performance. For this study they are the network ties, network stability network centrality and network configuration. This chapter presents the merits of using both strong and weak network ties as knowledge sharing mechanisms. Network centrality is also presented explaining the importance of central individuals in sharing knowledge within the organisation. Network stability also explains the importance of individuals who have been in the organisation for a while and their value in sharing knowledge within the organisation. Network configuration explains the significance of all the above in enhancing knowledge sharing within the organisation.

Nahapiet and Ghoshal (1998) building on Granovetter's (1992) structural embeddedness introduce network ties, network centrality, network stability and network configuration

(Yli-Renko, Autio, and Sapienza, 2001; Krause, Handfield, and Tyler, 2007; Reinholt, Pedersen, and Foss, 2011; Fiorillo, and Sabatini, 2015). However, Nahapiet and Ghoshal (1998) refer to structural capital at the organisational level, which assesses the network ties, stability and centralisation of the overall organisation (Wasko and Faraj, 2005: 39). Thus following Wasko and Faraj, (2005), we adopt the centrality of the individual as occupying a central position which affords them many ties, *they are in the thick of things* and central for personal and electronic socialisation to communicate (Freeman, 1979; Krause, Handfield, and Tyler, 2007; Reinholt, Pedersen, and Foss, 2011:1278). We also adopt dynamic stability as it involves *the pattern of interactions*, which is also related to structural capital within the organisation (Nahapiet and Ghoshal, 1998:244; Kilduff, Tsai, and Hanke, 2006:1036).

2.4.4.1. Network ties

Nahapiet and Ghoshal, (1998)'s portrayal of structural and relational embeddedness extended and developed the three interrelated dimensions of social capital namely: relational, cognitive and structural capital (Tsai and Ghoshal, 1998; Krause, Handfield, and Tyler, 2007). Structural capital includes connections and links and interactions amongst individuals within the organisation (Nahapiet and Ghoshal, 1998; Yli-Renko, Autio, and Sapienza, 2001; Wasko and Faraj, 2005; Chow and Chan, 2008; Chang and Chuang, 2011; Hau, Kim, Lee, and Kim, 2013; Lin and Lo, 2015). Individuals can use this connectivity to reach other individuals to share knowledge.

Granovetter (1973) reveals that the sharing of new knowledge is predominantly through weak ties. Weak ties he argues can be boundary spanners and have opportunities to link individuals in different functional and departmental boundaries within the organisation.

Weak ties create opportunities for nonredundant connections with nonredundant and diverse knowledge, ideas and expertise (Granovette, 1973; 83; Levin, and Cross, 2004; Tiwana, 2008; Tortoriello, and Krackhardt, 2010; Tortoriello, Reagans, and McEvily, 2012; Zhou, Zhang, Sheng, Xie, and Bao, 2014; Todo, Matous, and Inoue, 2016).

Conversely, strong ties often result in knowledge that is redundant (Granovetter, 1973; Dyer, and Nobeoka, 2000; Brass, Galaskiewicz, Greve, and Tsai, 2004; Centola, and Macy, 2007; Kilduff, and Brass, 2010; Michelfelder, and Kratzer, 2013; Ellison, Gibbs, and Weber, 2015). Similarly scholars note that strong ties might have knowledge that may be valuable but redundant (Nelson, 1989; Hansen, 1999; Rowley, Behrens, and Krackhardt, 2000; Perry-Smith, and Shalley, 2003; Burt, 2004; Tiwana, 2008; Tortoriello, Reagans, and McEvily, 2012; Michelfelder, and Kratzer, 2013; Ellison, Gibbs, and Weber, 2015).

Nevertheless, scholars reveal that individuals with strong ties are essential in sharing knowledge as the frequency of their interactions would enable the development of trust and familiarity of the knowledge source (Hansen, 1999; Krackhardt, Nohria, and Eccles, 2003; Khoja and Maranville 2009; Baer, 2012). Moreover, scholars note that strong ties are more willing to cooperate especially in uncertain times to share knowledge (Hansen, 1999; Krackhardt, Nohria, and Eccles, 2003; McFadyen, Semadeni, and Cannella Jr, 2009; Rost, 2011; Battilana, and Casciaro, 2013; Todo, Matous, and Inoue, 2016). Also, strong ties are important for sharing tacit complex knowledge and the socialisation among individuals that are strongly connected can enhance absorptive capacity, shared language and understandings to sharing valuable and sensitive knowledge (Granovetter, 1985; Coleman, 1988; Cohen and Levinthal, 1990; Szulanski, 1996; Sparrowe and Liden, 1997; Chowdhury, 2005; Lin, 2007; Maurer, Bartsch, and Ebers, 2011; Roberts, 2015).

However, Granovetter's (1973)'s focus on weak ties seems to indicate a weak tie strong tie divide on either the ability of weak ties to link and provide access to novel, or strong ties to complex knowledge or just the opportunities to do so in a timely manner Granovetter (1973). Also Granovetter, (1973), whilst acknowledging the importance of strong ties in building cohesion amongst individuals also note their potential to demarcate these individuals from the rest of the organisation. Weak ties on the other hand play an important role in the creation of opportunities for individuals not only in accessing novel information but also in sharing it across the organisation (Granovetter, 1973; Hansen, 1999; Cross, and Cummings, 2004; Chow and Chan, 2008; Wang and Noe, 2010; Carmeli, Gelbard, and Reiter-Palmon, 2013; Ellison, Gibbs, and Weber, 2015).

Nevertheless the assumption of the above scholars is that these ties are in a stable structure, and that individuals do not interact with other individuals face to face or electronically in the course of performing their tasks in the organisation (Dyer, and Nobeoka, 2000; Perry-Smith, and Shalley, 2003; Hite, 2005; Mu, Tang, and MacLachlan, 2010; Reinholt, Pedersen, and Foss, 2011; Carnabuci, and Operti, 2013; Wang, 2016). Moreover, the studies do not reflect a holistic picture of network ties by assuming the ties are passive; however, individuals have direct and indirect ties to many others and create and recreate ties (Adler and Kwon, 2002; Perry-Smith, and Shalley, 2003; Balkundi, and Kilduff, 2006; Ganley. and Lampe, 2009; Tortoriello, Reagans, and McEvily, 2012; Fang, Landis, Zhang, Anderson, Shaw, and Kilduff, 2015). Moreover the view that ties are passive is a view that is consider unsustainable in organisational settings, and the gains from such ties are at best temporary (Obstfeld, 2005; Ahuja, Soda and Zaheer, 2009; Oh, and Beckett, 2015; Wang, 2016).

Indeed in organisational life individuals change organisations, functions and departments (Van de Ven, and Poole, 1995; Tsai, 2000; Requena, 2003; Pelling, High, Dearing, and Smith, 2008; Jones, 2010; Petrou, Demerouti, and Schaufeli, 2015). Moreover ties are formed, they morph and can be dissolved leading to a change in the structural capital or pattern of ties (Zammuto, Griffith, Majchrzak, Dougherty, and Faraj, 2007; Ahuja, Soda and Zaheer 2009; Ahuja, Soda, and Zaheer, 2012; Petkova, 2015). In addition Rowley, Behrens and Krackhardt, (2000), note that both strong and weak ties can positively impact organisational performance. Jack (2005); also acknowledge the necessity of using both strong and weak ties as they provide different resources. In essence individuals should use their weak and strong ties to interact and share new valuable knowledge that is dispersed in the heads of other individuals in different areas of the organisation (Tsoukas, 1996; Hasen, 1999; Perry-Smith, and Shalley, 2014; Lin and Lo, 2015). Moreover, tasks differ, knowledge types differ (tacit and explicit), and the costs and efforts in maintaining the two types of ties differ. In view of the above discussion we put forward the following hypothesis:

H_{3a}: Network ties working relationship will positively relate to network centrality direct contact

H_{3b}: Network ties working relationship will positively relate to network working advice

H_{3c}: Network ties working relationship will positively relate to network stability

H_{3d}: Network ties working relationship will positively relate to configuration

H_{3e}: Network ties working relationship positively relate to operations performance

H_{4f}: Network ties work advice will positively relate to network stability

H_{4g}: Network ties work advice will positively relate to network configuration

H_{4h}: Network ties work advice will positively relate to operations performance

Table 3 illustrate studies on both strong and weak ties in the literature.

Table 3 Selected studies on network ties

Author	Research question	Methodology	Results
Garanovetter, M.S. (1973)	The strength of weak ties	Theoretical	<ul style="list-style-type: none"> • Linking micro and macro levels important in developing sociological theory. • Weak ties often denounced as generative of alienation are here seen as crucial to individuals opportunities and to their integration into communities • Strong ties breeding local cohesion, lead to overall fragmentation.
Hansen, M. T. Podolny J. M. Pfeffer, J. (2001)	Investigate whether actors' network structure in a company conveys social capital (as manifested in enhanced performance) or social liability (as manifested in reduced performance).	Two surveys sent out sequentially Within division networks in teams 25 divisions.	<ul style="list-style-type: none"> • Organization network theories of tie strength and structural holes need to be broadened to reject the effects of task differences, network costs, and difficulties in getting others to help
Tenkasi, V.R. and Chesmore, C.M. (2003)	Examine the impact of strong network ties on effective change implementation and use	<p>Inter-unit ties of 329 individuals in 40 units in a large multinational corporation.</p> <p>Assurances: Confidentiality Aggregate results University based research.</p> <p>241 usable responses (73%) Access one of the researchers worked in the org.</p> <p>UNICET 1V Hierarchical Regression</p>	<ul style="list-style-type: none"> • Implementers of change should create strong ties with change recipients units for successful implementation. • <u>Limitations/Future research</u> • An important omission and one they aim to rectify in the future concerns the patterns of intra unit ties (:298). • Did not consider density of within network strong ties.
Hansen, M. T. (1999)	Examine the role of weak ties to transfer knowledge across organisation subunits	120 new product development projects. 41 sub divisions in an electronic company	<ul style="list-style-type: none"> • Weak inter-unit ties help the search for useful knowledge but impede the transfer of complex knowledge which tends to require strong ties between parties.
Tsai, W. (2000)	Investigates why some organizational	Large multinational (food industry) 36	<ul style="list-style-type: none"> • Social capital and strategic relatedness affect the creation of new inter-unit linkages

	units quickly create an interunit linkage for resource exchange (or knowledge transfer) while others take longer to do so	business units Two points on site survey of Directors data collection Internal reports to supplement data analysis. Event history analysis	<ul style="list-style-type: none"> • Prior network centrality, trustworthiness, and strategic relatedness significantly affect the rate of new linkage creation. • Organizational units that are rich in social capital can more quickly create a new linkage for resource exchange. • Organizational units with a higher degree of strategic relatedness likely to more quickly create a new inter-unit linkage to realize the potential synergy in related business operations.
Tsai, W. (2001)	Investigate network position and absorptive capacity on business unit innovation and performance	24 business units in a petrochemical company and 36 business units in a food-manufacturing company	<ul style="list-style-type: none"> • The interaction between absorptive capacity and network position has significant, positive effects on business unit innovation and performance.
Friedkin, N.E. (1982)	Compared strong and weak ties and their contributions of information flow in intraorganisational networks	Mail questionnaire to 851 faculty members of two universities OLS Regression	<ul style="list-style-type: none"> • Strong ties are more important than weak ties in promoting information flow about activities within an organisational subsystem. • Weak ties are important in promoting information flow outside the subsystem. • The strength of weak ties in promoting boundary spanning information flows lie not in their individual efficiency but in their numbers

Source: Author (2015).

2.4.4.2. Network Centrality

The next section explains network centrality. Network centrality is a facet of structural capital. Individuals who occupy central positions in organisations are often associated with having power to do things and often would have access to other individuals with expertise and skills and new ideas (Brass, 1984; Krackhardt, 1990; Wasko and Faraj, 2005; Chow and Chan, 2008; Tortoriello, Reagans, and McEvily, 2012; Lin and Lo, 2015). The resource and the knowledge based views of the firm focus on knowledge within the firm from which organisations must create value (Grant, 1991, 1996; Spender 1996; Darroch, 2005; Chen, and Huang, 2009; Zheng, Yang, and McLean, 2010; Zhou, and Li, 2012; Donate et al, 2015)). Firms will find it difficult to sustain competitive advantage if they are not able to facilitate the interactions of individuals to combine and reconfigure knowledge, skills and ideas to produce goods and services to meet demand (Zahra, and George, 2002; Ambrosini, and Bowman, 2009; Carnabuci, and Operti, 2013; Michailova, and Zhan, 2015).

Being central in an organisational network denotes access to many other ties and resources and power (Rowley, 1997; Gnyawali, and Madhavan, 2001; Brass, Galaskiewicz, Greve, and Tsai, 2004; Borgatti, Mehra, Brass, and Labianca, 2009; Borgatti, and Halgin, 2011; Smith, Halgin, Kidwell-Lopez, Labianca, Brass, and Borgatti, 2014; Sanou, Le Roy, and Gnyawali, 2016). Furthermore, network centrality is described and include in degree centrality and closeness centrality, the former describes the number of nodes or individuals with whom a central individual has direct contacts and the latter explains the sum of the shortest distance from the central individual to others within the network (Borgatti, 2005; Bonacich, 2007; Opsahl, Agneessens, and Skvoretz, 2010; Brandes, Borgatti, and Freeman,

2016). Individuals in a central position in the network will be able to share knowledge using knowledge sharing mechanisms to reach many other individuals at the shortest distance (Freeman, 1979; Ruhnau, 2000; Otte, and Rousseau, 2002; Borgatti, and Everett, 2006; Everett, and Borgatti, 2010; Brandes et al, 2016).

Moreover, Freeman's view is consistent with Faust (1997) who reveals that central nodes can reach a large number of other individuals with new skills, ideas and experiences in a timely manner (Tsai, 2001; Hansen, 2002; Chow and Chan, 2008; Reinholt et al, 2011). In addition centrality relates to how important or visible an individual is within the network (Faust, 1997; Tsai, 2001; Chan, and Liebowitz, 2005;; Leonardi, 2015). Accordingly, scholars reveal that an individual's central position in a network is determined by how active the individual is, and efficient knowledge sharing paths, in essence the knowledge sharing mechanisms utilized in connecting to other individuals within the network (Faust 1997 Ahuja, Galetta and Carley, 2003 Wasko and Faraj, 2005; Chow and chan, 2008; Reinholt et al, 2011; Lin and Lo, 2015). In view of discussions above we propose that:

H_{5a} Network centrality direct contact will positively relate to Network centrality immediate access

H_{5b}: Network centrality direct contact will positively relate to Network ties work advice.

H_{5c}: Network centrality direct contact will positively relate to Network stability established contact.

H_{5d}: Network centrality direct contact will positively relate to Network Configuration

H_{5e}: Network centrality direct will positively relate to operations performance.

H_{6a}. Network centrality immediate access will positively relate to network tie work advice

H_{6b} Network centrality immediate access will positively relate to network stability establish contact

H_{6c} Network centrality immediate access will positively relate to configuration interaction

H_{6d} Network centrality immediate access will positively relate to operations performance

H_{6e} Network centrality immediate access will positively relate to profit performance

2.4.4.3. Network Stability

Network stability describes the degree to which the links or ties in a network change over a period of time (Tichy, Tushman and Fombrun, 1979; Dhanaraj, and Parkhe, 2006; Chow and Chan, 2008; Turrini, Cristofoli, Frosini, and Nasi, 2010; Hurmelinna-Laukkanen, Olander, Blomqvist, and Panfilii, 2012; Levén, Holmström, and Mathiassen, 2014; Lefebvre, Sorenson, Henschion, and Gellynck, 2016). Similarly, Inkpen and Tsang, (2005:153) defined network stability as *change of membership in a network*. A stable network amongst individuals will increase their individual social capital and their ability to share knowledge within the organisation (Inkpen and Tsang, 2005; Nambisan, and Sawhney, 2011; Berglund, and Sandström, 2013; Lefebvre et al, 2016).

The stability dimension of structural capital includes *perfect stability* (e.g. no change in the distribution of knowledge), *time to stability* (e.g. time until the network reaches perfect stability) and *endurance* (e.g. the longer it takes for individuals to only interact within the network) (Carley, 1991:336). These facets of stability relate to links and connection for social interaction in sharing knowledge or information about expertise, ideas or skills of other individuals within the organisation (Tsai and Ghoshal, 1998; Inkpen and Tsang, 2005; Cristofoli et al, 2010; Luo, Du, Liu, Xuan, and Wang, 2015).

Furthermore, research on alliance networks emphasise the importance of stable ties in increasing opportunities and sustaining partnerships (Inkpen and Tsang, 2005; Turrini et al, 2010; Lefebvre et al, 2016). Network forms among alliance partners are noted for high instability rates, and when partners leave the network, the tie is discontinued and knowledge is lost. The reason being that, unlike networks within organisations, alliance

forms of networks do not often work towards common goals (Inkpen and Beamish, 1997; Yan and Zeng, 1999; Dyer, and Hatch, 2006; Nambisan, and Sawhney, 2011; Berglund, and Sandström, 2013; Zimmermann, and Ravishankar, 2014; Lefebvre et al, 2016). Being in a stable network mean individuals are able to conform to norms and habits that encourage knowledge sharing (Grandori, 2001; Wasko and Faraj, 2005; Li, Veliyath, and Tan, 2013; Levén, Holmström, and Mathiassen, 2014; Lefebvre et al, 2016).

In addition a stable network within the organisation reduces time spent cultivating new links and connections for sharing knowledge within the organisation (Sparrow, Liden, Wayne and Kraimer, 2001; Jones, Cline, and Ryan, 2006; Chung, and Jackson, 2013; Ellison, Gibbs, and Weber, 2015). In their study of intra firm networks and knowledge sharing Tsai and Ghoshal, (1998) found social interaction and trust to be significant for knowledge sharing. In networks within the organisation long duration in the network will improve interaction and trust in knowledge sharing among individuals. Carley (1991), proposed a constructural view that attributes the existence of groups to the need for knowledge. In effect networks within organisations exist because of *discrepancies in who knows what* Carley (1991:332).

Thus in challenging economic environments sustaining a stable network within the organisation will enhance knowledge sharing, and limit uncertainty (Droege, and Hoobler, 2003; Inkpen and Tsang, 2005). In addition, the experiences norms and organisational values acquired within a stable network will minimise the not invented here knowledge sharing barrier and encourage individuals to share valuable tacit knowledge (Szulanski, 1996; Huber, 2001; Michailova, and Husted, 2003; Dhanaraj, and Parkhe, 2006; Chow and chan, 2008; Luo, Du, Liu, Xuan,. and Wang, 2015). Accordingly Inkpen and Tsang (2005),

note that sustaining a stable network to enhance knowledge sharing is necessary within the organisation. However being in a stable network or a stable tie could encourage *isolation*, *attrition* and *cliquish* behaviour that could hinder knowledge sharing across the organisation (Cowan, and Jonard, 2009; Suppiah, and Singh Sandhu, 2011; Hurmelinna-Laukkanen, Olander, Blomqvist and Panfilii, 2012; Du et al, 2015)

Conversely, Kilduff et al (2006:1039), in examining social network research liken networks to organisations, in that they're both *rapidly changing engines of creativity and bundles of routines*. A notion Tsai (2000) agrees with, and notes the inevitable ebb and flow of individuals joining and leaving the organisation or network. Thus, while it is inevitable that individuals may leave and join the organisation or the network, the network or organisation will remain stable in the sense that their interacting links remain and the knowledge of who knows what, remains in the network (Kilduff et al, 2006; Oh, Labianca, and Chung, 2006; Flynn, Reagans, and Guillory, 2010; Kleinbaum, and Stuart, 2014).

Hence stability sustains interaction for knowledge sharing, as individuals know that the good turn shown in sharing knowledge will be reciprocated (Ahuja and Carley, 1999; Inkpen and Tsang, 2005; Chow and Chan, 2008; Ahuja, Soda and Zaheer, 2012). Stability in a network facilitates the building up of social capital which enhances the effectiveness of knowledge sharing through social interactions (Nahapieth and ghoshal, 1998; Inkpen and Tsang, 2005; Chow and Chan, 2008; Borgatti, Brass, and Halgin, 2014; Ellison et al, 2015). Moreover stability of the network tie and or position facilitates an understanding of tacit complex knowledge when it is share, and establishes who the experts and people with ideas experiences and skills are within the organisation (Carley, 1991; Kim, Oh, and

Swaminathan, 2006; Mäkelä, and Brewster, 2009; Ahuja, Soda and Zaheer, 2012; Du et al, 2015).

Thus a dynamically stable network is useful in ensuring that knowledge is shared quickly to provide quick responses to customer and competitive threats, stability in the tie or position will also yield knowledge sharing individuals that are reliable and dependable (Carley, 1991; Kilduff, Tsai, and Hanke, 2006; Farjoun, 2010; Lefebvre et al, 2016). According to Kilduff et al (2006), changes in the networks within the organisation vary, dependent on the needs of the individual within the network. Moreover, *knowledge of the circumstances of which we must make use never exists in concentrated or integrated form, but solely as the dispersed bits of incomplete and contradictory knowledge which all the separate individuals possess* (Hayek, 1945: 519). In view of the above discussions we proposed that

H_{7a}: Network stability will positively relate to Network Configuration

H_{7b}: Network stability will positively relate to operations performance.

2.4.4.4. Network configuration

Other aspects of structural capital are the facets of the structure of the network; stability and centrality (Nahapiet and Ghoshal, 1998; Kilduff et al, 2006; Turrini et al, 2010; Hurmelinna-Laukkanen et al, 2012; Ellison et al, 2015). The importance of these facets of structural capital in facilitating knowledge sharing within the organisation is linked to how individuals can share knowledge effectively and efficiently with others within the network (Faust, 1997; Kleinbaum, and Stuart, 2014). In the social capital literature the ease with which individuals share knowledge is often determined by their positions in a network, how central they are in the network, and the stability of the network (Tsai, 2001; Inkpen and

Tsang, 2005; Sasovova, Mehra, Borgatti, and Schippers, 2010; Ellison, Gibbs, and Weber, 2015). There are many groupings in the structure of networks; we focus on the configuration of network ties, stability and centrality as facets that will enhance social interactions and knowledge sharing within the organisation (Inkpen and Tsang, 2005; Chow and Chan, 2008; Reinholt et al, 2011; Ritala et al, 2015). The importance of the configuration of ties and the different structural positions lie in the opportunities it affords the individuals who occupy such positions, and the ties they have that enhance the sharing of knowledge within the organisation in a timely manner (Moran, 2005; Van Wijk, Jansen, and Lyles, 2008; Wang and Noe, 2010; Kleinbaum, 2014).

Moreover, reconfiguring ties and positions facilitates the recombination of knowledge to enhance organizational performance. In addition, while structural capital features prominently in the literature, scholars are yet to reach a consensus on what combination of ties and network positions are most likely to augment knowledge sharing and subsequently the performance of the organisation (Ahuja, 2000; Brass et al 2004; Noorderhaven, 2009; Ellison et al, 2015). Strong ties are bonding and facilitate the sharing of very valuable tacit knowledge (Coleman, 1988; McFadyen et al, 2009; Borgatti, and Halgin, 2011; Carnabuci, and Operti, 2013). However, this bonding characteristic also alienate others that are not part of the strong tie unit or department, and would amongst other things encourage the not invented here syndrome (Granovetter, 1973; Szulanski, 1992; Kathoefer, and Leker, 2012; Antons, and Piller, 2015; Hussinger, and Wastyn, 2016).

Weak ties on the other hand provide opportunities for novel ideas and are very crucial to individuals becoming part of the department or functional group within the organisation (Granovetter, 1973; Baer, 2010; Sandstrom, 2014). This study argues that with knowledge

dispersed and not known in its entirety the combination of strong and weak ties is essential in sharing knowledge within the organisation (Hansen, 1999). Individuals will interact to share knowledge as and when they need to, the type of knowledge (tacit or explicit) required will determine the strength of interaction and subsequently the type of tie (weak or strong) (Granovetter, 1973; 1985; Burt, 1992). In view of the above discussions we proposed that

H₈: Network Configuration will positively relate to operations performance.

2.5. Organisational Performance: Operations Performance

Operations performance is explained as industry accepted indicators of effectiveness and efficiency; they include but are not limited to cost management, quality development/improvement, productivity, responsiveness and flexibility (Samson, and Terziovski, 1999; Figueiredo, 2002; Hervani, Helms, and Sarkis, 2005; Devaraj, Krajewski, and Wei, 2007; Chae, 2009; de Leeuw, and van den Berg, 2011; Aboelmaged, 2014; Wang, Sharma, and Cao, 2016; Hoisl, Gruber, and Conti, 2017). There is however no commonly agreed definition for the flexibility indicator (Suárez, Cusumano, and Fine, 1991; Jordan, and Graves, 1995; Anand and Ward, 2004; Schonenberg, Mans, Russell, Mulyar, and van der Aalst, 2008; Wong, Boon-Itt, and Wong, 2011; Chen, Wang, Nevo, Jin, Wang, and Chow, 2014).

Furthermore, flexibility in operations performance is explained as *an organisation having a range of products or services; or able to develop a range of products and services or increase its activities to meet demand* (Slack and Lewis, 2008: 176). Additionally, Piore (1989), explained flexibility as the ability to effectively respond to changing circumstances in the business environment. Planned flexibility according to scholars affords organisations

time to respond to demanding knowledgeable customers in uncertain competitive environments (Anand and Ward, 2004; Schonberger, Mans, Russell, Mulyar, and van der Aalst, 2008; Wong, Boon-Itt, and Wong, 2011). Moreover, flexibility in this study focuses on production and work productivity. Also production in this study includes quality. Thus, operations performance is critical to profit performance as it drives and sustains competitiveness and presents a holistic picture of organisational performance (Tallman, and Li, 1996; Neely, Adams, and Crowe, 2001; del-Rey-Chamorro, Roy, van Wegen, and Steele, 2003; Tangen, 2005; Naranjo-Gil, Hartmann, and Maas, 2008; Wang and Wang, 2012; Wang et al, 2014; Visnjic, Wiengarten, and Neely, 2016).

In view of the above discussion we propose that

H₈ Operations performance will positively relate to Profit performance

In challenging competitive economic environment knowledge sharing is a necessity if it is to subsequently positively influence organisational performance (Grant, 1996; Bartol and Srivastava, 2002; Srivastava et al, 2006; Ihrig, and MacMillian, 2015). The dominance of knowledge in the knowledge economy characterised by hyper competition, globalisation, short product cycles and time to market, requires a rethink on the measurement of organisational performance (Nickerson, and Zenger, 2004; Battor, and Battor, 2010; Arend, Patel, and Park, 2014). However whilst there are signs of a rethink on the dominance of financial measures over non financial measures of performance, balance sheets remain skewed towards financial measures of performance (Eccles, 1991; Atkinson, and Brander Brown, 2001; Jusoh, Nasir Ibrahim, and Zainuddin, 2008; Van der Laan, Van Ees, and Van Witteloostuijn, 2008; Saeidi, Sofian, Saeidi, Saeidi, and Saeidi, 2015).

Additionally, organisations have become too dependent on traditional financial measures as they are valuable in directing and providing information on how effectively and efficiently resources have been allocated and used and what if any improvements are needed (Bourne, Mills, Wilcox, Neely, and Platts, 2000; Kaplan, and Norton, 2001; Ferreira, and Otley, 2009; Huang, Zhou, and Zhu, 2012; Saeidi et al, 2015). Indeed, performance measurement is defined as the process of quantifying the efficiency and effectiveness of past action, by statistically analysing and interpreting appropriate organisational data (Neely, 1998; 1999; Striteska, and Spickova, 2012; Saeidi et al, 2015). However, the total focus on using only traditional methods to measure the performance of organisations do not portray an all together holistic picture of the organisation in its omission of non financial contributing measures (Ahn, 2001; Lau, 2011; Melnyk, Bititci, Platts, Tobias, and Andersen, 2014).

Additional over reliance of managers on the use of traditional financial measures to account for organisational success has attracted criticisms (Chakravarthy, 1986; Conant, et al 1990; Kennerley, and Neely, 2002; Battor, and Battor, 2010; Arend, Patel, and Park, 2014)). Some of the dissatisfaction is on the sole use of traditional measures and the use of figures that are prehistoric, making organisational managers more incline to focus on short term achievements (Kennerley, and Neely, 2002; Ferreira, and Otley, 2009; Huang, Zhou, and Zhu, 2012; Farre-Mensa, and Ljungqvist, 2016). Also traditional measures of performance and their failure to account for the input of sharing knowledge within the organisation would inhibit managers in sustaining competitive advantage in hypercompetitive business environment where knowledge is increasing playing an important role in the performance of organisations (Ahn, 2001; Battor, and Battor, 2010; Ihrig, and MacMillian, 2015).

However, there are difficulties in measuring the returns and benefits of knowledge sharing mechanisms to the organisation thus, scholars advocate the use of other success indicators like time savings, customer satisfaction; qualified staff, improving work and signal of competence as appropriate non financial performance measures that would subsequently lead to financial measures of performance (Ahn, 2001; Haas, and Hansen, 2007; López-Nicolás, 2011; Asongu, 2015). Additionally, whilst the Balanced scorecard's perspectives may account for the short and long terms and non financial measures, its implementation is time consuming and organisations must remain cautious in its adaption and adoption (Ahn, 2001; Dyer and Hatch, 2006; Nudurupati, Bititci, Kumar, and Chan, 2011).

Table 4 summary of contributors on Performance

Author (s)	Research problem(s)	Methodology	Results	Outcome(s)	Analysis
Weber, Y. (1996)	To examine corporate culture and its influence on the integration process and business performance	Mail survey 185 Top Management Team with 73 responded (39%)	Cultural difference Autonomy removal Commitment Performance Rate of return on asset (ROA)	Cultural differences have destructive effects at least in the bank mergers of the integration process	Regression
Claycombe, C Drogbe, C And Germain, R. (2001)	To investigate the link between applied process knowledge, environmental uncertainty and market performance	Survey 480 questionnaires (faxed) 227 response or (47%) Directors, vice presidents and managers (in purchasing and material) Large manufacturing firms	Applied process knowledge <ul style="list-style-type: none"> ▪ Applied supplier knowledge ▪ Applied internal knowledge ▪ Applied customer knowledge Demand unpredictability Product churning Process change Performance <ul style="list-style-type: none"> ▪ Market performance 	Applied knowledge drives superior performance	covariance
Domke-Damonte, D And Levsen, B.V. (2002)	To examine the influence of internet usage on corporation and performance	Mail survey 143 questionnaires 44 response or (34%) Hotel owners Small hotels (less than 125 rooms)	Co-operative moves Performance <ul style="list-style-type: none"> ▪ Competitive moves ▪ Internet usage 	Performance levels are affected by an increase in the number of competitive moves implemented	ANOVA
Drew, W.A.S. (1997)	To examine the influence of benchmarking on organisational performance	Cross-sectional mail survey 825 questionnaire sent to executives and managers 26% response rate	Identifying creative and useful ideas Setting stretch for improvement Identifying best-practices in industry Improving customer	The results support the view that benchmarking can be more than a tool for imitative or collaborative strategies, it helps to generate new ideas and is central to strategic	Correlation

			<p>service/quality Convincing people of the need for change <i>Supporting business performance redesign</i> Developing new products/services</p> <p>Performance</p> <ul style="list-style-type: none"> ▪ Market share ▪ Profitability ▪ Innovation ▪ Increase in growth 	management process as a catalyst for change	
Gopalakrishnan, (2000)	To examine the influence between two types of innovation and organisational performance	Mail survey 365 questionnaires 101 usable response Senior executives	<p>Innovation</p> <ul style="list-style-type: none"> ▪ Magnitude ▪ Speed <p>Performance</p> <ul style="list-style-type: none"> ▪ Return on assets 	The results indicate support that speed of innovation and magnitude is linked to different measures of performance. And although innovation speed resulted in positive financial performance, analysis show it is not associated with executives positive perception of performance	Multiple Regression
DeCarolis, and Deeds, (1999)	To investigate the impact of stocks and flows of organisation knowledge on firm performance	98 firms in the biotechnology industry (firms that went public after 1982) Data from prospectus	<p>Knowledge flows</p> <ul style="list-style-type: none"> ▪ Location (Number of medical, bioengineering schools) ▪ High technology employment <p>Knowledge stocks</p> <ul style="list-style-type: none"> ▪ Products in the pipe line ▪ Citations <p>Performance</p> <ul style="list-style-type: none"> ▪ Initial public offering 	Strong statistical support for the influence of knowledge flows and stocks on firm performance	Regression
Nelson, M.K. and Coopridr, G.J. (1996)	To examine the Concept of shared Knowledge between information systems groups and their customers and	86 groups survey 65% response first level IS personnel Pharmaceuticals Insurance Consumer goods	<p>Shared knowledge</p> <ul style="list-style-type: none"> ▪ Trust ▪ Influence <p>Multiplicative</p> <ul style="list-style-type: none"> ▪ IS role ▪ Line role 	The results indicate that mutual trust and influence between IS groups lead to increased levels of shared knowledge This shared knowledge in turn is a positive	Path Analysis

	it Influence on performance	Computer manufacturing automotive	Performance <ul style="list-style-type: none"> ▪ Operational ▪ Service 	contributor to IS group performance	
Tsai, W. (2001)	To examine the interaction between absorptive capacity and network and business unit innovation and performance	Mail survey 120 (100%) response rate (Directors, Deputy Directors of Multinational Corporations)	Unit position centrally High absorptive capacity Network position Performance <ul style="list-style-type: none"> ▪ Business unit ▪ ROI 	Absorptive capacity significantly affects business unit innovation as well as their performance	Regression

Source: Author 2016

Table 4 illustrates various metrics used to measure performance. Therefore, there is a need for the use of non-financial measures to measure organisations performance (Wooldridge and Minsky, 2002, Inkpen and Dinur, 1998). These measures will show a healthier organisational picture (Eccles, 1991). Moreover, managers adopting these measures will be able to focus on the future, and not just the present. Kaplan and Norton (1992) suggested the balanced scorecard concept, which combines financial and non-financial to measure business performance. Therefore, this study will use financial and non-financial metrics to measure the business performance.

2.5. Research conceptual framework

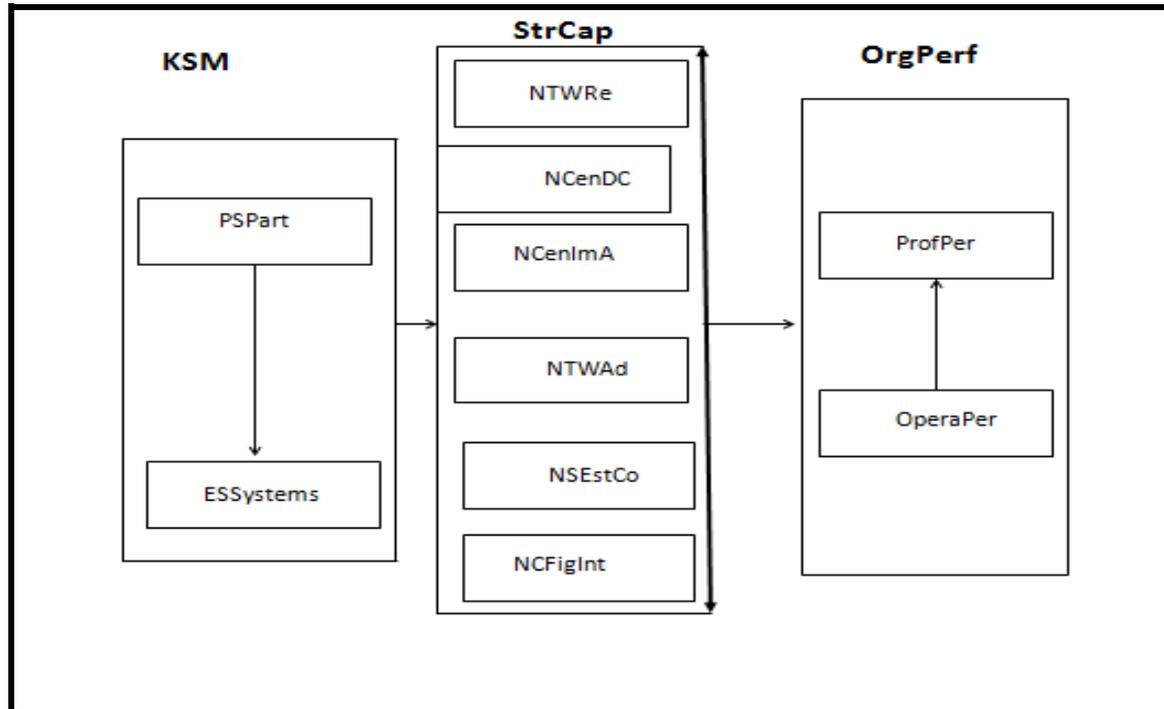
The examination of the literature shows that some scholars have attempted to examine in isolation knowledge sharing socialisation mechanisms structural capital, and organisational performance (OP). There are considerable advances in the literature, with various studies which have explored Knowledge sharing mechanisms (Hasen, 1999; Boh and Wong, 2013); Socialisation mechanisms (Lawson et al, 2009); structural capital dimensions such as network ties (Nahapieth and Ghoshal, 1998, Tsai, 2000, Alder and Kwon. 2002), network stability (Carley, 1991; Inkpen and Tsang, 2005), and network centrality (Faust, 1997; Ahuja, Galetta and Carley, 2003; and Wasko and Faraj, 2005).

However, scholars who examine knowledge sharing mechanism categorised the mechanisms following the tacit explicit categorisation of knowledge. Therefore the literature remains fragmented and incoherent (Yli-Renko, Autio, and Sapienza, 2001). Furthermore, there is little discourse about the relationships between the above mentioned constructs relating to empirical studies in this field. Therefore this study, proposes the following hypothetical framework in figure 1. Consequently, this study examines the

relationship between knowledge sharing socialisation mechanisms, on organisational performance through the mediating role of structural capital.

Based on the above discussions, this study proposes a conceptual framework showing the direct and indirect relationships between the constructs and dimensions of the study. Figure 1 shows the proposed relationships between research variables. These relationships will form the research hypotheses which will lead to the formulation of research of the research aim and objectives.

Figure 1: Knowledge sharing mechanisms structural capital and organisational performance.



Note: KSM = Knowledge sharing mechanisms; StrCap = Structural capital; OrgPerf = Organisational performance.
 PSPart = personal participation socialisation; ESSystems = Electronic socialisation systems.
 NTWRe = Network tie Relationship; NCenDC = Network centrality direct contact;
 NCenImA = Network centrality immediate access; NTWAd = Network tie work advice; NSEstCo = Network stability establish contact;
 NCFigInt = Network configuration interaction; ProfPer = Profit performance; OperaPer = Operation performance

Source: (Author, 2016)

The proposed conceptual framework depicted in Fig. 1, postulates direct and indirect effects of KSMs and the mediating role of structural capital on organisational performance. This study proposes the above conceptual model based on theoretical foundations which lead to the formulation of the research aim and objectives.

2.6. Summary

The preceding chapter reviewed knowledge sharing mechanisms, structural capital and organisational performance. It explored the categorisations of knowledge and knowledge sharing mechanisms in the literature. The chapter also examined knowledge sharing mechanisms and their importance in knowledge sharing. The study adopted a complimentary view of the mechanisms used to share knowledge, and on the tacit and explicit knowledge debate in the literature. The facets of structural capital were also explored. A conceptual framework is also proposed.

Chapter Three: Research Methodology

This chapter explains the research methodology adopted to validate the research. It goes on to explain the research paradigm, epistemological and ontological assumptions of this study. Additionally the study's research design and research approach are explained. Further explanations of the data collection method, sample selection and operationalisation of the research constructs are also provided. Details of the pilot study undertaken, administration of the questionnaire are also presented. Descriptions of the reliability and validity of the research instrument as well as the ethical issues taken into consideration in the course of conducting the research and a summary are presented.

Previous studies have discussed knowledge sharing mechanisms, structural capital and the organisational advantage or organisational performance (Nahapiet and Ghoshal, 1998; Tsai, 2001; Boh, 2007; Boh and Wong, 2013). In addition, there are studies on intra-organisational networks and the structural influence of an individual in the network within the organisation (Brass, 1984; Tsai and Ghoshal, 1998) and linkages within the organisation (Tsai, 2000). Boh, (2007) also examines mechanisms for sharing knowledge while Wasko and Faraj (2005) study sharing knowledge and electronic networks. However, few studies examine the relationship between Knowledge sharing mechanisms, structural capital and organisational performance. A conceptual framework is proposed, and a research question and hypotheses are formulated.

To answer the research question the next section describes the research methodology that was adopted.

Moreover the study will discuss the philosophical stance and the research approaches that were adopted for the study. In addition, the methodological approach to collect and analyse

the data for the study will be explained. The philosophical position and the methodological approach employed in the study considered the aim, objectives, research questions, hypotheses and the theoretical and contextual frameworks. The philosophical stance of the study was established at the inception of the study as it helped in determining the research design of the study (Easterby-Smith, Thorpe, and Jackson, 2008).

3.1.1. Research Paradigms

A research paradigm guides the researcher through the research process and is defined as *a philosophical framework that guides how scientific research should be conducted* (Collis, and Hussey, 2009:55). Furthermore a number of authors concur that these basic assumptions encompassed by the research paradigm seek to guide the researcher on their epistemological assumption (what the researcher will accept as valid knowledge); ontological assumption (the stance they will adopt on social reality); axiological assumption (value free or have values) and methodological assumptions (methods that will be used to conduct the research) (Collis, and Hussey, 2009; Saunders, Lewis, and Thornhill, 2007). Thus, given their importance on the research process, the above assumptions were accorded careful consideration by the researcher during the course of conducting the research (Bryman and Bell, 2007).

Moreover, (Mackenzie, and House, 1978), state that the research paradigm is the *scientific set of universally accepted rules, methods and beliefs* that give purpose to the research being conducted. These definition and explanations are a variation on the description of paradigm following the work of Kuhn (1962), who according to (Deshpande, 1983:101), describe *a paradigm as a set of linked assumptions about the world which is shared by a community of scientist investigating the world*. Hence it is established that a research

paradigm is a set of philosophical values which encompass epistemological ontological, axiological and methodological assumptions (Berthon, Nairn, and Money, 2003; Collis, and Hussey, 2009). And more importantly these assumptions are connected, intertwined and follow the same orientation (Deshpande, 1983; Saunders, Lewis, and Thornhill. 2007).

3.1.2. Epistemological Assumption

The epistemological assumption deals with what is acceptable as knowledge in the chosen area of the researcher (Creswell, 1994; Collis and Hussey, 2009). Furthermore there is a focus *on the relationship between the researcher and what is being researched* (Collis and Hussey, 2009:59). Epistemological assumptions also decide what the truths are and how researchers arrive at truth claims. Additionally, a theory that is considered true by an epistemological stance is one that has been rigorously tested Chua (1986). As a result, the researcher conducted research that is value free and objective and mainly used statistics to present data (Saunders et al, 2007). Moreover, this study adopted the above stance in adding to the body of knowledge and did so by following the positivist way of conducting research (Saunders et al, 2007). There are several perspectives in the literature that can be adopted in developing new knowledge; the three dominant ones in management research are positivism, interpretivism and pragmatism (Saunders et al, 2007).

3.1.3. Positivism

Positivism describes a perspective which was developed from the natural sciences; accordingly social reality is objective and value free from being researched and the researcher (Collis and Hussey, 2009). Researchers adopting a positivist stance use deduction to conduct research (Bryman and Bell, 2007). Positivism is the stance where

acceptable and valid knowledge is that which can be observed and measured (Saunders et al, 2007).

Furthermore in the course of developing new acceptable knowledge the researcher is independent and objective from the research subject so as not to introduce bias (Bryman and Bell, 2007; Collis and Hussey, 2009). The study will be building on previous studies that have observed and measured knowledge sharing mechanisms, structural capital (facets); and organisational performance separately. These studies include Tsai and Ghoshal, 1998; Haas and Hansen, 2007; Hansen, Mors and Lovas, 2005; Yli Renko et al. 2005 and Boh and Wong, 2013). Additionally, these studies were informed by the epistemological point of view, they adopted a positivist stance, relying on a structured method, operationalised constructs so that they are measured, and derived hypotheses that were tested. Additionally the use of statistics was dominant in presenting the data (Saunders et al, 2007; Collis and Hussey, 2009).

3.1.4. Ontological Assumption

The ontological philosophical assumptions and commitments deal with the nature of reality in research (Saunders et al. 2007; Easterby-Smith, Thorpe and Lowe, 2008). The researchers' view of the nature of reality influenced the process of formulating the research question and subsequently how the research was conducted (Bryman, and Bell, 2007). The two facets of ontological assumptions are concern about the objectivity or subjectivity of the existence of social entities and how separate or intertwined they are with the perceptions and world view and commitments held by the researcher (Saunders et al. 2007; Bryman, and Bell, 2007). Accordingly objectivism represent the stance that social entities being studied exist independently from the researcher whilst subjectivism describes the

input of the researcher in generating and regenerating social entities (Saunders et al. 2007). In essence both viewpoints express the degree of influence of the researchers on the participants of the study. This study adopted an objective stance in conducting the research.

3.1.5. Research Design

A research design is defined as a plan that guides the investigator in the process of collecting, analysing and interpreting observations. It is a logical model of proof that allows the researcher to draw *inferences concerning causal relations among variables under investigation* (Nachimias and Nachimias, 1992:77-8; Easterby-Smith, Thorpe and Lowe, 2008). Furthermore, a research design outlines the ways research questions are answered, the methods employed and the time scale involved (Robson, 1993). It is a guide that can be altered to fit the situation, and used to keep the researcher in check (Sekaran, 2003). It is the all encompassing plan for answering the research question empirically (Ghuri and Gronhaugh, 2002). Research designs employed by researchers vary but the cost of the research and the time constraints *should top the list of factors to consider when adopting a research design* (McDaniel and Gates, 1991:56). This is because a research design that is well chosen will instil confidence in the results of the study (Cook et al, 2010). Also the research design entails formulating a research approach and a research strategy (Sekaran, 2003).

Based on the literature review theoretical gaps were identified and led to the formulation of research aim and objectives (Alvesson and Sandberg, 2011). In order to achieve the research aim and objectives, two methodological schools (positivism: deduction and interpretivism: induction) enable the research to be undertaken. This study adopts a positivist stance using a questionnaire survey method to test the formulated hypotheses in

chapter two. Arguably, the chosen methodology is underpinned by some constraints (finance and time for data collection), and researcher's prior skills. In addition, it allows validity and reliability assessment of the research instrument, and has a comparatively quick response rate from a large sample of respondents leading to generalise findings.

3.1.6. Research Approach

Two research approaches are prevalent in management research, the deductive approach and the inductive approach (Saunders, Lewis and Thornhill (2009)). This study used the deductive approach to test the relationship between knowledge sharing mechanism, structural capital and organisational performance. This study conducted a literature review from which several hypotheses were deduced. Additionally we operationalised the constructs and proposed positive relationships between for example: personal socialisation and network ties; personal socialisation and network centrality; personal socialisation and electronic socialisation systems and personal socialisation and organisational performance.

Additionally This study utilized postal and electronic mail survey on the United Kingdom top 500 companies. The decision to use this group of companies was based on of their awareness of knowledge as a strategic resource (Yao, Kam and Chan, 2007). Moreover, they are organizations with over a hundred employees working in functional and departmental areas of these companies. Thus knowledge in the heads of these individuals will be dispersed within these organisations making examining knowledge sharing socialisation mechanisms structural capital and organisational performance important.

A postal survey was utilized because it was cost effective (the envelopes to the respondents were franked and sent from the University of Hull post room). This was very cost effective and gave the envelopes and the survey authenticity. Prior to sending out the questionnaire, it was piloted to iron out potential problems of clarity of constructs; questions; wording and length of the questionnaire. The data was cleaned (check for error and missing data) prior to conducting statistical analysis.

Conversly the inductive approach would entail a using a qualitative approach to generate theories about knowledge sharing mechanisms. Moreover, rather than utilising data sets and employing statistical analysis, here a reflective narrative of the interviews and how they were conducted will be written. There is also less concern about generalising the results beyond the small sample used to conduct the interviews. Moreover the qualitative technique and or method focuses non-numerical data collection through unstructured interviews and the results categorised (Saunders et al, 2007).

The study chose a deductive approach because we needed to explain the relationship between knowledge sharing socialisation mechanism, structural capital and organisational performance. Chosing the deductive approach allowed the use of quantitative technique and or method to use questionnaire to collect data that were measurable and statistically analysed. Furthermore, various authors have used the quantitative methodology in research examining knowledge sharing mechanisms, structural capital, and organisational performance (Tsai, 2002; Hansen, Mors and Lovas, 2005; Lin et al 2006; Chow, et al, 2000; Maurer, Bartsch, and Ebers, 2011). Therefore, the quantitative technique and or method employed to test hypotheses are outlined in this study. Additionally, study adopted deductive approach was adopted because of time and costs constraints.

Table 5 Data collection methods Comparison Questionnaire Personal interview and telephone interview

	Questionnaire	Personal Interview	Telephone Interview	On line
Cost	Lowest	Highest	Intermediate	Intermediate /High
Time required to gather data	Intermediate	Intermediate or greatest	Least	intermediate
Response rate	Lowest	Probably highest	Intermediate	Variable 30% within or internet 10% or lower
Nature of Non-response-rate	Mostly refusals	Two-thirds refusals	Mostly refusals and break-offs	
Item-non response rate	Can be high	Low	Low	variable
Dealing with sensitive topics	Best	Intermediate	Worst	Poor
Dealing with complex topics	Poor	Good	Poor	Poor

Source: Adapted from Kervin (1992:420; Saunders et al, 2007)

Each of the above methods in table 5 has its advantages and weaknesses in (Easterby-Smith, Thorpe, and Jackson, 2008). In addition, none of the above approaches are superior over the other. The chosen approach depended on the research problem being investigated and the resources available (Todd, 1979). In this instance the quantitative approach aimed to obtain data for testing the proposed relationship between knowledge sharing mechanisms Structural capital, and organisational performance.

3.1.7. The Survey method

The mail questionnaire method was adopted in collecting data because of the following reasons. The most frequently considered advantage of mail surveys is their low costs of administration (Bryman and Bell, 2007). Secondly, the study has to be completed within a reasonable time frame. Compared with the other data collection methods, mail surveys allow researcher to reach a dispersed target group, particularly when respondents are difficult to contact (for instance intensity of their work) (Saunders et al, 2007). A mail survey permits respondents to look at the questionnaire several times and complete the questionnaire in their own time. Also the survey method allows respondents to organise their thoughts before responding to the questions, which may reduce respondents' bias (Creswell, 1994; Saunders et al, 2007).

Although there are limitations inherent in the survey we used the mail survey questionnaire, as it is a suitable means of data collection from our large sample of the UK Top 500 companies. Respondents are likely to participate because knowledge sharing mechanisms structural capital and organisational performance might be interesting to them Yli-renko, et al, (2001). Thus the mail surveys provided greater response validity than other methods of collecting primary data (e.g. observation). It allows the application of statistical tests to

verify the internal consistency and validity (e.g. factor analysis, Cronbach Alpha Value), assess the hypotheses with empirical evidence. Examples of studies using mail survey to collect data include Mehra, Kilduff and Brass, (2001); Reagans and McEvily, (2003); and Bartol, Zeng and Wu, (2009).

3.1.8. Sample Selection

The researcher concentrated the research on the U.K. Fortune 500 companies. A comprehensive list of these companies was obtained from the Fame (financial analysis made easy) Database. Although there are other sources that could be utilised for the creation of the population (e.g. Yearbook, Compass, Yellow Pages etc.), the FAME database provides a comprehensive and up-to-date source of information. The database has a compiled list of organisations that have been categorised by industry, turnover, number of employees and regularly updated (Alkaraan and Northcott, 2006). In addition, the fame database covers manufacturing and services industries (Chang, Hughes and Hotho, 2011).

The study focuses on the knowledge sharing socialisation mechanisms individuals will employ to share knowledge at work. Thus chief executive officers, operations managers and managers of departments and or functions within large organisations were targeted as prospective respondents for the study. Chief executives /managers are generally involved in aspects of the organisation's decision making. Their attitudes and judgements with respect to knowledge sharing socialisation mechanisms structural capital and organisational performance are considered to be of great importance in influencing management. Additionally, the support of managers in terms of allocating time and financial sources and assurances of knowledge sharing socialisation mechanisms to employees may help to foster knowledge sharing within the organisation (Lee, Kim, and Kim, 2006).

The UK top 500 companies from the FAME database are the focus of the study because of their awareness of knowledge as a strategic resource. In addition knowledge is often localised and or embedded within departmental and or functional boundaries within organisations making its sharing across the organisation challenging (Hansen, 1999; Holsapple, and Joshi, 2000; Tsai, 2002; Easterby-Smith, and Prieto, 2008).

3.1.9. Questionnaire Design

Data collection will enable the testing of the propositions generated from the literature review. Several sources including, Oppenheim (1994), Bryman and Bell, (2007) have provided practical guidance in designing the questionnaire. They contend that a combination of closed, multiple choice, dichotomous, and scale questions should be used, where they are deemed appropriate. The layout was arranged with the objective of gaining a good response rate (Robson, 1993).

The questions incorporated in the instrument were of two types: questions of a factual nature and attitudinal questions designed to measure the attitudes, perception, beliefs, and relevant characteristics of the respondents. Factual questions comprise the section of the questionnaire on the background of the selected firms. These included questions relating to the primary nature of the business, number of employees etc. An issue in trying to capture the attitudes of the respondents is the level of scale measurement to apply. Past research indicated that ordinal classification of attitude was a more realistic task for respondents than the use of interval measures (King and Marks, 2008; Lee, Lee and Kang, 2005). Thus, an ordinal measurement scale was utilized.

In addition, the use of ordinal level data leaves the researcher with the issue of the nature of rating scale to employ. Examples of distinct usable rating measures are; Likert scale, semantic differential scales, Stapel scale, Guttman scale, Thurstone scale and graphic scale. Each of the scales has advantages and disadvantages (Oppenheim, 1994). A Likert scale is probably the easiest to construct and has the further advantage of being simple to administer. In addition it is amongst the most commonly applied in studies using surveys and questionnaires to collect data (Oppenheim, 1994).

Moreover, in the expectation that managers in organisations are often busy with little time to fill and respond to questionnaire, an easily understood Likert scale appeared to be more feasible than a potentially more precise but more complex one such as a Thurstone scale. Furthermore, Likert scales have been used in research examining areas of knowledge sharing activities (Bock *et al.*, 2005; Lee and Ahn, 2007; King and Marks, 2008). Therefore, the Likert scale is well established in this arena of research. In order to assess the validity of a specified set of practical issues or hypothetical propositions that are examined, it was necessary to develop measures of the conceptual framework. This leads to descriptions of the constructs so that they are measurable on the Likert scale (Collis and Hussey, 2009).

All the focal constructs of the conceptual model were measured using multiple items based on validated scales obtained from the literature (Tsai and Ghoshal, 1998). Then the items were assessed via a five-point Likert-scale ranging from *strongly disagree* to *strongly agree* (Hansen, 1999). Knowledge sharing socialisation mechanisms (P and E socialisation) the facets of structural capital (network tie, network centrality, and network stability and network configuration); and organisational performance, were measured with items adopted

and adapted from the literature (Tsai and Ghoshal, 1998). The process is often referred to as operationalisation whereby the operational measurement items were derived from the empirical literature and *described in such a way that they can be measured* (Collis and Hussey, 2009:60). The constructs and items used to operationalise the instrument were developed following the suggested guidelines of reliability and validity (Churchill, 1979; Nunnally and Bernstein, 1994).

3.1.10. Operationalisation

Operationalisation serves as a bridge between theoretical concept and real-world events or factors. It transforms conceptual constructs by spelling out what the research must do to establish boundaries for the concept. Moreover, this study operationalised the constructs to ensure that the data collected are valid (Churchill, 1979); to enable the interpretation of results and the drawing of strong conclusions from the literature (Hinkins, 1995).

Table 6 Operationalisation of constructs and Items

Constructs	Authentic (Original) Items
<p>Personal Socialisation: Personal socialisation in your organisation: Sharing knowledge, know-how face-to-face in person with colleagues in your organisation (Hansen, Nohria and Tierney, (1999; Nonaka, 1994).</p>	
<p>PS5 Project participation enhances the exchange of knowledge ideas and expertise</p>	<p>Knowledge is shared through the socialisation mechanism formal project structure (Lawson et al, 2009:172).</p>
<p>PS7 Workshops enable making contacts to share knowledge and ideas and expertise</p>	<p>Workshops act to connect individuals across parties (Lawson et al, 2009:157).</p>
<p>PS6 Face-to-face Peer mentoring strengthens my interactions to share knowledge, ideas and expertise</p>	<p>Peer mentoring provides a mechanism for sharing job-related knowledge (Bryant and Terborg, 2008:13).</p>
<p>PS4 Face-to-face presentations enable the communication of ideas and knowledge</p>	
<p>PS3 Visits to other departments enhance face-to-face sharing of ideas and knowledge</p>	<p>Inter unit trips and visits (Bjorkman, Barner-Rasmussen and Li, 2004:449). Engineers visit other divisions and share ideas about possible new products (Hansen, et al, 1999:6).</p>
<p>Electronic Socialisation Systems (Essystem): Electronic Socialisation in your organisation: Sharing know-how, ideas electronically</p>	
<p>ES6 The intranet enables sharing knowledge, ideas and expertise</p>	<p>The intranet fosters person to document knowledge sharing (Boh and Wang, 2013)</p>
<p>ES4 The electronic knowledge repository encourage communication with colleagues to share knowledge and ideas</p>	<p>Knowledge shared through electronic repositories (Hasen el, 1999:2).</p>
<p>ES5 E-mail enhances interaction for sharing knowledge, know-how and expertise</p>	<p>Knowledge is shared via e-mail (Hansen et al, 1999:4).</p>
<p>ES2 Online directories facilitate my connections with</p>	<p>Use online directories to find experts to share knowledge (Alavi</p>

my colleagues in sharing know-how and ideas	and Leidner, 2001)
Network Tie Close Working Relationship (NTWRe): Network Ties (how strong or weak; or close or not so close your ties are with colleagues on average over the past three years within your organisation	(1) How close was your working relationship with each person? (1 = very close; 4 = somewhat close; 7 = distant). (2) How often did you communicate with each person? (1 = daily; 2 = twice a week; 3 = once a week; 4 = twice a month; 5 = once a month; 6 = once every 2nd month; 7 = once every 3 months or less (or never). (3) To what extent did you typically interact with each person? (1 = to no extent; 2 = to little extent; 3 = to some extent; 4 = to a great extent; 5 = to a very great extent (Levin & Cross, 2004, p. 1488). Factor loading above 0.4. Weak ties provide people with access to information and resources beyond those available in their own social circle (Granovetter, 1983: 209)
NT1 I provide work related advice to colleagues I know will reciprocate	
NT2 I confide in colleagues I know will do the same in sharing ideas, knowledge and expertise	
NT3 Colleagues outside my immediate social circle provide opportunities to meet new colleagues to share ideas, knowledge and expertise.	
NT4 Colleagues I know vaguely share knowledge, ideas, insights and expertise beyond what exists from colleagues in my social circle	
NT5 I go to colleagues outside my established contacts for work related advice	
Network Tie Weekly Advice (NTWAd)	
NT10 I communicate with colleagues twice a week to give advice	
NT11 I go once a week to colleagues for advice	
Network centrality Direct Contact (NCenDC): Network Centrality: Your position relative to your colleagues in the organisation as a whole for sharing	Network centrality Respondents were asked to name the people in the agency: 1. With whom you discuss what is going on in the organisation.

<p>knowledge, ideas and expertise</p>	<p>2. Who are important sources of professional advice, whom you approach if you have a work related problem, or when you want advice on a decision you have to make.</p> <p>3. That you can count on whom you view as allies, who are dependable in times of crisis.</p> <p>4. That you have personally talked to over the past couple of years when you want to affect the outcome of an important decision.</p> <p>5. Who are very good friends of yours, people whom you see socially outside of work Ibarra (1993:480).</p> <p>Faust (1997:160) The general notion of centrality encompasses a number of different aspects of “importance” and “visibility” of actors within a network. Common motivation for centrality in one-mode dyadic networks:</p> <ul style="list-style-type: none"> • Actors are central if they are active in a network (motivating degree centrality) • Actors are central if they can contact others through efficient (short) paths (motivating closeness centrality) • Actors are central if they have the potential to mediate flows of resources or information between other actors (motivating betweenness centrality) <p>Actors are central if they have ties to other actors that are themselves central (motivating eigenvector centrality)</p>
<p>NCe1 I can go to top management with a problem and get heard in the organisation</p>	
<p>NCe3 I get asked for my input and advice on work related activities by my colleagues many times</p>	
<p>NCe2 I am in direct contact with many of my colleagues in my organisation</p>	
<p>NCe4 It is not difficult for me to approach senior management with a concern in my organisation</p>	
<p>NCe10 I am very involve with colleagues in sharing knowledge and expertise</p>	
<p>Network centrality Immediate Access (NCImAc)</p>	
<p>NCe12 Most of my colleagues know me by my name in my organisation</p>	
<p>NCe11 I have immediate access to several colleagues with work related expertise</p>	

<i>Network Stability Established Contacts (NSEstCo):</i> Network Stability: The long term working relationships you have with colleagues within your organisation to share knowledge, ideas and expertise	
NS1 I have established working relationships with colleagues that enables interaction for knowledge sharing	
NS2 My long term established contacts with colleagues that provide support over time	
NS4 My long term established relationships with colleagues are reciprocal	
NS3 I share the same values as colleagues I interact with over a period of time	
Network Configuration Interaction (NCfigInt)	As a result, a focal firm's performance depends on its ability to position itself and configure its ties (e.g., weak versus strong, bridging versus cohesive) in a way that optimizes both its access to information and its ability to exert control over others in its organizational network (Gulati, Dialdin and Wang 2002:288).
NC5 The strong interactions enable me to have a variety of connections with colleagues	
NC4 A combination of e-mail the telephone enable contact with colleagues	
NC3 My position gives me the opportunity of accessing a variety of connections	
Operations Performance	Productivity of our organization is better as compared to key competitors (Wang and Wang, 2012:8907).
FP10 Our production /operation processes have been become more flexible	
FP6 Work productivity in my organisation has improved in the last three years	
Profitability (financial) performance	Return on total assets Return on sales Profit growth Return on investment in the past three years (Cousins, Lawson, Petersen, and Handfield, 2011:936; Calatone, Cavusgil and Zhao, 2002:520).

FP4 My organizations' return on assets improved	Return on total assets Return on sales Profit growth Return on investment in the past three years (Cousins, Lawson, Petersen, and Handfield, 2011:936; Calatone, Cavusgil and Zhao, 2002:520).
FP9 Our return on capital employed improved	Return on total assets Return on sales Profit growth Return on investment in the past three years (Cousins, Lawson, Petersen, and Handfield, 2011:936; Calatone, Cavusgil and Zhao, 2002:520).
FP11 Our return on investments improved	Return on total assets Return on sales Profit growth Return on investment in the past three years (Cousins, Lawson, Petersen, and Handfield, 2011:936; Calatone, Cavusgil and Zhao, 2002:520).
FP7 Our profits grew in the last three years	
FP3 My organisations' annual average sales growth was enhanced	

Source: Author: (2016)

Table 6 illustrates the original items generated from the literature and their adaptation for the study. Additionally, Table 6 has the authors and or scholars from whom the items were generated and adapted and adopted and operationalised for this study. Additionally, the questionnaire was piloted to strengthen the validity of the operationalised instrument.

3.1.11. The Pilot Survey

A pilot study was conducted as an initial means of highlighting any problems that might have been inherent in this study. Robson (1994) and Yin (1994) contend that a pilot survey enhances the conceptualisation and re-conceptualisation of the key aims of the study and ensures that error and omissions are detected. Oppenheim (1994) also supports this view.

The questionnaire was piloted by four academics that are (active researchers and are familiar with the design and application of survey instruments) and five people in the business world to determine whether; the items reflect the theoretical constructs as the study intended. Moreover, their expertise was sought on the wording of the items, the content length, layout and grouping of the items in the different constructs. Their expertise was also sought on the clarity of the language used and the length and format of the whole questionnaire. Similarly thirteen executive MBA students were also asked for clarity on the wording, length layout and format of the questionnaire. Twenty questionnaires were distributed by academic staff teaching the executive MBA students. Thirteen were returned.

The main concern sent by email and written on the returned questionnaires was the length of the questionnaire being too long and the familiar wording of some of the questions. This was rectified by rewording the questions/items and deleting items/questions that were familiar without losing the essence of the study. Also it was revealed that information about

number of employees and profitability and sales revenue etc in the demographic section of the research instrument are sensitive. This information was removed as suggested.

Face validity of the research instrument was established in terms of readability, length, layout presentation of the instrument, consistency of style and formatting and the clarity of the language used (Taherdoost, 2016:29). The revised shorten, clearly worded, readable and well laid out version of the research instrument was utilised for the main study. As a result the pilot undertaken reduced measurement bias (e.g.operationalisation error) and reinforced the internal validity of the research instrument prior to the main data collection survey.

3.1.12. The Administration of the Questionnaire

The administration of the questionnaire deals with the cover letter, which explains the aim of the study and solicits the corporation of respondents in completing the questionnaire. A self addressed stamped envelope was included with the franked questionnaire with the university stamp and despatched to respondents. After three weeks follow-up letters were sent to increase the response rate (Saunders et al, 2007).

In addition this study considered ways of increasing the response rate by using procedures outlined in table 7

Table 7. Mail Questionnaire: Suggested Procedures

Influential survey issues	Procedures: overall effect on response rate	Used
Survey sponsorship	The University of Hull has a positive effect for academic purpose of the survey	Yes
Cover letter Personalisation Type of appeals	Individually-typed & printed addressed to the respondents Personal salutation Hand-written signature General information (contact addresses and self addressed prepaid envelop) The respondent knowledge and interest on the topic The importance of the topic potential respondents organisation c	Yes Yes
Questionnaire Content	Comprehensibility of questions Logical flow	Yes
Length Format	Average measured by no. of pages Average measured by no. of questions Professional and attractive overall appearance Questions are not complex Looks easy to and quick to complete Paper size: A4	Yes
Ethical issues Anonymity and Confidentiality	Providing assurances that both promised anonymity and confidentially will be maintained	Yes
Contact Timing Follow-ups	Questionnaire received on certain days not Friday and at Christmas time and other holidays Reminder letter Telephone reminder Postcard reminder	Yes
Incentives	Postcard thank you Promised a summary of the study results	Yes

Source: Diamantopoulos and Schlegelmilch (1996); Saunders, M. Lewis, P. and Thornhill, A. (2007).

Diamantopoulos and Schlegelmilch (1996) stressed that the length of questionnaire remains a matter of debate. Additionally the above scholars note that a five-page questionnaire on a subject, which the respondent find interesting, might have higher chances of completion

than a two-page questionnaire on a boring topic. Therefore, the questionnaire was made to comply with the stimuli of good response rate (sent to respondent that were likely to be interested in knowledge sharing socialisation mechanisms, structural capital and organisational performance).

Furthermore, to increase the response rate access was negotiated with the conference organisers of *UC EXPO 2015 Europe's Largest Unified Communication & Collaboration Event* – 21-22 April, 2015 in Olympia London. As it is a fee paying event, the researcher contacted the organisers and explained that as a student I can not afford to pay the event fees, but willing to help them at the registration desk in order to have access to the attending delegates. Access was granted, Thus, I and an academic familiar with survey went to a conference to solicit help in filling the questionnaire from managers attending the conference.

During the exhibition period in the conference we went from stand to stand and politely asked for help in filling the questionnaire (after checking if their organisations are in the FAME database). Those managers who could not fill in the questionnaires took copies of the questionnaire with cover letters and return stamped envelopes. Additionally, others suggest that I send them questionnaires by email. So questionnaires including a cover letter were sent by email. A week after the conference, a gentle reminder was sent to respondents about filling the questionnaires. The above exercise enhanced the response rate. An example of a respondent from the above event is in the appendix (due to the confidentiality issue, the respondent's details were removed).

3.1.13.1. Reliability and Validity of the Instrument

To ensure the reliability of the data collection instrument the internal consistency test was run using Cronbach's alpha before testing the hypotheses. Any time an inference is made from the results of an instrument the questions of reliability and validity would be prominent. Bell (1993) and Norusis (1994) highlight the point that whatever procedure employed for collecting data is selected, it is necessary to examine the reliability and validity of the data collection. Some of the many different ways to assess both the validity and reliability of a survey instrument are discussed next.

3.1.13.2. Validity of the Instrument

For this research the validity of the instrument is defined as the extent to which it measures what it is designed to measure in terms of accuracy, effectiveness and evaluation (Oppenheim, 1996; Sekeran, 1992). There are various types of validities used to test the correctness of a measure. According to Churchill (1991), the validity of a measuring instrument can be assessed by looking for evidence of its content, construct, and realistic validity. This study's validity was assessed by examining its content validity (Churchill, 1991).

Content validity refers to the agreement among professionals that an instrument logically appears to accurately reflect what it intends to measure (Zikmund, 1991:263). In addition, Sekeran (1992:171) points out that *content validity ensures that the measure includes an adequate set of items which tap the concept*. In this study the content validity of the instrument was established using a literature review (to develop the questionnaire items) and pilot test conducted by asking four academics and five people in the business world.

These individuals were asked to comment on the questions and the wording in the questionnaire. Feedback from the individuals was drawn on to revise the wordings and some questions for further clarification before the instrument was sent out to respondents (Saunders et al, 2007).

3.1.13.3. Reliability of the Instrument

In this study the reliability of a scale represents the extent to which the scale yields similar results when different people administer it and when alternative forms are used. It is useful to measure the reliability of the scale. There are different methods for measuring the reliability of a scale such as “test-retest (administering the same test after the first), the alternative forms method (when equivalent versions on the same items are given and the results correlated).

3.1.13.4. Test-retest Reliability

T-test reliability (or external reliability) refers to the degree of consistency of a measure over time. It is one of the main ways of checking external reliability (Bryman and Cramer, 1997). This happens during the process of the research being conducted where the research instrument is administered on two occasions to the same respondents of the same sample in order to assess the consistency. The results of these measurements are then compared to determine their similarity. The problem with this procedure is that intermediary events between the test and the retest of measurement may account for any discrepancy between the sets of results. It may be in the intervening period that respondents have received a change to their working practices/environment, personal factors or some grievances causing the

retest to change. Moreover, if the two are close in time, respondents may recollect earlier answers so that an artificial consistency between the two tests is created. Furthermore, it may even be very difficult to locate and gain the co-operation of respondents for the second testing.

3.1.13.5. Internal Consistency /Reliability

The constraints imposed on this study by time consideration did not allow resurveying the same or equivalent of all respondents in the sample. Thus, methods such as test-retest and alternative forms were not feasible. The use of internal consistency reliability is an optimal method that is considered due to its relative savings on time, and ability to produce a correlation coefficients matrix to measure scales and sub-scales.

The internal consistency reliability assesses from one administration with one instrument the degree of the consistent homogeneity of a set of measures. The internal consistency reliability is characterised by two techniques: split-half reliability (where the same items in test are split into two matched halves and scores are then correlated) and Cronbach's alpha (based on correlation of items on a single scale. This study conducted Cronbach's alpha to measure internal consistency and reliability of the items in the survey instrument.

This method computes the reliability coefficient estimates for all possible ways of splitting a set of items in half (Cronbach, 1951). A lack of correlation of an item with other items in the scale is evidence that the item does not belong in the scale and should be dropped. One restriction of the Cronbach's alpha is that the items must be interval-scaled. The scales used in this study met this criterion. Therefore, for this research scale reliability was established

by using Cronbach's alpha coefficient, i.e. *one of the most commonly used methods* (Norusis, 1994:147). The internal reliability coefficient is calculated for the variables comprising the study where all sub-scales and scales comprising a concept measure the same attribute.

3.1.14. Ethical considerations

The acceptability of the research and the cultural background of the respondents were considered so as not to cause offence or harm. Consideration was also taken so the respondents were not put at risk (e.g. job loss). Respondents were given a written statement outlining the research project and what it entails. The researcher was explicit in explaining the role the respondents will play should they agree to participate in the study, and the respondents were made to understand that they were not obliged to participate in the study. In addition assurances of confidentiality and anonymity were emphasised when permission was sought from an individual or organisation to conduct research. The researcher ensured data were safely stored and used only for the purpose of the research for which permission was granted (HUBS ethical-procedures-research-teaching.pdf) (Saunders et al, 2007).

3.1.15. Summary

Chapter three discussed the research paradigm and the epistemological and ontological assumptions adopted for this study. This chapter also explains the research design approach, and the the positivist stance adopted for this study. The sample characteristic and the reliability and validity tests employed to make the data valid and reliable for this study are also presented. Also the ethical considerations employed in the course of undertaking the research are explained.

Chapter Four: Data analysis and results

Chapter four explains the data analysis undertaken and present the results of the initial and subsequent analysis of the data. The sample characteristics are explained and results present. The data preparation and what it entailed for the next stage of the data analysis that considered dealing with missing data, outliers, normality of the data are explained. The exploratory factor analysis undertaken and the results are also presented. Also Confirmatory analysis and structural equation modelling analysis undertaken are explained and the results presented.

The data from the postal survey was coded and entered into SPSS for windows version 22. Data analysis consists of the preparation of data and analysis. Before analysing the data a range of checking operations (i.e. labelling each case with an identity number, dealing with missing data, allocating codes, feeding codes into the computer and checking the logged codes, and data cleaning) were performed on the complete data set in order to eliminate data entry errors (Oppenheim, 1996:279). In order to provide statistical support for the research questions and hypotheses, the data gathered for the study was analysed using a number of statistical techniques provided by SPSS version 22. This chapter also presents the results of the findings from the data analyses conducted. Moreover, this chapter also includes discussions about the different segments of participants of the sample and their response rates. It also includes the segments of their different business operations, their genders, departments and length of time they have been in the organisation.

4.1. Initial data Analysis

Initially descriptive statistical techniques were used to outline the characteristics present report any similarities or differences in the various groups in a way that is meaningful in our sample (Diamantopoulos, 2000; Langdrige, 2004). The collection and data analysis chapter also describes the statistical techniques adopted in preparing and analysing the collected data for the study. In addition, initial finding are presented.

Data from the two methods were prepared by being coded (defining, labelling, and numbering variables) and imputed into SPSS for windows version 22 (Forza, 2002; Pallant, 2007). Data were checked to ensure that the labels and numbers of cases were identical, analysis and checks were perform for detecting and imputing missing data to reduce data entry errors (De Vaus 2002:202; Pallant, 2007). Care was taken to ensure that the statistical tests employed where possible were *relevant*, *comprehensive* and not *redundant* in answering the research objectives (Diamantopoulos, 2000:79). A number of statistical techniques provided by SPSS for windows version 22 were employed to screen, prepare and analyse the data (Bryman and Cramer, 1997; Palant, 2007).

4.1.1. Sample Characteristics Description

This section describes the different segments of the sample. A survey instrument was sent out to (top tier –executives, operations managers; CEOs and managers of departments and functions) of the top 500 firms in the UK listed in the FAME database. A total of 185 (37%) responses were returned, 18 (3.6%) of which were not usable because respondents declined to participate or incompleated, leaving a total of 167 (33.4%) usable responses (Baruch, 1999, Dillman, 2000) was tested for non response bias. The segments are

illustrated in the table below. On the sector of business operations the least response was from the manufacturing sector with 18.1%; with mixed sectors at 16.9%. The majority of respondents were from the service sector with 65.1%.

In addition the percentage of male respondents at 61.1% is almost double the percentage of female respondents at 38.9%. A majority at 41.3% of respondents have worked in their organisations for less than five years, 30.5% between 5 and ten years, 12.0% at between 11 and 16 years, and only 16.2% of respondents with length of work experience of 17 years and above.

The bulk of respondents were postgraduates at 52.7%, followed by respondents that are undergraduates and those with diplomas at 35.9% and professional qualifications with 7.2%. Also most respondents work in organisations with 3-5 levels of managerial hierarchies (42.2%); closely followed by 1-3 levels at 27.7% with 26.5 at 5-7 levels of management and just 3.0% in levels of managerial hierarchies of 7 and above..

Response from chief executive officers and level 1 managers was 27.1%, from managers at 2 levels from the CEOs was 27.1%, 3 levels 22.9% and 22.9% from managers that are 4 levels removed from the CEOs.

In the functional area, most of the respondents head the marketing departments with 28.1%, Accounting and finance 22% HR 25% R&D 12.6% with the least response from IT at 12.6%.

Table 8: Sample Description Research sample characteristics (N =167)

Basic information	Variables	Usable cases	Response rate (%)
Sample Description			
Sector of Business Operation			
	Manufacturing sector	30	18.1
	Service sector	108	65.1
	Both (mixed sectors)	28	16.9
Gender			
	Male	102	61.1
	Female	65	38.9
Length of Work Experience years			
	Less than 5 yrs	69	41.3
	5-10 yrs	51	30.5
	11-16 yrs	20	12.0
	17 yrs and above	27	16.2
Highest level of Education			
	Diploma and Undergraduate	60	35.9
	Postgraduate	88	52.7
	Only professional qualifications	12	7.2
Levels of Managerial Hierarchy			
	1-3	46	27.7
	3-5	70	42.2
	5-7	44	26.5
	7 and above	5	3.0
Levels in management hierarchy from CEO/CEO			
	1	45	27.1
	2	45	27.1
	3	38	22.9
	4	38	22.9
Department/Functional unit			
	Information Technology	20	12.0
	Accounting and Finance	37	22.2
	Marketing	47	28.1
	Research and development	21	12.6
	Human Resources	42	25.1

Source Author (2016)

4.2. Data Preparation (for further analysis)

Data preparation is an essential part of data analysis that ensures that the data are in a form that can be imputed into SPSS version 22 to perform univariate, bivariate and multivariate analysis (Pallant, 2007; Bryman and Bell, 2007). Hence initial preliminary analysis are perform to determine the level of missing data, outliers, the normality, multicollinearity, sample distribution and between group differences (Pallant, 2007; Easterby-Smith, Thorpe and Jackson, 2008).

4.2.1. Missing Data

Missing data remain the focus of scholars in the social sciences (Roth, 1994; McKnight et al, 2007). *Missing data are data that are missing for some (but not all) variables and for some (but not all) cases* (Allison, 2001:72). Moreover, missing data will almost always remain aspects of data collection that social science researchers have to contend with (Fichman, and Cummings, 2003). Resolving the issue of missing data is important as it impacts the analysis of the data and subsequent generalisation of the results (McKnight et al 2007). Thus, particular attention and care were paid to the research design and strategy for collecting the data following recommendations by research scholars in order to lessen the amount of missing data (Cooper and Schindler 2006; Tsikriktsis, 2005; McKnight et al 2007).

However, it is not always possible to avert some participant's tendencies of forgetting to answer an item, skip an item, lack of motivation, or make errors in the course of filling the questionnaire (Hair, Tatham and Black, 1998). Infact, Schafer and Olsen (1998:545) note that missing data are *inevitable* in the social sciences but *unintended* and *uncontrolled* by the researcher. Therefore, collecting data from participants using a likert scale type

questionnaire is almost always certain to present problems of missing data and how are they are dealt with (Little and Rubin, 1987; Tsikriktsis, 2005).

The data was checked for data entry errors, skipped and non refusal items to ascertain the pattern if any of missing data (McKnight et al, 2007). An initial examination and analysis of the data reveals that data are missing at random (MCAR) and that the percentage of data is ignorable (i.e. the percentage of missing data is negligible and replaceable (Tabachnick and Fidell, 2007; McKnight et al, 2007). The percentage of missing data ranged from 1.4% to .7% which is within the 10% recommendation by Raymond and Roberts (1987). Missing data above 10% will impact the sample size, analysis and subsequent results (McKnight et al, 2007). However, scholars are yet to reach a consensus on how much missing data is too much (Tsikritsis, 2005).

There are several techniques and or procedures available to the researcher seeking to replace missing data or impute missing data (Roth, 1994). They range from the very simple to the most complicated, with Listwise deletion; pairwise deletion, regression imputation, hot-deck imputation, expectation maximization, regression imputation and mean substitution being some of the techniques (Roth, 1994). These techniques and procedures all have their advantages and disadvantages (Roth, 1994). Additionally while the amount of missing data is important, focus should be on the mechanisms (MCAR, MAR, MNAR) and patterns of missing data (Tabachnick and Fidell, 2007). In this instance to ascertain that the data are missing completely at random Little's MCAR test was conducted and with nonsignificant levels of .166% indicating that the *probability that the pattern of missing diverge from randomness is greater than .05* and validates that there is no pattern to the

missingness of the data and allows the use of Expectation maximization (EM) (Little, 1988; Tabachnick and Fidell, 2007:63).

Having established the mechanisms of the missing data Expectation maximization technique was employed as the percentage of missing data ranged between 1 and 5% (Roth, 1994). Expectation Maximization is a maximum likelihood approach *where the missing data is imputed with maximum likelihood values* (Little, 1988). Expectation Maximization involves iteration by estimating missing data and estimating parameters (Dempster, Laird and Rubin, 1977; Roth, 1994; Tsikriktsis, 2005). Performing this technique entails a two step process (Dempster et al 1977). The first step, expectation (E) step involves finding the *conditional expectations* of the missing data and substituting these expectations for the missing data (Roth, 1994; Tabachnick and Fidell, 2012). The maximization (M) step is then conducted with the assumption that there is no missing data (Dempster et al 1977; Tabachnick and Fidell, 2007). The process is repeated between the two steps until the two converge and the data is imputed and saved (Dempster et al 1977; Tabachnick and Fidell, 2007). Expectation Maximization was performed using the available software in SPSS version 22 (EM) tests and or techniques (Schafer and Graham, 2002).

4.2.2. Outliers

Preparing the data for performing some inferential statistics involve checking your data for extreme values (Langdrige, 2004). These types of data are described as extreme or outliers because the values of the cases are either too high or too low and not representative of other values in the data set (Pallant, 2007). Tabachnick and Fidell (2007) note the presence of outliers in the different stages of analysing data. Namely outliers can be identified from conducting univariate, bivariate or multivariate analysis (Hair, Anderson, Tatham and

Black, 1998). Checking the data set for outliers is important to prevent the occurrence of Type 1 and Type 11 errors and limit the generalisation of results (Tabachnick and Fidell, 2007).

Outliers can ensue from incorrect data entry or coding, an extraordinary event, extraordinary observations for which the researcher has no explanation (Hair, Anderson, Tatham and Black, 1998). Outliers were detected due to incorrect data entry and the values corrected as recommended by Landgdrude (2004) and Pallant (2007). Visual examinations of the box plots also reveal outliers for some of the variables in the descriptive statistics. The 5% Trimmed mean and mean values were examined and do not seem very different from the remaining distribution, thus the cases were retained in the data file (Pallant, 2007).

4.2.3. Linearity and Homoscedasticity

To identify violations of linearity and homoscedasticity before carrying out any correlation regression scatterplots were generated using Spss version 22 (Pallant, 2007; Tabachnick and Fidell, 2009). These were visually examined and the scatterplot of scores and lines were approximately linear and the assumption for homoscedasticity and linearity were not violated (Pallant, 2007).

4.2.4. Normality

Checking that the data are theoretically normally distributed is required for performing statistical tests like correlation, analysis of variance and regression and structural equation modeling (Shapiro and Wilk, 1965; Cramer and Howitt, 2004). These tests often referred to as parametric tests assume the data is drawn from a population that is normally distributed (Pallant, 2007). However, it is often not the case in reality that you find a normally

distributed or bell shaped curve (Bryman and Cramer, 1997). To a certain extent the data are often approximately or fairly distributed (Bryman and Cramer, 1997; Ghasemi, and Zahediasl, 2012). However it is essential that data is tested for normality to ensure the reliability and validity and accuracy of results (Ghasemi, Zahediasl, 2012). Although our sample size of 167 is greater than 30 or 40 data was tested to determine its deviation from normality and to ensure that the assumption of normality is not violated (Pallant, 2007).

The shape of the distribution was manually examined for the variables; as the standard errors for both skewness and kurtosis decrease with large samples, and the null hypothesis likely to be rejected when there are only minor deviations from normality (Tabachnick and Fidell, 2003; 2007). However the scores on the histogram seem not to have varied greatly from a normal distribution. In addition a visual inspection of the Normal Q-Q plot shows the scores plotted along the straight line suggesting a normal distribution (Pallant, 2007).

4.3. Exploratory Factor Analysis

Factor analysis is a multivariate statistical techniques; an intrinsic set of statistical techniques commonly used in the social sciences (Nunnally and Bernstein 1994; Tabachnick and Fidell 2007). Most importantly it is a factor reduction technique, utilised to summarise or reduce variables to a smaller, simpler more manageable set of factors (Tabachnick and Fidell 2007). Indeed Kerlinger (1979:180) argue that factor analysis is *one of the most powerful methods yet for reducing variable complexity to greater simplicity*. Factor analyses reveal the essential dimensions of the latent variable (Henson, and Roberts, 2006; Field, 2005). In addition to being a reduction technique where most of the original information of the latent variable is preserved, *it is crucial in the validation of constructs* (Nunnally, 1994; 2004).

Variations of factor analyses include confirmatory and exploratory analyses (Field, 2005). Exploratory factor analysis as the name implies was used to explore the dimensions underlying the main variable and whether the factors produced are interrelated (Field, 2005; Tabachnick and Fidell, 2007). Prior to performing exploratory factor analysis certain factors must be taken into consideration (Ford, MacCallum, and Tait, 1986; Hair et al, 1998). Various scholars emphasize either the importance of the absolute number of cases with N cases ranging from 100 to 500 (Hair et al, 1998) or the subject to variable ratio ranging from 20 to 1 to at least 10 cases for each item in instrument, to no lower than 5 (Arridell, and van der Ende, 1985; Velicer and Fava, 1998).

However, the many variations in the recommendations for sample size are confusing and remain debatable (Fabrigar, Wegener, MacCallum, and Strahan, 1999). MacCallum, Widaman, Zhang and Hong (1999:96), concluded that rules of thumb regarding sample size in factor analysis are not *valid or useful*. An alternatively factor loadings of at least .40 are deemed reliable as long as the sample size is 150 or more (Arrindell, and Van der Ende, (1985). Hence to ensure we can use Exploratory factor analysis in the study to summarise and simplify knowledge sharing mechanisms, the dimensions structural capital, and performance, we defined and operationalised the constructs and ensured that the dimensions of knowledge sharing mechanisms, structural capital and organisational performance were in line with the recommended three to five needed in a study (Fabrigar, Wegener, MacCallum, and Strahan, 1999). Below are the results for the exploratory factor analysis for the dimensions of Knowledge sharing mechanisms structural capital, and organisational performance?

4.3.1. Personal Socialisation

Exploratory factor analysis was conducted for the construct personal socialisation to establish whether the initial set of ten (10) variables could be represented by a smaller number of refined variables with relatively simple explanations in aid of developing the final research instrument (Armstrong, and Soelberg, 1968; Pallant, 2007; Bartholomew, Knotts, and Moustaki, 2011). To determine how many or what factors to retain the 10 variables were subjected to principal component analysis with an orthogonal varimax rotation with an eigenvalue greater than 1 using SPSS Version 22 (Pallant, 2007). One factor was extracted based on an eigenvalue greater than 1.0 as observed in the screeplot. This one factor accounted for 31.17% of cumulative variance, the KMO of .836 falls within the range of values considered great (Field, 2005). In addition Bartlett's test of Sphericity is highly significance at .000 and variables loaded on each factor by >0.30 were deemed adequate to retain. The results indicated that the data are appropriate for factor analysis (Field, 2005).

However, exploratory factor analysis is multifaceted with no commonly agreed guidelines on how many factors to retain (Hayton, Allen and Scarpello, 2004). Accordingly combining several principles aided interpretation and factor retention (Hair et al 1998). Five variables were retained with factor loadings ranging from .62 to .79 on a single factor indicating a solid factor with recommended loadings being (.50 or better) Costello and Osborne (2005). Consequently the following variables were rejected: (1) face-to-face post reviews; (2) Coffee breaks and lunches; (3) Face-to-face training programmes; (4) Job rotation; (5) Face-to-face meetings.

Although EFA is a technique that requires large sample sizes e.g. 300, researchers are yet to agree on a sample size for factor analysis, (Yong and Pearce, 2013). Thus following Pallant (2007) and Hair et al (1995)'s, recommendations of a sample size of 100 or more, the sample size of 167 is adequate for undertaking a factor analysis for the items from our respondents (Hair et al 1995; Williams et al 2012). Moreover factor analysis includes tests for Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of Sphericity. The KMO index ranges from 0 to 1 the Bartlett's Test of Sphericity should be significant at $p < .05$. Combining multiple sources will ensure that not too many or too few factors are retained; avoiding errors that may produce factor structures that are a challenge to interpret (Gorsuch, 1996; Hayton, et al 2004). Table nine (9) shows a list of the 5 item factor loadings from the principal component analysis, the means and standard deviation.

Table 9: Statistical summary for Personal Socialisation: Descriptive statistic, factor analysis and reliability analysis with N = 167

Factors and Variables	Descriptive Statistics		Factor components & Loadings	Reliability	
	Mean	Std		1	CITC
<i>Personal Socialisation Participation(5items)</i>					.85
PS5 Project participation enhances the exchange of knowledge ideas and expertise	4.19	.74	.79	.72	.79
PS7 Workshops enable making contacts to share knowledge and ideas and expertise	4.00	.82	.78	.61	.82
PS6 Face-to-face Peer mentoring strengthens my interactions to share knowledge, ideas and expertise	4.02	.83	.75	.60	.82
PS4 Face-to-face presentations enable the communication of ideas and knowledge	4.23	.76	.73	.73	.79
PS3 Visits to other departments enhance face-to-face sharing of ideas and knowledge	4.10	.88	.62	.59	.83
% of Cumulative variance			31.17		

Note: Kaiser-Meyer-Olkin (KMO) Measure Sampling Adequacy = .836 Bartlett test of sphericity = 618.351 Bartlett test significance = .000 Mean score, Std = Standard Deviation, CITC = Corrected Item-Total Correlation, α = Cronbach Alpha Values

4.3.2. Electronic Socialisation

Exploratory factor analysis was conducted for the construct electronic socialisation to ascertain the underlying dimensions of the initial set of nine (9) variables (Pallant, 2007). Additionally the smaller number of refined variables with relatively simple explanations was included in the final research instrument (Armstrong, and Soelberg, 1968; Pallant, 2007; Bartholomew, Knotts, and Moustaki, 2011). To determine how many or what factors to retain the nine (9) variables were subjected to principal component analysis with an orthogonal rotation with varimax and an eigenvalue greater than 1 using SPSS Version 22 (Kaiser, 1958/59; Brown, 2001; Pallant, 2007). One factor was extracted based on an eigenvalue greater than 1.0 as observed in the screeplot (Cattell, 1966; Hayton et al, 2004). This one factor accounted for 29.87% of cumulative variance, the KMO of .794 is above .6 (Pallant, 2007). In addition Bartlett's test of Sphericity is highly significance at .000 and variables that load on each factor by >0.30 were deemed adequate to retain. The results indicate that the data are appropriate for factor analysis (Field, 2005).

Exploratory factor analysis is multifaceted with no commonly agreed guidelines on factor retention (Hayton, Allen and Scarpello, 2004; Osborne and Costello, 2009). Accordingly combining several principles aided the interpretation and factor retention (Hair et al 1998). Four variables were retained with factor loadings ranging from .62 to .79 on a single factor indicating a solid factor with recommended loadings being (.50 or better) Costello and Osborne (2005). Consequently the following variables were not amenable to interpretation and were rejected: (1) Online forums; (2) the telephone; (3) Video conferencing; (4) Smart phone; (5) Telepresence, Table ten (10) below illustrate the summary of the results.

Although EFA is a technique that requires large sample sizes e.g. 300, researchers are yet to agree on a sample size for factor analysis, (Yong and Pearce, 2013). Thus following Pallant (2007) and Hair et al (1995)'s, recommendations of a sample size of 100 or more, the sample size of 167 is adequate for undertaking a factor analysis for the items from our respondents (Hair et al 1995; Williams et al 2012). Moreover factor analysis includes tests for Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of Sphericity. The KMO index ranges from 0 to 1 the Bartlett's Test of Sphericity should be significant at $p < .05$. Table 10 shows a list of the 4 item factor loadings from the principal component analysis, the means and standard deviation.

Table 10: Statistical summary for Electronic Socialisation: Descriptive statistic, factor analysis and reliability analysis with N = 167

Factors and Variables	Descriptive Statistics		Factor components & Loadings	Reliability	
	Mean	Std	1	CITC	α
<i>Electronic Socialisation Systems</i>					<i>.77</i>
ES6 The intranet enables sharing knowledge, ideas and expertise	3.61	1.02	.79	.66	.66
ES4 The electronic knowledge repository encourage communication with colleagues to share knowledge and ideas	3.18	1.00	.74	.52	.73
ES5 E-mail enhances interaction for sharing knowledge, know-how and expertise	3.43	1.07	.72	.53	.73
ES2 Online directories facilitate my connections with my colleagues in sharing know-how and ideas	3.17	1.01	.62	.55	.72
% of Cumulative variance			29.87		

Note: Kaiser-Meyer-Olkin (KMO) Measure Sampling Adequacy = .794 Bartlett test of sphericity = 413.835 Bartlett test significance = .000 Mean score, Std = Standard deviation, CITC = Corrected Item-Total Correlation, α = Cronbach Alpha Values

4.3.3. Network Ties

Exploratory factor analysis was conducted for the construct Network ties to ascertain the underlying dimensions of the initial set of twelve (12) variables (Pallant, 2007). Moreover a smaller number of refined variables with relatively simple explanations were included in the final research instrument (Armstrong, and Soelberg, 1968; Pallant, 2007; Bartholomew, Knotts, and Moustaki, 2011). To determine how many or what factors to retain the 12 variables were subjected to principal component analysis with an orthogonal varimax rotation with an eigenvalue greater than 1 using SPSS Version 22 (Kaiser, 1958/59; Brown, 2001; Pallant, 2007). Two factors were extracted based on an eigenvalue greater than 1.0 as observed in the screeplot (Cattell, 1966; Hayton et al, 2004). The two factors accounted for 53.85% of cumulative variance, the KMO of .794 is above .6 (Pallant, 2007). In addition Bartlett's test of Sphericity is highly significance at .000 and variables that load on each factor by >0.30 were deemed adequate to retain. The results indicate that the data are appropriate for factor analysis (Field, 2005).

Exploratory factor analysis is multifaceted with no commonly agreed guidelines on factor retention (Hayton, Allen and Scarpello, 2004; Osborne and Costello, 2009). Accordingly combining several principles aided the interpretation and factor retention (Hair et al 1998). Seven variables were retained with factor loadings ranging from .60 to .82 on both factors indicating a solid factors with recommended loadings being (.50 or better) Costello and Osborne (2005). Consequently the following variables were rejected: (1) Online forums; (2) the telephone; (3) Video conferencing; (4) Smart phone; (5) Telepresence, Table 11 below show a summary of the results.

Although EFA is a technique that requires large sample sizes e.g. 300, researchers are yet to agree on a sample size for factor analysis, (Yong and Pearce, 2013). Thus following Pallant (2007) and Hair et al (1995)'s, recommendations of a sample size of 100 or more, the sample size of 167 is adequate for undertaking a factor analysis for the items from our respondents (Hair et al 1995; Williams et al 2012). Moreover factor analysis includes tests for Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of Sphericity. The KMO index ranges from 0 to 1 the Bartlett's Test of Sphericity should be significant at $p < .05$. Table eleven (11) below shows a list of the seven item factor loadings from the principal component analysis, the means and standard deviation

Table 11: Statistical summary for Network Ties Descriptive statistic, factor analysis and reliability analysis with N = 167

Factors and Variables	Descriptive Statistics		Factor components & Loadings		Reliability	
	Mean	Std	1	2	CITC	α
<i>Network Tie Close Working Relationship</i>						.77
NT1 I provide work related advice to colleagues I know will reciprocate	3.63	1.15	.72		.54	.72
NT2 I confide in colleagues I know will do the same in sharing ideas, knowledge and expertise	3.79	.90	.72		.51	.73
NT3 Colleagues outside my immediate social circle provide opportunities to meet new colleagues to share ideas, knowledge and expertise.	3.59	.96	.68		.52	.73
NT4 Colleagues I know vaguely share knowledge, ideas, insights and expertise beyond what exists from colleagues in my social circle	3.18	1.09	.67		.56	.72
NT5 I go to colleagues outside my established contacts for work related advice	3.18	1.17	.60		.56	.72
<i>Network Tie Weekly working Advice</i>						.70
NT10 I communicate with colleagues twice a week to give advice	3.30	1.22		.82	.54	
NT11 I go once a week to colleagues for advice	3.05	1.27		.79	.54	
% of Cumulative variance			28.05	53.85		

Note: Kaiser-Meyer-Olkin (KMO) Measure Sampling Adequacy = .794 Bartlett test of sphericity = 611.444 Bartlett test significance = .000 Mean score, Std = Standard deviation, CITC = Corrected Item-Total Correlation, α = Cronbach Alpha Values.

4.3.4. Network Centrality

Exploratory factor analysis was conducted for the construct network centrality to determine the underlying dimensions of the initial set of twelve (12) variables (Pallant, 2007; 2013). Additionally the smaller number of refined variables with relatively simple explanations will be included in the final research instrument (Armstrong, and Soelberg, 1968; Pallant, 2007; Bartholomew, Knotts, and Moustaki, 2011). To determine how many or what factors to retain the 12 variables were subjected to principal component analysis with an orthogonal varimax rotation with an eigenvalue greater than 1 using SPSS Version 22 (Kaiser, 1958/59; Brown, 2001; Pallant, 2007; 2013). Two factors were extracted based on an eigenvalue greater than 1.0 as observed in the screeplot (Cattell, 1966; Hayton et al, 2004), is above .6 (Pallant, 2007).

In addition Bartlett's test of Sphericity is highly significance at .000 and variables that load on each factor by >0.30 were deemed adequate to retain. The results indicate that the data are appropriate for factor analysis (Field, 2005). Exploratory factor analysis is multifaceted with no commonly agreed guidelines for the retention of factors (Hayton, Allen and Scarpello, 2004; Osborne and Costello, 2009). Accordingly combining several principles aided the interpretation and factor retention (Hair et al 1998). Seven variables were retained with factor loadings ranging from .60 to .85 on two factors indicating solid factors with recommended loadings being (.50 or better) Costello and Osborne (2005). Consequently the following the remaining variables were rejected: Table 16 below show a summary of the results.

Although EFA is a technique that requires large sample sizes e.g. 300, researchers are yet to agree on a sample size for factor analysis, (Yong and Pearce, 2013). Thus following Pallant

(2007) and Hair et al (1995)'s, recommendations of a sample size of 100 or more, the sample size of 167 is adequate for undertaking a factor analysis for the items from our respondents (Hair et al 1995; Williams et al 2012). Moreover factor analysis includes tests for Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of Sphericity. The KMO index ranges from 0 to 1 the Bartlett's Test of Sphericity should be significant at $p < .05$. Table twelve (12) shows a list of the seven item factor loadings from the principal component analysis, the means and standard deviation.

Table 12: Statistical summary for Network Centrality: Descriptive statistic, factor analysis and reliability analysis with N = 167

Factors and Variables	Descriptive Statistics		Factor components & Loadings		Reliability	
	Mean	Std	1	2	CITC	α
<i>Network centrality Direct Contact</i>						.82
NCe1 I can go to top management with a problem and get heard in the organisation	3.66	1.23	.84		.68	.76
NCe3 I get asked for my input and advice on work related activities by my colleagues many times	3.93	1.04	.83		.67	.75
NCe2 I am in direct contact with many of my colleagues in my organisation	4.03	.88	.66		.57	.79
NCe4 It is not difficult for me to approach senior management with a concern in my organisation	3.91	.95	.62		.59	.78
NCe10 I am very involve with colleagues in sharing knowledge and expertise	4.05	.79	.60		.53	.80
<i>Network centrality Immediate Access</i>						.72
NCe12 Most of my colleagues know me by my name in my organisation	4.14	.87		.85	.57	
NCe11 I have immediate access to several colleagues with work related expertise	4.06	.92		.82	.57	
% of Cumulative variance			28.96	47.09		

Note: Kaiser-Meyer-Olkin (KMO) Measure Sampling Adequacy = .831 Bartlett test of sphericity = 709.090 Bartlett test significance = .000 Mean score, Std = Standard deviation, CITC = Corrected Item-Total Correlation, α = Cronbach Alpha Values.

4.3.5. Network Stability

Exploratory factor analysis was conducted for the construct Network stability to ascertain the underlying dimensions of the initial set of ten (10) variables (Pallant, 2007). Additionally the smaller number of refined variables with relatively simple explanations was included in the final research instrument (Armstrong, and Soelberg, 1968; Pallant, 2007; Bartholomew, Knotts, and Moustaki, 2011). To determine how many or what factors to retain the 10 variables were subjected to principal component analysis with an orthogonal varimax rotation with and an eigenvalue greater than 1 using SPSS Version 22 (Kaiser, 1958/59; Brown, 2001; Pallant, 2007). Two factors were extracted based on an eigenvalue greater than 1.0 as observed in the screeplot (Cattell, 1966; Hayton et al, 2004). The two factors accounted for 53.85% of the total variance, the KMO of .794 is above .6 (Pallant, 2007). In addition Bartlett's test of Sphericity is highly significance at .000 and variables that load on each factor by >0.30 were deemed adequate to retain. The results indicate that the data are appropriate for factor analysis (Field, 2005).

Exploratory factor analysis is multifaceted with no commonly agreed guidelines on factor retention (Hayton, Allen and Scarpello, 2004; Osborne and Costello, 2009). Accordingly combining several principles aided the interpretation and factor retention (Hair et al 1998). Seven variables were retained with factor loadings ranging from .62 to .82 on both factors indicating a solid factors with recommended loadings being (.50 or better) Costello and Osborne (2005). Consequently the following variables were not amenable to interpretation and were rejected (Pallant, 2007; 2013). Although EFA is a technique that requires large sample sizes e.g. 300, researchers are yet to agree on a sample size for factor analysis, (Yong and Pearce, 2013). Thus following Pallant (2007) and Hair et al (1995)'s, recommendations of a sample size of 100 or more, the sample size of 167 is adequate for

undertaking a factor analysis for the items from our respondents (Hair et al 1995; Williams et al 2012). Moreover factor analysis includes tests for Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of Sphericity. The KMO index ranges from 0 to 1 the Bartlett's Test of Sphericity should be significant at $p < .05$. Table thirteen (13) shows a list of the seven item factor loadings from the principal component analysis, the means and standard deviation.

Table 13: Statistical summary for Network Stability: Descriptive statistic, factor analysis and reliability analysis with N = 167

Factors and Variables	Descriptive Statistics		Factor components & Loadings	Reliability	
	Mean	Std		1	CITC
<i>Network Stability Established Contacts</i>					.80
NS1 I have established working relationships with colleagues that enables interaction for knowledge sharing	4.05	.76	.82	.62	.73
NS2 My long term established contacts with colleagues that provide support over time	4.00	.79	.82	.67	.71
NS4 My long term established relationships with colleagues are reciprocal	3.93	.76	.76	.60	.75
NS3 I share the same values as colleagues I interact with over a period of time	3.80	.86	.62	.53	.78
% of Cumulative variance			53.85		

Note: Kaiser-Meyer-Olkin (KMO) Measure Sampling Adequacy = .793; Bartlett test of sphericity = 653.734

Bartlett test significance = .000: Mean score, Std = Standard deviation, CITC = Corrected Item-Total Correlation, α = Cronbach Alpha Values

4.3.6. Network Configuration

Exploratory factor analysis was conducted for the construct Network configuration to ascertain the underlying dimensions of the initial set of twelve (12) variables (Pallant, 2007). Also the smaller number of refined variables with relatively simple explanations was included in the final research instrument (Armstrong, and Soelberg, 1968; Pallant, 2007; Bartholomew, Knotts, and Moustaki, 2011). To determine how many or what factors to retain the twelve (12) variables were subjected to principal component analysis with an orthogonal varimax rotation and an eigenvalue greater than 1 using SPSS Version 22 (Kaiser, 1958/59; Brown, 2001; Pallant, 2007). Three factors were extracted based on an eigenvalue greater than 1.0 as observed in the screeplot (Cattell, 1966; Hayton et al, 2004). The three factors accounted for 72.69% of the total variance, the KMO of .799 is above .6 (Pallant, 2007). In addition Bartlett's test of Sphericity is highly significance at .000 and variables that load on each factor by >0.30 were deemed adequate to retain. The results indicate that the data are appropriate for factor analysis (Field, 2005).

Exploratory factor analysis is multifaceted with no commonly agreed guidelines on factor retention (Hayton, Allen and Scarpello, 2004; Osborne and Costello, 2009). Accordingly combining several principles aided the interpretation and factor retention (Hair et al 1998). Three variables were retained with factor loadings ranging from .70 to .86 on the three factors indicating solid factors with recommended loadings being (.50 or better) Costello and Osborne (2005). Consequently the remaining variables were not amenable to interpretation and were rejected (Pallant, 2007; 2013). Although EFA is a technique that requires large sample sizes e.g. 300, researchers are yet to agree on a sample size for factor analysis, (Yong and Pearce, 2013). Thus following Pallant (2007) and Hair et al (1995)'s, recommendations of a sample size of 100 or more, the sample size of 167 is adequate for

undertaking a factor analysis for the items from our respondents (Hair et al 1995; Williams et al 2012). Moreover factor analysis includes tests for Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of Sphericity. The KMO index ranges from 0 to 1 the Bartlett's Test of Sphericity should be significant at $p < .05$. Table fourteen (14) shows a list of the eight item factor loadings from the principal component analysis, the means and standard deviation.

Table 14 Statistical summary for Network Configuration: Descriptive statistic, factor analysis and reliability analysis with N = 167

Factors and Variables	Descriptive Statistics		Factor components & Loadings	Reliability	
	Mean	Std		1	CITC
<i>Network Configuration Interaction</i>					.81
NC5 The strong interactions enable me to have a variety of connections with colleagues	4.02	.88	.83	.71	.69
NC4 A combination of e-mail the telephone enable contact with colleagues	4.13	.91	.80	.64	.77
NC3 My position gives me the opportunity of accessing a variety of connections	4.20	.82	.76	.64	.76
% of Cumulative variance			28.05		

Note: Kaiser-Meyer-Olkin (KMO) Measure Sampling Adequacy = .799 Bartlett's test of sphericity = 468.842 Bartlett test significance = .000
Mean score, Std = Standard deviation, CITC = Corrected Item-Total Correlation, α = Cronbach Alpha Values.

4.3.7. Performance

Exploratory factor analysis was conducted for the construct financial performance to ascertain the underlying dimensions of the initial set of twenty three (23) variables (Pallant, 2007). Also the smaller number of refined variables with relatively simple explanations was included in the final research instrument (Armstrong, and Soelberg, 1968; Pallant, 2007; Bartholomew, Knotts, and Moustaki, 2011). To determine how many or what factors to retain the twenty three (23) variables were subjected to principal component analysis with an orthogonal varimax rotation and an eigenvalue greater than 1 using SPSS Version 22 (Kaiser, 1958/59; Brown, 2001; Pallant, 2007). Seven factors were extracted based on an eigenvalue greater than 1.0 as observed in the screeplot (Cattell, 1966; Hayton et al, 2004). The seven factors accounted for 46.65% of the total variance, the KMO of .918 is above .6 (Pallant, 2007). In addition Bartlett's test of Sphericity is highly significance at .000 and variables that load on each factor by >0.30 were deemed adequate to retain. The results indicate that the data are appropriate for factor analysis (Field, 2005).

Exploratory factor analysis is multifaceted with no commonly agreed guidelines on factor retention (Hayton, Allen and Scarpello, 2004; Osborne and Costello, 2009). Accordingly combining several principles aided the interpretation and factor retention (Hair et al 1998). Seven variables were retained with factor loadings ranging from .63 to .80 on the seven factors indicating solid factors with recommended loadings being (.50 or better) Costello and Osborne (2005). Consequently the remaining variables were not amenable to interpretation and were rejected (Pallant, 2007; 2013).

Although EFA is a technique that requires large sample sizes e.g. 300, researchers are yet to agree on a sample size for factor analysis, (Yong and Pearce, 2013). Thus following Pallant (2007) and Hair et al (1995)'s, recommendations of a sample size of 100 or more, the sample size of 167 is adequate for undertaking a factor analysis for the items from our respondents (Hair et al 1995; Williams et al 2012). Moreover factor analysis includes tests for Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of Sphericity. The KMO index ranges from 0 to 1 the Bartlett's Test of Sphericity should be significant at $p < .05$. Table fifteen (15) shows a list of the seven item factor loadings from the principal component analysis, the means and standard deviation.

Table 15: Statistical summary for Financial Performance Descriptive statistic, factor analysis and reliability analysis with N = 167

Factors and Variables	Descriptive Statistics		Factor components & Loadings		Reliability	
	Mean	Std	1	2	CITC	α
<i>Profitability performance s</i>						.90
FP4 My organizations' return on assets improved	3.48	.90	.80		.79	.87
FP9 Our return on capital employed improved	3.40	.99	.79		.73	.88
FP11 Our return on investments improved	3.46	.92	.72		.78	.87
FP7 Our profits grew in the last three years	3.58	1.01	.72		.76	.88
FP3 My organisations' annual average sales growth was enhanced	3.50	.95	.63		.72	.89
<i>Operations Performance</i>						.77
FP10 Our production /operation processes have been become more flexible	3.35	.98		.63		
FP6 Work productivity in my organisation was improved in the last three years	3.55	.97		.63		
% of Cumulative variance			29.27	46.65		

Note: Kaiser-Meyer-Olkin (KMO) Measure Sampling Adequacy = .918 Bartlett test of sphericity = 1053.087 Bartlett test significance = .000
Mean score, Std = Standard deviation, CITC = Corrected Item-Total Correlation, α = Cronbach Alpha Values

4.4. Structural Equation Modelling

4.4.1. Multicollinearity

Multicollinearity describes the presence of *correlation among independent variables*, or an instance where the *independent variables are highly correlated* (Pedhazur, 1982:233). Multicollinearity undetected would adversely affect interpretations in structural equation modelling (Marsh and Dowson, 2004). To assess if multicollinearity is a problem we tested using variance inflation factor (VIF) as suggested by Hair, Anderson, Tatham and Black, (1995). Results indicating any variance inflation factor (VIF) greater than 10 are deemed problematic Hair, Anderson, Tatham and Black, (1995). The variance inflation factors (VIF) in our table below are all below 10, ranging from 1.146 to 1.913 indicating the data is free from multicollinearity. The results are illustrated in table 16. We also use the Durbin-Watson test and the result of 1.94 is above 1.50 and below the 2.20 indicating the lack of multicollinearity (Bryman and Cramer, 1997; Hair et al, 1995; Mendenhall and Sincich, 1989).

4.4.2. Normality Test

Table 17 below are results of the multivariate normality test as recommended by Decarlo (1997). The kurtosis values are within the recommended range of ± 3 indicating that the data are approximately normal or no problems with normality (Decarlo, 1997).

Table 16 Multicollinearity Test

Model	Coefficients ^a									
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
(Constant)	1.237	.401		3.086	.002					
PSPart5	.078	.093	.061	.838	.403	.266	.067	.049	.654	1.529
ESSystems	.101	.070	.098	1.444	.151	.342	.114	.085	.755	1.325
NTWRe	.012	.074	.011	.159	.873	.209	.013	.009	.713	1.402
NTWAd	-.047	.046	-.063	-1.009	.315	.134	-.080	-.059	.872	1.146
NCenDC	.123	.088	.114	1.408	.161	.355	.112	.083	.523	1.913
NCenImAc	-.143	.071	-.139	-2.021	.045	.097	-.159	-.119	.731	1.369
NSEstCo	.098	.099	.075	.989	.324	.272	.079	.058	.591	1.692
NCfigInt	-.121	.082	-.112	-1.485	.139	.211	-.118	-.087	.610	1.639
OperaPer	.554	.067	.600	8.311	.000	.652	.553	.488	.661	1.512

a. Dependent Variable: ProfPer

Note: PSPart5=Personal socialisation participation, ESSystem=Electronic socialisation system, NTWRe=Network ties working relationship, NTWAd=Network tie working advice, NCenDC=Network centrality direct contact, NCenImAc=Network centrality immediate access, NSEstCo=Network stability established contact, NCfigInt=Network configuration interaction, OperaPer=Operations performance, ProfPer=Profitability performance

Table 17: Results from multivariate Normality Test

	Statistics									
	PSPart5	ESSystems	NTWRe	NTWAd	NCenDC	NCenImAc	NSEstCo	NCfigInt	OperaPer	ProfPer
Valid	167	167	167	167	167	167	167	167	167	167
Missing	0	0	0	0	0	0	0	0	0	0
Mean	4.11	3.35	3.48	3.18	3.92	4.10	3.94	4.11	3.45	3.48
Std. Deviation	.63	.78	.76	1.10	.75	.79	.62	.74	.87	.81
Skewness	-1.01	-.57	-.73	-.39	-.302	-1.22	-.418	-1.061	-.951	-.689
Std. Error of Skewness	.188	.188	.188	.188	.188	.188	.188	.188	.188	.188
Kurtosis	2.670	.289	1.346	-.406	-.545	1.709	.201	1.272	1.597	1.542
Std. Error of Kurtosis	.374	.374	.374	.374	.374	.374	.374	.374	.374	.374

Note: PSPart5=Personal socialisation participation, ESSystem=Electronic socialisation system, NTWRe=Network ties working relationship, NTWAd=Network tie working advice, NCenDC=Network centrality direct contact, NCenImAc=Network centrality immediate access, NSEstCo=Network stability established contact, NCfigInt=Network configuration interaction, OperaPer=Operations performance, ProfPer=Profitability performance

Table 18: Correlation matrix

Code	Variables	Mean	Std	1	2	3	4	5	6	7	8	9	10
1	PSPart5	4.11	.63	1									
2	ESSystems	3.35	.78	.35**	1								
3	NTWRe	3.48	.76	.40**	.24**	1							
4	NTWAd	3.18	1.09	.23**	.14*	.14*	1						
5	NCenDC	3.92	.75	.41**	.22**	.30**	.32**	1					
6	NCenImAc	4.10	.79	.37**	.25**	.20*	.13*	.34**	1				
7	NCfigInt	4.11	.74	.35**	.24**	.42**	.17*	.54**	.19*	1			
8	NSEstCo	3.94	.62	.34**	.32**	.39**	.17*	.46**	.43**	.44**	1		
9	OperaPer	3.45	.88	.33**	.40**	.27**	.26**	.47**	.24**	.36**	.35**	1	
10	ProfPer	3.48	.81	.27**	.34**	.21**	.13*	.35**	.10 ^{ns}	.27**	.27**	.65**	1

Note: * *Correlation is significant at the 0.01 level * Correlation is significant at the 0.05 level, ns = not significant, Std: Standard Deviation. PSPart5=Personal socialisation participation, ESSystem=Electronic socialisation system, NTWRe=Network ties working relationship, NTWAd=Network tie working advice, NCenDC=Network centrality direct contact, NCenImAc=Network centrality immediate access, NSEstCo=Network stability established contact, , NCfigInt=Network configuration interaction, OperaPer=Operations performance, ProfPer=Profitability performance

Table 19. Discriminant Validity

	1	2	3	4	5	6	7	8	9	10
PSPart5	0.74									
EsSystems	0.35**	0.72								
NTWRe	0.40**	0.24**	0.68							
NTWAd	0.23**	0.14	0.32**	0.80						
NCenDC	0.41**	0.22**	0.30**	0.32**	0.72					
NCenimAC	0.38**	0.25**	0.20**	0.13	0.34**	0.83				
NSestCo	0.34**	0.32**	0.42**	0.17*	0.46**	0.43**	0.76			
NCfigInt	0.35**	0.22**	0.39**	0.17*	0.55**	0.19*	0.44**	0.80		
ProfPer	0.27**	0.34**	0.21**	0.13*	0.36**	0.10 ^{ns}	0.27**	0.21**	0.73	
OperaPer	0.33**	0.40**	0.27**	0.26**	0.47**	0.24**	0.35**	0.36**	0.65**	0.78

Diagonal (**bold**) = Square root of AVE; for discriminant validity criterion, value of the square root of AVE should be greater than off-diagonal elements;

** correlation is significant at the 0.01 level

* correlation is significant at the 0.05 level

PSPart5=Personal socialisation participation, ESSystem=Electronic socialisation system, NTWRe=Network ties working relationship, NTWAd=Network tie working advice, NCenDC=Network centrality direct contact, NCenImAc=Network centrality immediate access, NSEstCo=Network stability established contact, , NCfigInt=Network configuration interaction, OperaPer=Operations performance, ProfPer=Profitability performance

4.4.3. Common Method Bias/Variance

Ensuring that the constructs used in this study measure what they are supposed to measure is important if we are to draw the right conclusions from our data (Doty and Glick, 1998). Although its introduction by Campbell and Fiske (1959) spans decades common method variance also referred to as monomethod or same source bias remains the bane of researchers in the behavioural studies (Podsakoff and Organ, 1986; Spector, 2006). According to Spector (2006), method variance is to do with the method used to collect the data. Variance is accrued when any variable is assessed using a particular method, it results in common method variance when two variables are assessed using the same method (Spector, 2006). On the other hand common method bias relates to the *degree to which the correlations are altered or inflated due to a methods effect* (Meade, Watson and Kroustalis, 2007:1). Meade et al (2007) note this distinction to shift the emphasis from whether common method variance has a significant effect to how large the common method bias is. Accordingly, a minor alteration or inflation in the correlations amongst measures will resolve the significant effects of common method variance (Meade, Watson and Kroustalis, 2007).

Self report surveys in cross sectional studies being the most popular means of data collection get the most criticism (Spector, 2006; Malhotra, Kim and Patil, 2006). However, Spector (2006) and Crampton and Wagner (1994) refute the claim that self report surveys are to blame for introducing severe and comprehensive bias into the measurement of variables. Moreover Spector (2006) notes the lack of studies reporting a level of baseline correlation among all variables. Additionally, debates on its usefulness, the degree of its effects, continue unabated in the literature (Malhotra, Kim and Patil, 2006). Spector (1987)

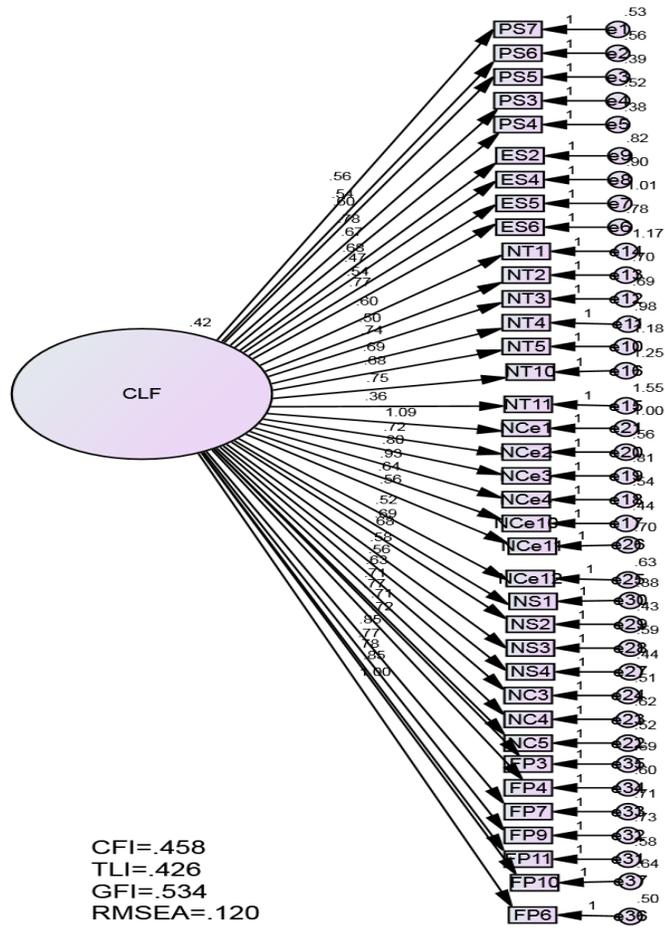
in his reanalysis of 11 data sets on job satisfaction note that method variance was non - significant or trivial. Reanalysing the same data set, Williams, Cote and Buckely, (1989) concluded that method variance was significant. These researchers differ on the extent or magnitude of method variance found, because of the different methods of analysis employed (Bagozzi and Yi, 1991). Although the strength of the bias, the sources of bias and the methods employed to determine common method variance varies, care was taken to minimize its effect on the conclusions drawn on this study (Podsakoff, et al 2003).

The study employed a self report survey, and whilst there are no definitive guidelines, to control for common method variance we followed suggestions by Podsakoff et al, (2003). Self report survey items were carefully selected from the literature, pilot tested and rectified where necessary for clarity, and simplicity and length (Podsakoff et al, 2003). In addition double barrel questions were avoided and the wordings, definitions of constructs and instructions for filling the questionnaire were uncomplicated precise and brief (Korff, Biemann and Voelpel, 2016). Potential respondents were identified in the sample frame to ensure they could understand items and for their interest in knowledge sharing mechanisms, structural capital and organisational performance. Moreover, respondents were assured of their anonymity and the university logo was used for assurance and credibility (Korff, Biemann and Voelpel, 2016).

Statistically Harman's single factor test was utilized to evaluate the effects of common method variance. All the measures were loaded onto exploratory factor analysis to determine how many factors will account for the variance in the variables (Podsakoff et al 2003). A single factor emerged with the cumulative percentage variance of 26.09%. The results indicate there is minimal or no common method variance as 26.09% is below the

50% level (Podsakoff et al, 2003; Alumran et al, 2014). However, Harman's test only determines the magnitude of common method variance and fails to statistically control for methods effects (Podsakoff et al, 2003). Thus, this study also used the more comprehensive confirmatory factor analysis (Iverson and Maguire, 2000; Alumran et al, 2014).

Figure 2 Common Method Bias with Single Factor



4.4.4. Confirmatory factor Analysis

Confirmatory factor analysis is an influential, popular and essential statistical technique used *to confirm and evaluate the extent to which the measurement model is replicated in the data* (Worthington and Whittaker, 2006:808). Additionally CFA is a precursor to structural Equation modelling that focuses on measurement, in essence it is a measurement model (Byrne, 2004; Kline, 2005; Brown, 2006). Thus, after ascertaining the underlying structure of the factors through exploratory factor analysis, we conducted a confirmatory factor analysis (Kline, 2005). Additionally prior to the analysis and having conducted exploratory factor analysis, details of the number of factors in our instrument, the number of items in each factor and the extent to which the factors are correlated were presented (Worthington and Whittaker, 2006; Brown, 2006).

Furthermore, Brown (2006) notes the important role CFA play in determining the validity of constructs in the social and behavioural sciences. Moreover Henseler, Ringle, and Sinkovics, (2009), note the many sources that can undermine the validity of constructs.

Accordingly in the course of the CFA analysis we determined the reliability, validity and goodness of fit of the measurement model. Convergent and discriminant validity entails assessing constructs against each other as oppose to an external standard (Kline, 2011). Convergent validity explains the converging of factors that measure a construct (Browne, 2006; Kline, 2011; Wang and Wang, 2012). Similarly scholars note that convergent validity is established when *measures that are theoretically supposed to be highly interrelated, are highly interrelated in practice also* (Yasmeen, and Supriya 2008:32). Additionally Yasmeen and Supriya (2008) report the use of Bentler Bonett Coefficient to establish convergent validity. Moreover they note a scale with values of .90 and above as evidence of

strong convergent validity. In this study our values of .91 and .90 fall within the accepted range, indicating that our model meets the convergent validity criteria.

Conversely discriminant validity requires that *test not correlate too highly with measures from which it is supposed to differ* (Campbell 1960:548; Kline 2011; Henseler, Ringle, and Sarstedt, 2015). For this study we followed Fornell and Larcker (1981)'s recommendation that the AVE for each construct should be higher than the squared correlation between the construct and any of the other constructs. Results Table 19 above illustrates the AVE - the diagonal figures in bold is higher than the off diagonal figures – the squared correlation between constructs. Consequently all the constructs in the measurement model were deemed to have adequate discriminant validity.

The goodness of fit of the measurement model was determined using goodness of fit indices that include a selection from absolute indices, incremental fit indices and parsimonious fit indices as recommended in the literature (Byrne, 2004; Kline, 2005; Brown, 2006).

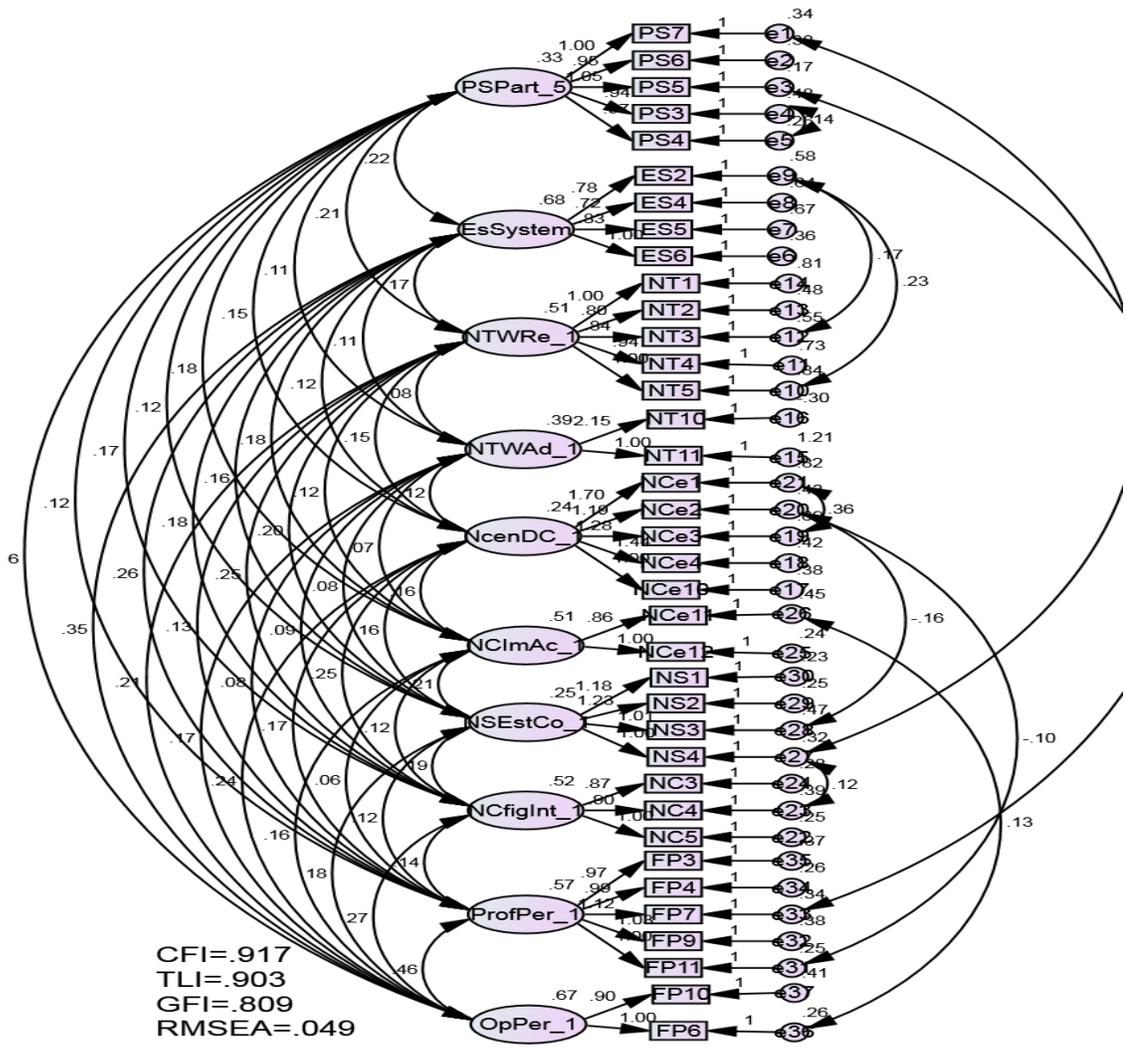
Below are the results of the goodness of fit indices obtained by performing a confirmatory factor analysis using maximum likelihood method in AMOS version 22. Moreover the results achieved reflect one or more absolute, incremental and parsimonious fit indices.

Table 20 Results of the measurement model Confirmatory Factor Analysis

Model	Achieved fit indices							
		Absolute fit Indices		Incremental Fit Indices		Parsimonious Fit Indices		
	χ^2/df	GFI	RMR	CFI	TLI	PNFI	PCFI	RMSEA
	1.40	.80	.05	.91	.90	.66	.79	.04
	Suggested fit indices cut-off values							
	≤ 5	$\geq .90$	$\leq .05$	$\geq .90$	$\geq .90$	> 0.5	> 0.5	.05 to .08

The results of the fit indices in the table above depict a close or better model fit (Tabachnik and Fidell, 2007; Bentler, 1990; Hair et al, 1998; Western and Gore, 2006; Mulaik et al 1989; Hooper et al, 2008; Schumaker and Lomax 2010). Researchers are yet to agree on GFI cut off value of .80 as an indicator of model fit (Shevlin, Miles and Lewis, 2000). Moreover, Sharma, Mukherjee, Kumar and Dillion (2005) report that not only are these fit indices affected by the interaction of sample size and factor loadings, but that the sample sizes that affect the various indices also vary. In addition researchers advise against using the goodness of fit (GFI) in assessing model fit (Hu and Bentler, 1998; 1999; Sharma, Mukherjee, Kumar and Dillion 2005). What's more in their study Sharma et al (2005) report that the GFI was more adversely affected by sample size and number of indicators. Thus we report the GFI in conjunction with other fit indices. Moreover the cut off value of .04 of RMSEA indicates a close fit according to Browne and Cudeck (1993). The fit indices all meet the criterion of suggested values and indicate a good fit between the measurement model and the observed data (Schreiber, Nora, Stage, Barlow and King, 2006).

Figure 3 Measurement model



4.4.5. SEM for the research model

Structural equation modelling is an all encompassing statistical technique that stems from integrating multi equation modelling from econometrics and values of measurement from the psychology and sociology disciplines (Hair, Anderson, Tatham and Black, 1998).

Although certain aspects of structural equation modelling (e.g. appropriate sample size and fit indices) are an ongoing debate, it remains a widely used statistical technique across disciplines and especially in the social sciences (Bagozzi, 1977; Kline, 2011; Byrne, 2013). The appeal lies in SEM being a comprehensive technique (Byrne, 2013) and a combination of statistical techniques (Kline, 2011). For Tabachnick and Fidell, (2007), SEM is the integration of exploratory factory analysis and multiple regression analyses.

Moreover, SEM as a statistical technique is underpinned by theory, accounts for measurement error and allows for the examination of latent variables (Byrne, 2013). Above all, multiple relationships can be simultaneously analysed using structural equation modelling (Kline, 2011; Byrne, 2013). However, SEM is unlikely to confirm specific models as they are unknown (Kline, 2011). Our hypothesized model is explained as fitting and being consistent with the data but our model cannot be verified as the true model is unknown (Kline, 2011). Nevertheless, Assessing whether the model fits our data is fundamental to using SEM (Yaun, 2005). Moreover, SEM remains important as it enables the analysis of research problems in a *single systematic* and *comprehensive* manner (Gefen, Straub and Boudreau, 2000:3). Additionally, in SEM it is essential that the researcher is familiar with the theory underpinning possible relationships among variables (Tabachnick and Fidell, 2007).

Several issues pertaining to SEM remain contentious; goodness of fit indices and their cut-off points and sample sizes (Byrne, 2013). A number of goodness of fit indices has been recommended as guidelines for testing model fit in the literature (Hu and Bentler, 1998,). Whilst they may be the golden rules that enable the researcher to remain objective in interpreting data (Hu and Bentler, 1998); others contend that there are no golden rules or guidelines for approximating goodness of fit indices (Yaun, 2005). However, Steiger (2007:894) bemoans the *nil hypothesis of perfect fit* as SEM models are restrictive and unlikely to fit perfectly to the data. Thus, while researchers remain critical of the cut-off points or thresholds of the fit indices, they generally agree that they are a practical objective guide in model fit assessment (Yuan, 2005). We chose our model for this study based on how approximately and sufficiently enough the model fits the data, the theoretical underpinnings of the study and for simplicity in interpretation (Hair et al 1998, 2006).

Furthermore, debate on what constitutes a fit indice has resulted in a number of goodness of fit indices that are either absolute or incremental/comparative, relative fit indices or parsimonious fit measures (Hair et al 1998). Moreover, recommendations on which fit indices to include in reporting model fit report vary as absolute and incremental indices both play different roles in determining model fit simultaneously (Kline, 2011). Therefore it is essential that one or more of the fit indices reflect absolute and incremental and parsimonious fit indices (Hair et al 1998, 2006).

Table 21. List of some recommended fit indices in the literature.

Table Selected Fit indices

Fit Measures/Indices	Description	Acceptable Levels	Interpretation
Absolute Fit Measure	<p>Assess only overall model fit (Structural and measurement); no adjustment for the degree of over fitting that might occur (Hair et al, 1998:611)</p> <p>Absolute fit indices determine how well a priori model fits the sample data (McDonald and Ho, 2002)</p> <p>Demonstrates which proposed model has the most superior fit.</p> <p>Provide the most fundamental indication of how well the proposed theory fits the data.</p> <p>Calculation does not rely on comparison with a baseline model</p> <p>Measure of how well the model fits in comparison to no model at all (Jöreskog and Sörbom, 1993; Hooper et al, 2008:54).</p>		
<p>Chi-square /df (χ^2/df)</p> <p>Relative χ^2 (χ^2/df)</p>	<p>The Chi-Square value is the traditional measure for evaluating overall model fit and, ‘assesses the magnitude of discrepancy between the sample and fitted covariances matrices’ (Hu and Bentler, 1999: 2).</p> <p>Also known as the badness of fit (Kline, 2005), or lack of fit (Mulaik et al 1989). 2:1 (Tabachnik and Fidell, 2007); 3:1 (Kline, 2005) Adjusts for sample size (Hooper et al, 2008)</p>	<p>Tabled χ^2 value</p> <p>Low χ^2 relative to degrees of freedom with an insignificant p value ($p > 0.05$)</p> <p>3 or less than 3 good indication of model fit (Kline, 1998)</p>	<p>Compares obtained χ^2 value with tabled value for given df</p>
RMSEA- Root mean square error of approximation	<p>Corrects for a model’s complexity. RMSEA value of .00 indicates that the model exactly fits the data. Measures how well the model, with unknown but optimally chosen parameter estimates would fit the populations covariance matrix (Byrne, 1998; Hooper et al, 2008:54; Western and Gore, 2006)</p> <p>Has a known distribution. Favours parsimony. Values less than 0.03 represent excellent fit.</p>	<p>.05 to .08</p> <p>$\leq .06$ (Hu and Bentler, 1999) 0.07 (Steiger, 2007)</p>	<p>Value of .05 to .08 indicate close fit</p>
GFI-Goodness of Fit Index	<p>Scaled between 0 and 1, with higher values indicating better model fit. Should be used with caution.</p>	<p>0 (no fit) to 1 (perfect fit)</p>	<p>Values greater than or very close to 0.90 reflect a good fit</p>
AGFI	<p>Adjusts the GFI based on the number of parameters in the model. Values can fall outside the 0-1.0 range</p>	<p>0 (no fit) to 1 (perfect fit)</p>	<p>Values adjusted for df with 0.90</p>

			good model fit
RMR-	Residual based. The average squared differences between the residuals of the sample covariances and the residuals of the estimated covariances. Unstandardised	Researcher defines level Good models have small RMR (Tabachnik and Fidell, 2007)	Indicates the closeness of Σ to S matrices
SRMR	Standardised version of the RMR. Easier to interpret due to its standardised nature. The SRMR is a summary of how much difference exists between the observed data and the model. Smaller values indicate better fit (Bentler, 1995; Western and Gore, 2006)	< .05 SRMR less than 0.08 (Hu and Bentler, 1999)	Value less than .05 indicates a good model fit
Incremental Fit Indices	Compares proposed model to another specified by the researcher (Hair et al, 1998:611). Incremental fit indices, also known as comparative (Miles and Shevlin, 2007) or relative fit indices (McDonald and Ho, 2002) Indices do not use the chi-square in its raw form Compare the chi square value to a baseline model. For these models the null hypothesis is that all variables are uncorrelated (McDonald and Ho, 2002; Hooper et al, 2008:55)		
NFI	Assesses fit relative to a baseline model which assumes no covariance between the observed variables. Has a tendency to overestimate fit in small samples	0 (no fit) to 1 (perfect fit)	Value close to .90 reflects a good model fit
CFI-Comparative fit 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 (Bentler, 1990; Hair et al, 1998; Western and Gore, 2006)	Values greater than 0.90	
TLI /NNFI-Tucker-Lewis Index		0 (no fit) to 1 (perfect fit)	Value close to .90 reflects a good model fit
Parsimonious Fit Measures	Determine the amount of fit achieved by each estimated coefficient Adjusts the measures to provide comparison between models with differing numbers of estimated coefficients (Hair et al, 1998:611). Essential in determining model fit; a guide in the selection of alternative models (James, Mulaik, and Brett, 1982; Muller, 2003)		

PGFI - Parsimonious goodness-of-fit	A respecification of the GFI .50 recommended value (Mulaik et al 1989) Higher values reflecting greater model parsimony (Hair et al 1998; Muller, 2003).	Range between zero and one	Compares values in alternative models
PNFI	The PNFI adjusts for degrees of freedom based on the NFI (Mulaik et al 1989). .50 recommended value (Mulaik et al 1989) Higher values reflecting greater model parsimony (Hair et al 1998; Muller, 2003).	0 (no fit) to 1 (perfect fit)	Compares values in alternative models

Source: Adapted from: Hooper et al, (2008) Hair et al (1998); Schumaker and Lomax (2010)

The guidelines for fit indices recommended a decade ago differ from the more recent guidelines, resulting in debates about the number of indices, their recommended cut off values and their statistical justification (Bentler, 1990; McDonald and Marsh, Marsh et al, 2004). According to Marsh et al (2004), the cut off values of the fit indices recommended by Bentler (1990), were not meant to be the *golden rules*, or to be strictly adhere to, rather the fit indices chosen should be informed by the research area (Marsh et al 2004). Moreover, the new cut-off value of fit indices by Hu and Bentler (1999), while valuable should not be the sole decider on how approximately the model fits the data (Byrne, 2001). Approximating model fit should be guided by the experience of researcher, theoretical underpinnings and the complexity of the model for interpretation (Marsh et al, 2004). Accordingly in assessing the model fit we complemented the chi-square goodness of fit measurement with other absolute fit, incremental and parsimonious measures (Hair et al, 1998; Hu and Bentler, 1999; Byrne, 2001). Although the chi-square is commonly employed in assessing model fit it necessitates doing so with care (Tabachnik and Fidell, 2007).

In other words, the chi-square has several shortcomings; the chi-square is affected by variations in sample sizes (Kline, 2005; Tabachnik and Fidell, 2007; Hooper et al 2008). Indeed scholars note that with very large samples the chi-square value is large with small probability values; and small samples yield small chi-square values with larger probability values (Raykov and Marcoulides, 2000; Schumaker and Lomax, 2010). Therefore the chi-square in conjunction with other fit indices was employed to determine that the model approximately fits the data (Raykov and Marcoulides, 2000; Hooper et al, 2008).

The thirty three hypotheses tested are in Table 26, and 17 of these hypotheses are found to be significant while 16 were found to be non significant. Personal socialisation is found to be significantly related to network tie working relationship network centrality direct contact and electronic socialisation systems Furthermore the relationship between electronic socialisation systems and operations performance is highly significant. Significant relationships were also found between network tie working relationship and network configuration interaction, and network centrality direct contact and network configuration interaction.

There is also a significant relationship between network centrality immediate access and network stability established contact. Network centrality direct contact is found to have a significant relationship with operations performance. However, the relationships between network configuration interaction and operations performance and network tie working relationship and operations performance are not significant. Additionally, the relationships between electronic socialisation systems and network tie working advice and that of network stability established contact and profit performance are not significant. The relationship between network centrality immediate access and profit performance is also not significant. The relationships are illustrated in the structural model in figure (4).

Table 22 Hypothesis Testing Results

No	Variable		S.E	C.R	Standardised Path Coefficient (β)	Hypothesised Relationship
	Predictor	Criterion			Use for diagram	
H _{1a}	Personal Socialisation Participation	Network ties working relationship	0.86	5.59	0.39***	Supported
H _{1b}		Network Tie Working Advice	0.15	1.16	.10 ^{ns}	Not Supported
H _{1c}		Network Centrality Direct Contact	0.09	4.55	0.34***	Supported
H _{1d}		Network Centrality Immediate Access	0.09	3.66	0.28***	Supported
H _{1e}		Electronic Socialisation Systems	0.09	4.88	0.35***	Supported
H _{1f}		Operations Performance	.110	.38	.03 ^{ns}	Not Supported
H _{1g}		Profit Performance	.85	1.44	.09 ⁿ	Not Supported
H _{2a}	Electronic Socialisation Systems	Network Tie Working Advice	0.10	.64	0.05 ^{ns}	Not Supported

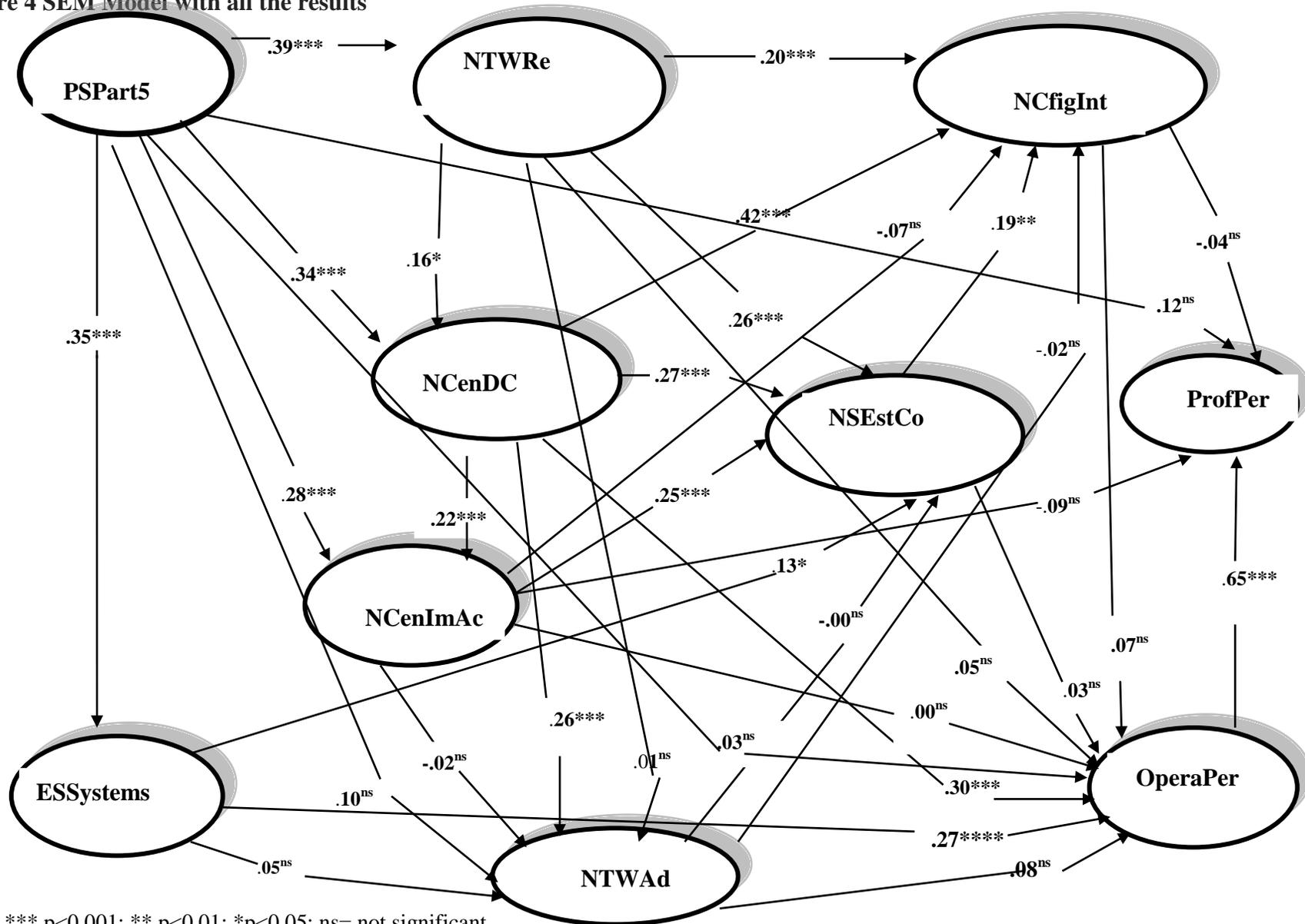
H _{2b}		Network Stability Established Contact	0.04	2.18	0.13*	Supported
H _{2c}		Operations Performance	0.76	3.91	.27***	Supported
H _{3a}	Network Tie Working Relationship	Network Centrality Direct Contact	0.07	2.10	.16*	Supported
H _{3b}		Network Tie Working Advice	.11	.13	.01 ^{ns}	Not Supported
H _{3c}		Network Stability Established Contact	.05	.40	.26***	Supported
H _{3d}		Network Configuration Interaction	.06	.29	.20***	Supported
H _{3e}		Operations Performance	.86	.66	.05 ^{ns}	Not Supported
H _{4a}	Network Tie Work Advice	Network Stability Established Contact	.03	.07	-.00 ^{ns}	Not Supported
H _{4b}		Network Configuration Interaction	.04	-.35	-.02 ^{ns}	Not Supported
H _{4c}		Operations Performance	.05	1.31	.08 ^{ns}	Not Supported
H _{5a}	Network Centrality Direct Contact	Network Centrality Immediate Access	.08	.29	.22***	Supported

H5b		Network Tie Work Advice	.12	3.40	.26***	Supported
H5c		Network Stability Established Contact	.05	3.87	0.27***	Supported
H5d		Network Configuration Interaction	0.07	5.81	.42***	Supported
H5e		Operations Performance	.09	3.55	.30***	Supported
H6a	Network Centrality Immediate Access	Network Tie Working Advice	.11	.244	-.02 ^{ns}	Not Supported
H6b		Network Stability Established Contact	.05	3.91	.25***	Supported
H6c		Network Configuration Interaction	0.06	1.08	-.07 ^{ns}	Not Supported
H6d		Operations Performance	.08	.113	.00 ^{ns}	Not Supported
H6e		Profit Performance	.06	-1.41	-.09 ^{ns}	Not Supported
H7a	Network Stability Established Contact	Network Configuration Interaction	.09	2.59	.19**	Supported
H7b		Operations Performance	.11	.47	.03 ^{ns}	Not Supported

H ₈	Network Configuration Interaction	Operations Performance	.94	.92	.07 ^{ns}	Not Supported
H ₈		Profit Performance	.06	-.67	-.04 ^{ns}	Not Supported
H ₉	Operations Performance	Profit Performance	.06	10.13	.65***	Supported

Note: *** p<0.001; ** p<0.01; *p<0.05; ns= not significant; S.E = Standard Error; C.R= Critical Ratio

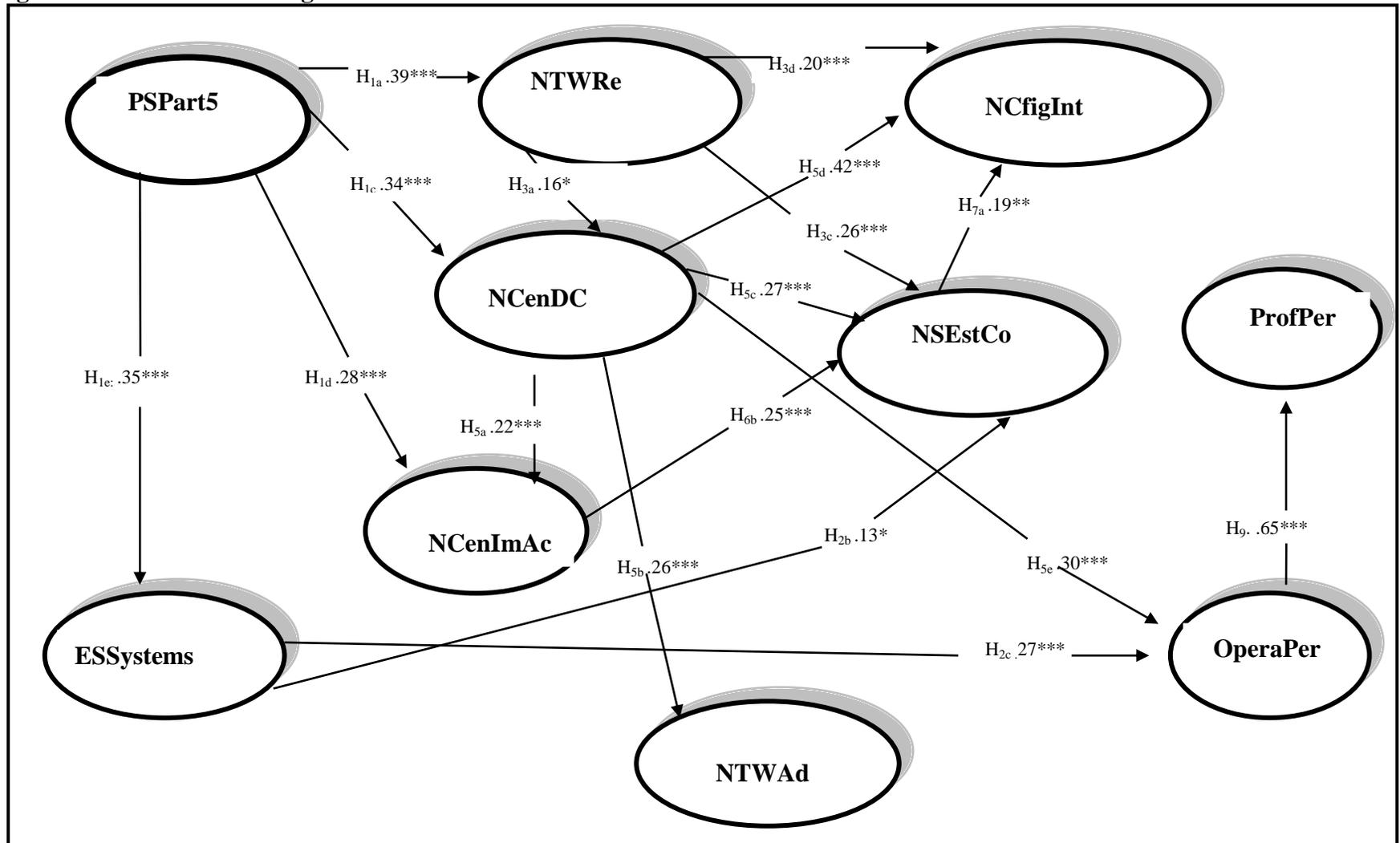
Figure 4 SEM Model with all the results



Note: *** p<0.001; ** p<0.01; *p<0.05; ns= not significant

PSPart5=Personal socialisation participation, ESSystem=Electronic socialisation system, NTWRe=Network ties working relationship, NTWAd=Network tie working advice, NCenDC=Network centrality direct contact, NCenImAc=Network centrality immediate access, NSEstCo=Network stability established contact, NCfigInt=Network configuration interaction, OperaPer=Operations performance, ProfPer=Profitability performance

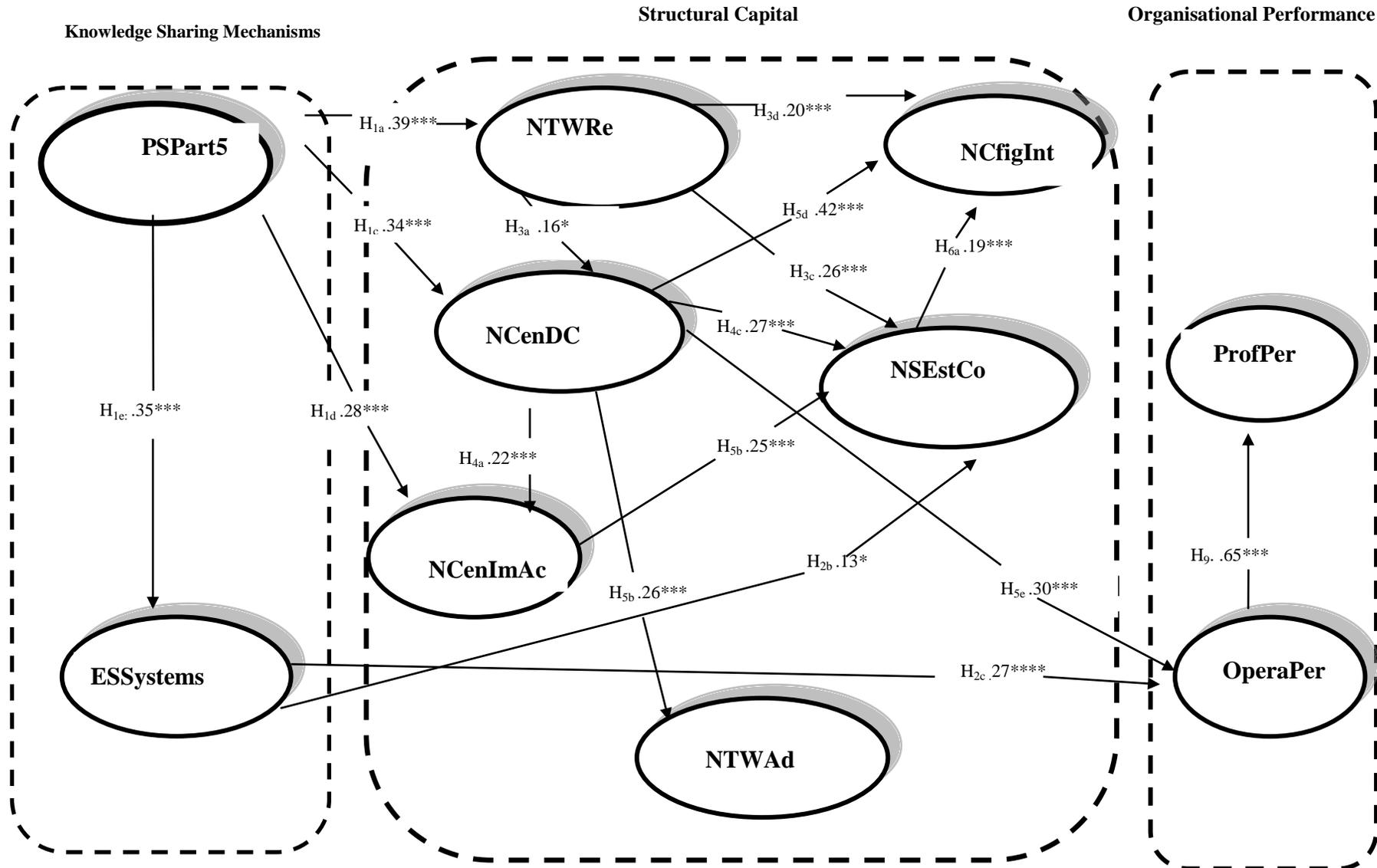
Figure 5 SEM Model with significant results



Note: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; ns= not significant

PSPart5=Personal socialisation participation, ESSystem=Electronic socialisation system, NTWRe=Network ties working relationship, NTWAd=Network tie working advice, NCenDC=Network centrality direct contact, NCenImAc=Network centrality immediate access, NSEstCo=Network stability established contact, NCfigInt=Network configuration interaction, OperaPer=Operations performance, ProfPer=Profitability performance

Figure 6 SEM Model



Note: *P < 0.05; **P < 0.01; ***P < 0.001; ns= not significant

PSPart5=Personal socialisation participation, ESSystem=Electronic socialisation system, NTWRe=Network ties working relationship, NTWAd=Network tie working advice, NCenDC=Network centrality direct contact, NCenImAc=Network centrality immediate access, NSEstCo=Network stability established contact, NCfigInt=Network configuration interaction, OperaPer=Operations performance, ProfPer=Profitability performance

Table 23 Direct and Indirect effects

Predictor Variable	Mediator Variable	Criterion Variable	Direct Effect	Indirect Effect	Total Effect
PSPart5	EsSys	NTWAd	0.21	0.02ns	0.23
PSPart5	NcenDC	NCenImAc	0.28	0.08*	0.36
PSPart5	NTWRe	NcenDC	0.35	0.06*	0.41
NTWRe	NcenDC	OPeraPer	0.07	0.06*	0.13
NTWRe	NCfigInt	NSEstCo	0.23	0.05**	0.28
NcenDC	NCenImAc	NSEstCo	0.19	0.06**	0.25
NcenDC	NCfigInt	NSEstCo	0.19	0.09**	0.28
NCenImAc	NSEstCo	ProPer	-0.10	0.03ns	-0.07

Note: *p<0.05;** p<0.01; *** p<0.001; ns= not significant

PSPart5=Personal socialisation participation, ESSystem=Electronic socialisation system, NTWRe=Network ties working relationship, NTWAd=Network tie working advice, NCenDC=Network centrality direct contact, NCenImAc=Network centrality immediate access, NSEstCo=Network stability established contact, NCfigInt=Network configuration interaction, OperaPer=Operations performance, ProfPer=Profitability performance

In examining the relationships between variables indirect relationships between variables was also observed. Indirect relationships were examined to observe a detailed picture of the relationships between variables (Raykov and Marcoulides, 2000). Additionally, Holbert and Stephenson note that the direct and indirect effects present the holistic effects of one variable on another. Using Sobel's test (1982), made popular by Baron and Kenny, (1986), insignificant relationships are observed to be significant through mediating variables. Network tie working relationship has no direct relationship with operations performance. However, it has an indirect relationship with operations performance mediated by network centrality direct contact. The total effects for the relationship between personal socialisation

participation and network centrality immediate access are mediated by network centrality direct contact.

Additionally the significant indirect relationship between personal socialisation participation and network centrality direct contact is mediated by network tie working relationship. Moreover network tie working relationship has a significant indirect relationship with network stability established contact mediated by network configuration interaction. Network work centrality direct contact has an indirect significant relationship with network stability established contact mediated by network configuration interaction and another indirect relationship with network stability established contact mediated by network centrality immediate access.

4.4.6. Summary

Chapter four presents and explains the data analysis undertaken and presents the results of the analysis. Chapter four presents explanations of the data preparation undertaken for the initial analysis. Chapter four also provides preliminary analysis perform to determine the level of missing data, outliers, the normality, multicollinearity, sample distribution and between group differences. Exploratory factor analysis was undertaken and the results of the number of factors and how they were retained is discussed and presented. Also Harman's single factor test was utilized to evaluate the effects of common method variance. Confirmatory factor analysis was conducted and the results presented. Structure equation modelling was undertaken and the results discussed and presented.

5. Chapter Five: Interpretation and Discussions of Results

Chapter provides an interpretation of the results from analysing the results using structural equation modelling. This chapter explains the results of the hypotheses and present explanations of the relationships between the constructs. A discussion of the results is also presented.

5.1. Interpretation of results

Structural equation modelling was used to examine kssms, dimensions of structural capital and organisational performance. The model fit was examined following the recommended fit indices in the literature X^2/df , CFI, TLI, GFI and RMSEA to determine whether the proposed model was a good fit to the data (Raykov and Marcoulides, 2000; Hooper et al 2008). The results show the model approximately fit the data in line with the suggested fit indices in the literature (Bentler, 1990; Hu and Bentler 1999; McDonald and Marsh, Marsh et al, 2004). The empirical results demonstrate support for 17 of the relationships, with 16 of the relationships not supported. The results are depicted in Table 22 and Figure 4.

Furthermore there are several significant and positive relationships that support our hypotheses. Our result found a significant and positive relationship between PSPart5 and NTWRe ($\beta_{1a} = + .39$ with $p < 0.001$) supporting hypothesis H_{1a} . The relationship between PSPart5 and NCenDC ($\beta_{1c} = + .34$ with $p < 0.001$) was also positive supporting H_{1c} . Furthermore, our results show a positive and significant relationship between PSPart5 and NCenImAc ($\beta_{1d} = + .28$ with $p < 0.001$), supporting H_{1d} . Additionally, the results confirm a significant and positive relationship between PSPart5 and ESSystems ($\beta_{1e} = + .35$ with $p < 0.001$). However, direct relationships between PSPart5 were not significant resulting in a lack of support for hypotheses H_{1f} and H_{1g} . This is surprising as researchers acknowledge that

personal socialisation engenders trust and enhances knowledge sharing, individuals and subsequently organisational performance (Louis, Posner, and Powell, 1983; Nelson, 1987; Ostroff, and Kozlowski, 1992; Lee, and Choi, 2003; Paarlberg, and Lavigna, 2010).

Hypotheses H_{2a} , H_{2b} , and H_{2c} predict that ESSystems would be positively related to NTWAd, NSEstCo and OperaPer. Results in table 22 show that H_{2b} , with ($\beta_{2b} = + .13$ with $p < 0.05$) and H_{2c} ($\beta_{2c} = + .27$ with $p < 0.001$) were supported and H_{2a} was not. Also, hypotheses H_{3a} , H_{3b} , H_{3c} , H_{3d} , H_{3e} , predict that NTWRe would positively relate to NCenDC, NTWAd, NSEstCo, NCfigInt and OperaPer. H_{3a} with ($\beta_{3a} = + .16$ with $p < 0.05$); H_{3c} with ($\beta_{3c} = + .26$ with $p < 0.001$) and H_{3d} with ($\beta_{3d} = + .20$ with $p < 0.001$) were all supported and NTWRe was positively related to NCenDC, NSEstCo and NCfigInt, H_{3b} (NTWAd) and H_{3e} (OperaPer) were not supported.

NCenDC was predicted to be positively related to NCenImAc, NTWAd, NSEstCo, NCfigInt and OperaPer. Our findings show a significant and positive relationship between NCenDC and NCenImAc with ($\beta_{5a} = + .22$ with $p < 0.001$). There is also a significant and positive relationship between NCenDC and NTWAd with ($\beta_{5b} = + .26$ with $p < 0.001$). NCenDC is also positively related to NSEstCo with ($\beta_{5c} = + .27$ with $p < 0.001$); NCfigInt ($\beta_{5d} = + .42$ with $p < 0.001$) and OperaPer with ($\beta_{5d} = + .30$ with $p < 0.001$) confirming Hypotheses H_{5a} , H_{5b} , H_{5c} , H_{5d} , and H_{5e} . Furthermore, NCenImAc was predicted to have associations with NTWAd, NSEstCo, NCfigInt, OperaPer and Profper. The results show a positive and significant relationship between NCenImAc and NSEstCo with ($\beta_{6b} = + .25$ with $p < 0.001$). Conversely our results indicate there were no significant relationships between NCenImAc and NTWAd, NCfigInt, OperaPer and Profper, hence no support for hypotheses H_{6a} , H_{6c} , H_{6d} and H_{6e} .

Hypotheses 7_a and 7_b state that NSEstCo will be positively related to NCfigInt and OperaPer. The results confirm a positive relationship between NSEstCo and NCfigInt with ($\beta_{7a} = + .19$ with $p < 0.01$) confirming hypothesis 7_a, however the relationship between NSEstCo and OperaPer was not significant. Additionally, NCfigInt was predicted to impact on OperaPer and Profper, our results indicate that there are no significant relationships between NCfigInt and OperaPer and Profper, hence no support for H_{8a} and H_{8b}. OperaPer was predicted to be associated with Profper our results found a positive and significant relationship between OperaPer and Profper with ($\beta_9 = + .65$ with $p < 0.001$) confirming hypothesis H₉.

5.2. Discussion of results

This study investigated the relationship between knowledge sharing mechanisms and organisational performance mediated by structural capital. Additionally we investigated the relationships between knowledge sharing mechanisms and structural capital. The study also examined the relationship between structural capital and organisational performance. Thus, the main research question is:

- (1) What is the relationship between knowledge sharing mechanisms and organisational performance, through the mediating role of structural capital?
- (2) What is the relationship between knowledge sharing mechanisms and structural capital?
- (3) What is the relationship between structural capital and organisational performance?

5.2.1. Personal socialisation participation and Network tie working relationship

This proposed a relationship between personal socialisation and participation and network tie working relationship.

This study investigated the relationship between knowledge sharing mechanisms and organisational performance with structural capital in a mediating role. We found that there was a relationship between knowledge sharing mechanism (personal socialisation participation) and structural capital (Network tie working relationship; network centrality direct contact, network centrality immediate access). Moreover there was significant relationship between knowledge sharing mechanisms (P and E socialisation).

The significant direct relationship between personal socialisation participation and network tie working relationship is in line with Bock and Wong (2013) who report that knowledge sharing mechanisms enhance the sharing of knowledge across organisations and Hansen (1999) and Szulanski (1996) who note that ties to others within the organisation could provide access to valuable relevant knowledge.

The findings of a direct link between personal socialisation participation and network tie working relationship is supported by Hansen (1999) who report that it is essential to share tacit knowledge that is embedded in the individual and is valuable for task completion through person to person contact (personal) and Lawson et al (2009) who found informal socialisation vital to sharing essential knowledge. Therefore personal socialisation will lead to network tie working relationship through person to person socialisation not just to learn the ropes about the job but also to know the ties with the expertise, know how, skills and experiences that will be vital in the course of completing tasks within the organisation. As Lawson et al (2009) note that participating in socialisation mechanisms like workshops enable and enhance interaction, social exchanges and increases the level of mutual respect and trust. Additionally Hansen, Nohria and Tierney, (2005) note the importance of visits by engineers to other departments to share ideas about possible new products.

5.2.2. Personal socialisation participation and Network centrality direct contact

Furthermore support was found for a direct and significant relationship between personal socialisation participation and network centrality direct contact. The knowledge sharing mechanism personal socialisation participation enables direct contact to individuals that are centrally located within the organisation. This implies that individuals using the above knowledge sharing mechanism have the opportunity to be directly connected to individuals that are centrally located. As Tsai (2001) found a central location affords access to knowledge from other parts of the organisation. Therefore access to an individual that is centrally located has direct access with other individuals within the organisation. Moreover centrally located individual has immediate access to several individuals within the organisation.

Thus through personal socialisation participation individuals have the opportunities of knowing who knows what and access to those individuals (Borgatti and Cross, 2003). Moreover, it will help to minimize the not invented here syndrome as individuals will be able utilise personal socialisation participation to connect with others through the direct link to centrally located individuals. As Rowley (1997) notes central individuals have influence (have direct access to top management), they have immediate access to several individuals and well known to colleagues. They are thus in powerful positions of gatekeepers that can enable access to other individuals with the relevant expertise, knowledge and ideas (Rowley, 1997).

Moreover tacit knowledge is valuable relevant knowledge that is mostly shared through personal socialisation mechanisms (Lawson et al, 2009). Personal socialisation mechanisms are informal and powerful ways to share or gain access to knowledge (Lawson et al, 2009;

Boh and Wang, 2013). The power in centrality is also informally gained through socialisation within the organisation (Ibarra, 1993). It is thus not surprising that there is a strong and significant relationship between personal socialisation participation and network centrality direct contact.

5.2.3. Personal socialisation participation and Electronic Socialisation systems

This study proposed a relationship between personal socialisation participation and electronic socialisation systems

A direct and significant relationship was also found between personal socialisation and electronic socialisation. This is line with Hansen, et al (2005) who acknowledges the use of e-mails as supplementary to sharing knowledge through personal socialisation. Moreover they emphasize the use of email (electronic socialisation system) to communicate in the process of sharing both tacit and explicit knowledge to ensure that knowledge in the form of electronic documents from electronic repositories are absorbed and used to complete the right organisational task (Hansen et al 2005). Additionally, Choi, Lee and Yoo (2010), found electronic socialisation systems support personal socialisation participation in sharing knowledge in organisations. Thus electronic socialisation systems can be used in combination with personal socialisation interaction to solve problems of absorptive capacity when knowledge is shared in different departments and or functional areas of the organisation.

5.2.4. Personal socialisation participation and Network centrality immediate access

We proposed a relationship between personal socialisation participation and network centrality immediate access. The analysis of this study found a significant relationship between personalisation socialisation participation and network centrality immediate access. This is consistent with Boh (2003) who note that peer mentoring and face to face meeting

(personal socialisation participation) enable meetings with individuals that are centrally located in the organisation. Moreover, the significant relationship between personal socialisation participation and network centrality immediate contact is not surprising. As Nonaka (1994) report that sharing knowledge using only personal socialisation participation is restricted. Meeting an individual who has immediate access to many others within the organisation will provide opportunities for scaling knowledge sharing through the use of personal socialisation participation knowledge sharing mechanism Ahuja, Galletta and Carley (2003).

5.2.5. Personal socialisation participation and Network tie working advice

This study proposed a relationship between personal socialisation participation (H1e). We found no significant relationship between personal socialisation and network tie working advice. This may be because the personal socialisation participation knowledge sharing mechanism focuses on sharing valuable tacit relevant ideas, expertise and knowledge (Hansen et al, 2005).

5.2.6. Personal socialisation participation and Profit performance

This study proposed a relationship between personal socialisation participation and profit performance. The analysis of the study found no relationship between personal socialisation participation and profit performance. This is consistent with Bock and Wong (2013), who report that whilst personal socialisation may be enabling the sharing of tacit valuable relevant knowledge, it is often informal and ad hoc and could not be recorded to appear as contributing to the bottom line and subsequently the profit performance of the organisation.

5.2.7. Personal socialisation participation and Operations performance

This study proposed a relationship between personalisation participation and operations performance. The proposed relationship between personal participation socialisation was not supported by the analysis of this study. This is surprising and as personal socialisation is focused on the person to person sharing of relevant tacit knowledge (Hansen, 1999, Hansen et al, 2005). This may be explained by its indirect relationship to operations performance through electronic socialisation systems.

5.2.8. Electronic socialisation systems and Network tie weekly working advice

This study proposed a relationship between electronic socialisation systems and network tie work advice. There was no relationship found between electronic socialisation systems and network tie working advice. This could be because asking for advice relating to work or following up on knowledge shared through personal socialisation by electronic socialisation entails more interactions in the course of one working day than once or twice on a weekly basis (Hansen, 1999).

5.2.9. Electronic socialisation systems and Network stability established contacts.

This study proposed a relationship between electronic socialisation systems and network stability established contacts. The analysis found a significant relationship between electronic socialisation systems and network stability established contact. This is in line with Zack (1999) who report that knowledge can be shared through electronic repositories with by individuals who have long established contacts. These individuals would have interacted through personal socialisation over a period of time to have built up a shared knowledge context (Zack, 1999; McDermott, 1999).

Moreover the relationship between electronic socialisation systems and network stability established contact could be explained as individuals who have been in the organisation over a period of time would share explicit knowledge through e-mails as one individual to a group of other individuals, or from one individual to another individual. Analysis of the study also supports a strong relationship between electronic socialisation systems and operations performance. This is consistent with Brynjolfsson and Hitt, (2000) who report that the economic contribution of electronic systems is huge and will continue to grow.

5.2.10. Electronic socialisation will positively relate to Operations performance

This study proposed a relationship between electronic socialisation and operations performance.

This study investigated the relationship between electronic socialisation and operations performance. We found that there was a significant relationship between electronic socialisation and operations performance. This is in line with Ostroff, and Kozlowski, (1992), findings that note that newcomers utilise different sources that are of varying importance, for sharing knowledge. Also Jarvenpaa and Staples (2000:146) found *the use of electronic media for communicating and sharing was strongly associated with the beliefs that computer based information systems provide valuable information in an effective way*. Chu and Chu, (2011)'s results also reveal that the use of the internet increase the extent of an employee's socialisation into the organisation.

Additionally scholars found found corporate socialisation mechanisms to be positively related to knowledge transfer Gupta and Govindarajan, 2000; Bjorkman, Barner-Rasmussen and Li, 2004). Socialisation in organisations seeks to enable newcomers to the organisation or other

departmental or functional areas to interact and with co-workers and supervisors to acquire knowledge ideas and expertise to perform their tasks well (Morrison, 2002; Cummings, 2004; Pan, Newell, Huang, and Galliers, 2007; Yuan, Rickard, Xia, and Scherer, 2011; Zhou, Zhang, Sheng, Xie, and Bao, 2014; Allen, Eby, Chao, and Bauer, 2017).). Additionally, Wang and Wang (2012) found explicit knowledge sharing has more significant effects on innovation speed and financial performance while socialisation to share tacit knowledge has more significant effects on innovation quality and operational performance. Moreover, Mano and Mesch, (2010), result establishes a positive link between the amounts of email sent and received to performance.

Thus electronic socialisation will enable newcomers to acquire the essential knowledge, ideas (about who knows what and who is who) and skills from a diversity of individuals across the organisation. Consequently, the acquired knowledge ideas and expertise will be diverse, reliable, fast and not redundant (Ostroff, and Kozlowski, 1992; Adams, Todd and Nelson, 1993; Flanagin and Waldeck, 2004; Valaski, Malucelli, and Reinehr, 2012; Bloom, Garicano, Sadun, and Van Reenen, 2014; Li and Herd, 2017). Moreover, newcomers will be better equipped and effective in their job performance, which will impact the quality of the goods and services, lower operational costs by not reinventing the wheel and minimising mistakes (Teigland, and Wasko, 2003; Mano, and Mesch, 2010;). In addition, it would afford the organisation flexibility in countering the short product life cycles and quicken the time it takes to launch the product or service to the market (Devaraj et al., 2004; Fugate, Stank and Mentzer, 2009; Wang, and Wang, 2012; Wang Wang and Liang, 2014; Mazzei Flynn, and Haynie, 2016).

5.2.11. Network tie working relationship and Network centrality direct contact

In this study our exogenous variable network tie working relationship is directly affected by three relationships. There is a significant relationship between network tie working relationship and network centrality. This is consistent with scholars who note that ties to central individuals who have connections with many other colleagues will provide opportunities to connect with others with the relevant knowledge ideas and skills to enable absorptive capacity and carry our task effectively and efficiently (Burt, 1992; Reagans and McEvily, 2003; Cross and Cummings, 2004). There was also a significant relationship found between network tie working relationship and network stability established contact. This is in line with scholars who note that ties that establish long term contacts and connections through personal socialisation participation and electronic socialisation systems over a period of time enable the sharing of tacit relevant knowledge expertise and skills (Hasen, 1999; Ahuja, 2000).

Also being connected to individuals that are established in the organisation will enhance the learning of organisational Norms shared language and increase the capacity of individuals to absorbed knowledge shared from other departments and functional areas (Coleman, 1988). Moreover being connected to individuals who have been in the organisation for a period will enhance the awareness of who knows what in the organisation. Cross and Cummings (2004) imply that increasing awareness of expertise would increase opportunities for sharing work relevant knowledge to solve new problems. Additionally ties to individuals that are established in the organisation are important reference points for valuable work relevant knowledge, skills and expertise (Hansen, 2004; Levin and Cross, 2004).

A significant relationship was also found for network tie working relationship and network configuration. This is consistent with Hansen (1999) and Hansen et al (2005) who found that neither weak ties nor strong ties prevail, they note that the knowledge type determine the knowledge mechanism it is share through. Moreover the ability to share knowledge when it is required is limited thus it is essential that individuals use knowledge sharing socialisation mechanisms to socialise with those individuals with the relevant expertise to be able to combine and recombine knowledge and ideas for task completion (McFadyen, Semadeni and Cannella, 2009).

There is no relationship between network tie working relationship and network tie working advice. This is surprising and may be a methodological issue in adopting and adapting items from Hansen's (1999) weak ties. Indications are that network tie working advice involves more socialisations for working advice than the once or twice weekly socialisations for advice.

Thus our argument that network tie working relationship affects network tie work advice may have to be amended. Although the analysis found a significant relationship between network centrality direct contact and network tie work advice.

Although there is no significant direct relationship between network tie working relationship and operations performance. There is an indirect relationship between network tie working relationship and operations performance mediated by network centrality direct contact.

5.2.12. Structural capital dimensions and Operations performance.

Significant direct relationships were found for network centrality direct contact and network centrality immediate contact; Network tie working advice; network stability establish contact; network configuration interaction and operations performance. This is hardly surprising as Faust (1997:160) note that centrality denotes facets of *importance and visibility* of individuals within the organisation. Moreover they can be very instrumental in sharing knowledge through personal socialisation participation as they have the shortest paths of communication to so. Additionally an individual who is central can either through personal socialisation participation or electronic systems socialisation share knowledge speedily with network tie working relationship, individuals who have been in the organisation for a period of time and or a combination of both (Burt, 1992).

Moreover attributes of centrality especially power are acquired by individuals through personal and electronic socialisation within the organisation (Ibarra, 1993). Network centrality also entails hierarchical or a position of power within the organisation (Rowley, 1997). Thus, CEO and top managers of organisational department and functions were not only appropriate respondents they also have power over resources within organisations (Ibarra, 1993). Furthermore having access and being able use knowledge sharing mechanisms to share knowledge in a timely manner would ensure problems are solved in a timely manner and impact operations performance (Burt, 1992).

5.2.13. Network centrality immediate access and Network tie working advice

No significant relationship was found between network centrality and network tie working advice. This is in contrast with scholars who associated the central position with opportunities to associate with network ties working advice to seek or give new advice (Granovetter, 1973;

Burt, 2005) However the result of the analysis of this study is in line with Reinholt and Pedersen, (2011:1280) who note that costs involve in seeking advice will deter an individual in a central position from seeking work advice in order not to be perceived as *inferior* or seen as *admitting incompetence*. Moreover for the network tie working advice, seeking advice from an individual in a central position notwithstanding the many opportunities, would refrain from doing so, to protect their sense of a *positive image and self worth* (Reinholt and Pedersen, 2011:1280).

Furthermore the lack of a relationship between network centrality immediate access and network tie work advice may be explained as pertaining to the lack of personal socialisation and electronic socialisation (Flanagin and Waldeck, 2004; Hansen et al 2005). Frequent personal and electronic socialisation enhances interactions and the creation of a shared organisational language and understanding that enables the sharing of work advice knowledge, ideas and expertise (Nonaka, 1994; Flanagin and Waldeck, 2000; Hansen, et al 2005).

5.2.14. Network centrality immediate access and Operations and Profit performance

The study proposed relationships between network centrality immediate access and operations performance; and network centrality immediate access and profit performance. The relationships between network centrality immediate access and operations performance was found to be non significant as was the relationship between network centrality immediate access and profit performance. This is in contrast with Tsai (2001) who found that a units' central position has positive effects on performance, albeit being moderated by absorptive capacity. Also contradicts Ahuja, Galletta and Carley (2003:33), who found centrality was a *stronger direct predictor of performance*.

5.2.15. Network stability Establish contact and Network configuration

This study proposed relationships between network stability established contact and network configuration interaction. There is a significant relationship between network stability established contact and network configuration interaction. This is in line with Li, Veliyath and Tan (2013) who found tie stability positively impacted on performance and also strengthen the relationship between in cluster ties (local) and performance.

5.2.16. Operations performance and Profit performance

This study proposed relationships between operations performance and profit performance. A significant relationship was found between operations profit and profit performance. Similarly Fugate, Stank and Mentzer, (2009) found a link between operations and organisational profit performance. Additionally they explained that knowledge must not only be understood but shared to be able to provide a unified response to changes in the business environment. Devaraj Krajewski, and Wei, (2007) also found supplier integration positively impact delivery times, costs and quality (operations performance), which will subsequently impact the financial performance of the organisation. Asree, Zain, and Rizal Razalli, (2010) also found responsiveness (operations performance) to have a positive impact on hotel revenues (profit performance). Additionally, Ahmed, Montagno, and Firenze, (1996) in examining several operational strategies, found a link between operations strategy (performance) and performance (profit performance). Additionally, Zhang, Lawrence, and Anderson, (2015) in their work found that there is a positive main effect of operations performance on profit performance.

Chapter 6. Conclusions

6.1. Contributions

The study set out to investigate the relationship between knowledge sharing mechanisms and organisational performance mediated by structural capital. The study was underpinned by social capital, socialisation and organisational performance and knowledge and resourced based views theories of the firm. Several contributions are made. The study contributes to our knowledge by finding support knowledge sharing socialisation mechanisms structural capital and operations performance.

Knowledge sharing mechanisms have being examined along the tacit and explicit dimension of knowledge focusing on personalisation or codification Hansen, Nohria and Tierney, (1999). These two mechanisms were extended by Boh and Wong (2013), to formal and informal personalisation and formal and codification. On the other hand scholars focus on formal and informal socialisation mechanisms. Moreover Nonaka, (1994) note that sharing knowledge through socialisation is limited. Socialisation studies also on the whole focus on socialising the newcomer to the organisation neglecting the dynamics of organisational life; individuals leave or join or move to other departmental or functional areas of the organisation, where they would have to relearn the ropes, and acquire knowledge of who knows what in that area of the organisation (Tsai, 2001).

This study's theoretical contribution is in the integration of the knowledge management and socialisation literatures. Additional this study by integrating personalisation, Codification and socialisation mechanisms extends knowledge sharing mechanisms to knowledge sharing

socialisation mechanism. It thus provides a holistic picture of knowledge sharing mechanism. From the above integrations a model was provided and tested across services and manufacturing organisations in the FAME database.

Furthermore, whilst there has been considerable focus on knowledge sharing mechanisms, only a limited number of studies have been mediated by structural capital. Moreover the emphasis in the mechanism investigated empirically are based on the notion that tacit and explicit knowledge are two types of knowledge. Whereas for this study tacit and explicit are two sides of the same knowledge, hence the mechanisms being personal socialisation (because the tacit side of knowledge is personal) and its sharing is effective through face to face socialisation. And instead of codification (with databases being the main sharing mechanism) we focus on electronic socialisation. Electronic socialisation systems were found to have a direct effect on operations performance.

Electronic socialisation systems deviate from the traditional methods of face to face socialisation extends socialisation as newcomers don't have to rely on face to face traditional socialisation mechanisms to determine who knows what within the organisation. Moreover socialisation just to share tacit knowledge is limiting. The findings from our results suggest that socialisation can happen between newcomers to other departments or functional area and individuals that have established contacts within the organisation. The results imply that not only will individuals save time but also save face for those individuals that feel inhibited. Thus, this study moves socialisation from solely focusing on the newcomers to the organisation and on sharing knowledge face to face to doing so electronically.

Moreover the results indicate that knowledge sharing socialisation mechanisms have a direct effect on operations performance and are mediated by structural capital. The focus of

researches has been on the network cohesion and range of tie strength centrality and tie stability and that they will enable the sharing of knowledge within organisation (Granovetter, 1973; Burt, 1992; Tsai, 2001; Reagans and McEvily, 2003; Li, Veliyath and Tan, 2013). These attributes of structural capital are not reconciled in these studies; the studies also imply stability of all the attributes of structural capital within the organisation. The results of the study indicate dynamic network tie and network stability; network centrality and network centrality; and network tie and network configuration. In the socialisation literature a configuration of structural capital facet are being called for to aid the interaction of new comers (Morrison, 2002). Indicating that ties change, network centrality positions change and the stability of tie is impacted as individuals leave and join the organisation (Tsai, 2001). Investigating structural capital facets empirically contributes to our understanding of the interactions of structural capital facets. Also in examining knowledge sharing mechanisms researchers fail to look at structural capital and organisational performance (Hasen et al 1999; Boh and Wong, 2013).

Additionally our results imply that tacit and explicit knowledge are the same knowledge type with two sides. Moreover this study recognises that organisations are inherently social and enable the sharing of knowledge. Consequently we introduce knowledge sharing socialisation mechanisms. This study in integrating the personalisation and codification mechanisms of knowledge sharing mechanisms heeded the call of scholars who contend that organisations do not have to emphasize one mechanism over the other as Hansen et al contended (Jasimuddin, Klien and Connel, 2005). Scholars put forward that emphasis on either personalisation or codification will not suffice (Jasimuddin, Klien and Connel, 2005). They added that tacit and explicit knowledge are one type of knowledge with different sides, with tacit knowledge inherent in all explicit knowledge (Jasimuddin, Klien and Connel, 2005). These scholars

consequently call for the integration of personalisation and codification mechanisms so that organisations can have holistic mechanisms with which to enable individuals to effectively and efficiently share knowledge within the organisation. This study on the whole also accomplished the research objectives.

6.2. Research implications

6.2.1 Theoretical Implications

Theoretically this study contributes to the literature by presenting a theoretical model to understand the relationship between knowledge sharing mechanisms structural capital and organisational performance. Additionally to the best of our knowledge this study is the first study to empirically test the relationship between knowledge sharing mechanisms, structural capital and organisational performance. Moreover, this study presented a research model that synergised the socialisation, social capital and organisational performance theories. One of the main conclusions was electronic socialisation to share knowledge significantly contributed to operations performance.

This study has made contributions to the knowledge management socialisation, social capital and the performance literatures. The introduction of electronic socialisation systems integrate the mechanisms used in the sharing of knowledge within the organisation. Moreover it moves away from the overreliance on codification and data bases as Kankanhalli, Tan and Wei, (2005), note that the failure of many knowledge management systems is due to lack of use by individuals within the organisations. This could imply that past studies focus on allocating technology to fit the knowledge being shared neglects the social aspects of the organisation

and of the knowledge sharing process and view tacit knowledge as being in opposition to explicit knowledge (Tsoukas, 2002).

Introducing electronic socialisation systems in conjunction with personal socialisation mechanisms takes into account the socialisation to know the ropes and how things are done in the organisation and who knows what for future face to face knowledge sharing. Moreover, electronic socialisation systems are not stand alone systems they become part of the way things are done within the organisation and enable personal socialisation mechanisms and subsequently providing a holistic way of sharing knowledge within the organisation. Furthermore, the introduction of personal socialisation and electronic socialisation is heeding calls *to simultaneously address the issues of social and technical barriers* to using knowledge sharing mechanisms within organisations (Kankanhalli, Tan and Wei, 2005:114). Both knowledge sharing mechanisms include socialisation which fosters face to face and electronic interactions.

The resource based view of the firm and knowledge based view of the firm socialisation and social capital theories helped in explaining the relationship between knowledge sharing mechanisms and organisational performance. Integrating the above theories provide opportunities for further explorations. The results pertaining to the negative impact of personal socialisation participation on operations performance could be replicated. It is also worth examining the negative impact on network tie work advice established contact, operations performance and profit performance with data from longitudinal studies.

6.2.2. Managerial implications

Knowledge sharing socialisation mechanisms will continue to play an important role in the sharing of knowledge within organisations. Managers should appreciate the many entities where knowledge is embedded within the organisation. Consequently managers should avoid emphasising electronic socialisation systems mechanisms over personal socialisation mechanisms or the other way round. Focusing on just electronic socialisation systems could lead to failure (Kankanhalli, Tan and Wei, 2005). This failure could stem from individuals' reluctance to access or contribute to discussions or databases. Thus as McDermott (1999), note electronic socialisation systems are enablers, they are pointers to who knows what. Moreover they can scale up or extend knowledge sharing, but this can be only done in conjunction with personal socialisation mechanisms ((Jasimuddin, Klien and Connel, 2005).

Furthermore with the prevalent use of email to communicate within organisations, this study presented electronic socialisation as a way of scaling up and facilitating knowledge sharing. The significant relationship between personal socialisation and network ties may provide managers with a guide on facilitating and encouraging personal interactions to form ties to share valuable knowledge to impact on the performance of the organisation and sustain competitive advantage. The results also highlight the importance of personal socialisation and network centrality and electronic socialisation for knowledge sharing. Thus managers could emphasise the importance of socialising face to face with individuals in central positions to share knowledge as central individuals have access to many others within the organisation. Moreover central individuals have immediate access to resources within the organisation.

Electronic socialisation is shown to be significant to network stability and operations performance. The results emphasise that knowledge sharing can be scaled up especially with

individuals that have been in the organisation for a while. Scaling up knowledge sharing using socialisation can reach many ties simultaneously and can impact on the operations performance of the organisation as a whole. Also the results highlight the important relationship between network stability and network configuration. Individuals in the stable network could be encouraged to connect and socialise with new individuals in the department or functional area to share knowledge. Moreover given the many problems highlighted as affecting knowledge sharing, the findings indicate strong support for a shift to focusing on knowledge sharing socialisation mechanisms and the mediating facets of structural capital to enhance knowledge sharing and subsequently the performance of the organisation.

6.3. Limitations

The data was collected using a postal questionnaire, has a single respondent for each organisation. A cross sectional study was utilized due to the cost and time that are required in a longitudinal study. Thus we were only able to deduce associations not infer causality. The single respondent criteria used to collect data on the relationship between knowledge sharing mechanisms structural capital and organisational performance could have targeted multiple respondents within each organisation. Therefore in interpreting the results of the data collected for the relationship between knowledge sharing mechanisms, structural capital and organisational performance, should allow for the limitation of a single correspondent.

This study examines knowledge sharing socialisation mechanisms, structural capital and organisational performance within organisations the replication of this study between organisations would add further insight and contribute to the generalisability of the results.

Furthermore knowledge sharing socialisation mechanisms could be studied at all levels of the organisation including the top managerial levels.

6.4. Further studies

Although this study extends the literature on knowledge sharing mechanisms much remains to be done. Other research might investigate the relationship between knowledge sharing socialisation mechanisms, structural capital and organisational performance in depth using longitudinal data. Researchers investigating the relationship between knowledge sharing socialisation mechanisms using longitudinal would be able data to infer causality.

Additionally, the research primarily used respondents from the FAME database, although very useful, researchers could employ other data bases to investigate the relationship between knowledge sharing mechanisms structural capital and organisational performance.

The organisations in the study also comprise of a mixture between manufacturing and services organisations researches could examine just manufacturing or services organisations using longitudinal surveys.

Moreover the sample from the FAME database restricts generalisation, research could be undertaken to generalize the findings to large organisation in the United Kingdom to include those not in the FAME data base. The relationship between knowledge sharing mechanisms, structural capital could also be investigated using several case studies to get an in depth account of the knowledge sharing mechanisms employed within the organisation and the ties with which they interact to impact on organisational performance.

6.5. Summary

This study in heeding the call for complimentary a view on the knowledge sharing mechanisms has integrated and extended knowledge sharing mechanisms that considered the sharing of knowledge as a whole by not having knowledge sharing mechanisms in opposition

to reflect the tacit knowledge in opposition to explicit knowledge contention. In addition this study's unification of the knowledge sharing mechanisms, socialisation, structural capital and performance has been substantiated and as such can serve as a platform for further studies. This study also contributed to further understanding of knowledge sharing socialisation mechanisms, structural capital and organisational performance.

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Dear Sir /Madam

I am Neneh Akamavi, a PhD student at the Hull University Business School. I am carrying out a survey to gain a better understanding of the relationship between networks links & connections and how knowledge, ideas skills expertise and information are shared, and organisational performance.

As you are aware, knowledge and its sharing have become very important and have been known to affect business performance. However, the ways in which knowledge is shared using links and connections within departments and organisations to contribute to business performance remains underexplored. The enclosed questionnaire seeks to explore how these networks, links and connections are used to share knowledge within departments and organisations to contribute to business performance.

As part of my study, I am administering a pre-test of the main questionnaire to ensure the content validity (e.g. common sense interpretation of the questions), reliability (e.g. internal consistency of the questions), readability and time requirements. Would you please read, fill in and comment on: the length of the questionnaire, how long it took you to complete the questionnaire and the clarity and content of questions related to the enclosed questionnaire.

Your comments would be most welcome and appreciated.

As part of the study I am trying to identify a number of organisations to take part in a more detailed study on the impact of networks links and or connections on organisational performance and how knowledge, ideas skills expertise and information is shared within departments in organisations.

If you are interested in finding out more about this and in your organisation taking part please fill in your details.

Respondent's details

Name:.....

Organisation:.....

Job Title:.....

If you have any further questions about the questionnaire or the study, please do not hesitate to contact:

Neneh Akamavi
PhD Student
The University of Hull Business School
The University of Hull
Cottingham Road, Hull HU6 7RX
N.Akamavi 2012@hull.ac.uk

All data collected in this survey will be held anonymously and securely. No personal data is asked for or retained. Cookies, personal data stored by your Web browser, are not used in this survey.

Yours Sincerely

Thank you for taking time to participate.

Neneh Akamavi

UNIVERSITY OF HULL BUSINESS SCHOOL
**CONFIDENTIAL QUESTIONNAIRE ON NETWORK STRUCTURE,
 KNOWLEDGE SHARING AND ORGANISATIONAL PERFORMANCE**

Introduction

The aim of this study is to explore network connections, how knowledge is shared and organisational performance.

The questionnaire is divided into 4 sections.

- The first section focuses on demographic variables
- Section 2 on the patterns, links and connections made within your organisation
- Section 3 is on how individuals share ideas knowledge and information within your organisation
- The final section focuses on organisational performance

Please answer all questions even where they may appear similar.

Individual responses will be analysed anonymously and held in strict confidence. Neither you nor your organisation will be identified during the analysis and reporting stages of the study.

SECTION 1

Please tick only the most appropriate box

Your Sector of Business Operation
 Manufacturing sector Service sector Both (mixed sectors)

Your Gender
 Male Female

Your Length of Work Experience in this organisation
 Less than 5 years 5 to 10 years 11 to 16 years 17 years and above

Your highest Level of education
 Diploma & Undergraduate Postgraduate Only Professional body Qualifications

Please estimate the Levels of management hierarchy in your organisation
 1-3 4-6 7-9

Please indicate how many levels you are in this management hierarchy removed from your CEO
 1 2 3 4

Your Department or Functional Unit
 Human Resources IT Accounting & Finance Marketing R&D

SECTION 2

Please note the following statements relate to **Patterns and Connections (Your contacts, connections and links within your organisation to share knowledge, ideas and expertise with colleagues)**. Please indicate the extent to which you agree or disagree with the statements by circling the most appropriate number *where 1=strongly disagree and 5=strongly agree*.

ITEM	Strongly disagree				Strongly agree
Our intranet makes it possible for me to access a broader set of colleagues	1	2	3	4	5
I manage my position to establish a combination of contacts with other colleagues	1	2	3	4	5
My position gives me the opportunity of accessing a variety of connections	1	2	3	4	5
A combination of contacts with colleagues facilitate access to new knowledge, ideas and expertise	1	2	3	4	5
Strong interactions enable me to have a variety of connections with colleagues	1	2	3	4	5
Our computer based system enables intense patterns of interactions with colleagues	1	2	3	4	5
My pattern of interactions play an important role in establishing a range of important connections with colleagues	1	2	3	4	5
My connections with different colleagues facilitates access to knowledge beyond what is publicly disclosed	1	2	3	4	5
A combination of contacts enables me easy access to specific colleagues with relevant expertise	1	2	3	4	5
Our formal management information system enables intense interactions with my colleagues	1	2	3	4	5
Our ICT infrastructure facilitates finding specific colleagues at the right time to share expertise, ideas and knowledge	1	2	3	4	5
I rely on our computer system for strong interactions with colleagues	1	2	3	4	5

The following statements relate to **Network Ties** (how strong or weak; or close or not so close your ties are with colleagues on average over the past three years within your organisation). Please indicate the extent to which you agree or disagree with the statements by circling the most appropriate number *where 1=strongly disagree and 5=strongly agree*.

ITEM	Strongly disagree				Strongly agree
I provide work related advice to colleagues I know will reciprocate	1	2	3	4	5
I confide in colleagues I know will do the same in sharing ideas, knowledge and expertise	1	2	3	4	5
Colleagues outside my immediate social circle provide opportunities to meet new colleagues to share ideas, knowledge and expertise.	1	2	3	4	5
Colleagues I know vaguely share knowledge, ideas, insights and expertise beyond what exists from colleagues in my social circle	1	2	3	4	5
I go to colleagues outside my established contacts for work related advice	1	2	3	4	5
I have a very close working relationship with colleagues practically like being in the same department in my organisation	1	2	3	4	5
My working relationship with colleagues is somewhat close like discussing issues together	1	2	3	4	5
My working relationship with colleagues is somewhat distance like an arms-length delivery	1	2	3	4	5
Colleagues that are acquaintances provide me with the latest ideas and tips	1	2	3	4	5
I communicate with colleagues twice a week to give advice	1	2	3	4	5
I go once a week to colleagues for advice	1	2	3	4	5

My working relationship with colleagues is somewhat close like solving issues together	1	2	3	4	5
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The following statements relate to **Network Centrality**: Your position relative to your colleagues in the organisation as a whole for sharing knowledge, ideas and expertise. Please indicate the extent to which you agree or disagree with the statements by circling the appropriate number where 1=strongly disagree and 5=strongly agree

ITEM	Strongly disagree				Strongly agree
I can go to top management with a problem and get heard in the organisation	1	2	3	4	5
I get asked for advice on work related activities by my colleagues	1	2	3	4	5
It is not difficult for me to approach senior management with a concern in my organisation	1	2	3	4	5
I am regarded as a focal point of contact by several colleagues in my organisation	1	2	3	4	5
I facilitate contacts between colleagues who are not connected	1	2	3	4	5
I can quickly establish direct contacts with many of my colleagues in my organisation	1	2	3	4	5
I have direct contacts with colleagues who are seen as crucial in my organisation	1	2	3	4	5
I mediate the flow of resources amongst a large number of colleagues	1	2	3	4	5
I am very involve with colleagues in sharing knowledge and expertise	1	2	3	4	5
I have immediate direct access to several colleagues with work related expertise	1	2	3	4	5
Most of my colleagues know me by my name in my organisation	1	2	3	4	5
I maintain direct contacts with many colleagues in my organisation	1	2	3	4	5

The following statements relate to **Network Stability**: The long term working relationships you have with colleagues within your organisation to share knowledge, ideas and expertise. Please indicate the extent to which you agree or disagree with the statements by circling the appropriate number where 1=strongly disagree and 5=strongly agree.

ITEM	Strongly disagree				Strongly agree
I have established working relationships with colleagues that enables interaction for knowledge sharing over a period of time	1	2	3	4	5
I have long term established contacts with colleagues that provide support over time	1	2	3	4	5
I share the same values as colleagues I have interacted with over a period of time	1	2	3	4	5
My long term established relationships with colleagues are mutual	1	2	3	4	5
Our information systems make it easy to reach established contacts at any time	1	2	3	4	5
Colleagues I have long term connections with are very clear about our mutual obligations	1	2	3	4	5
Our Information systems assist in the development of long term working relationships	1	2	3	4	5
Our information systems assist in sustaining long term working relationships	1	2	3	4	5
I am able to develop trust with colleagues over a period of time	1	2	3	4	5
I trust colleagues that I have established contacts with over a long period of time	1	2	3	4	5

The following statements relate to **Network Density**: If you feel you interact strongly with colleagues with whom you exchange ideas, skills and knowledge with in your organisation. Please indicate the extent to which you agree or disagree with the statements by circling the appropriate number where 1=strongly disagree and 5=strongly agree.

ITEM	Strongly disagree				Strongly agree
There is greater agreement about work with colleagues I know very well	1	2	3	4	5
I have strong direct interactions with colleagues I know very well	1	2	3	4	5
There is a low level of interactions with colleagues I do not know very well	1	2	3	4	5
Collective action in work related issues with many colleagues I am in direct contact with is relatively easy to achieve	1	2	3	4	5
I am very close to colleagues I identify with in my organisation	1	2	3	4	5
I am more motivated to provide reciprocal exchanges of knowledge with colleagues I know very well	1	2	3	4	5
I have many friends in common with several colleagues I have direct contact with	1	2	3	4	5
My intense direct interaction with quite a lot of colleagues increases my visibility	1	2	3	4	5
Close direct contact with several colleagues increases my accountability	1	2	3	4	5

SECTION 2

The following statements relate to **Personal socialisation** in your organisation: Sharing knowledge, know-how face-to-face in person with colleagues in your organisation. (Please indicate the extent to which you agree or disagree with the statements by circling the appropriate number where 1=strongly disagree and 5=strongly agree.

ITEM	Strongly disagree				Strongly agree
I share knowledge, expertise and ideas with colleagues in face-to face post reviews	1	2	3	4	5
Face-to-face meetings have been very effective in increasing interactions for sharing knowledge	1	2	3	4	5
Visits to other departments enhance sharing of ideas, expertise and knowledge face-to-face	1	2	3	4	5
Face-to-face presentations enable the communication of ideas and knowledge and expertise	1	2	3	4	5
Project participation enhances the exchange of knowledge ideas and expertise	1	2	3	4	5
Face-to-face Peer mentoring strengthens my interactions to share knowledge, ideas and expertise	1	2	3	4	5
Workshops enable making contacts to share knowledge and ideas and expertise	1	2	3	4	5
Job rotation facilitates meeting with different colleagues to share knowledge and expertise	1	2	3	4	5
Coffee breaks and lunches motivate me to socialise with my colleagues and share ideas and knowledge	1	2	3	4	5
Face-to-Face training programmes enhance connecting with colleagues to share ideas knowledge and best practices	1	2	3	4	5

The following statements relate to **Electronic Socialisation** in your organisation: **Sharing know-how, ideas electronically**. Please indicate the extent to which you agree or disagree with the statements by circling the appropriate number *where 1=strongly disagree and 5=strongly agree*.

ITEM	Strongly disagree				Strongly agree
Online forums enable interactions with colleagues to share knowledge, ideas and expertise	1	2	3	4	5
Online directories facilitate my connections with my colleagues in sharing know-how and ideas	1	2	3	4	5
Using the telephone fosters interactions with my colleagues in sharing knowledge, ideas and know-how	1	2	3	4	5
The electronic knowledge repository encourages communication with colleagues	1	2	3	4	5
E-mail enhances interaction for sharing knowledge, know-how and expertise	1	2	3	4	5
The intranet enables the sharing of knowledge, ideas and expertise	1	2	3	4	5
Video conferencing facilitates the exchange of knowledge, ideas and expertise	1	2	3	4	5
My smart phone enables sharing knowledge, expertise and know-how	1	2	3	4	5
Telepresence meetings fosters the exchange of knowledge, ideas and best practices	1	2	3	4	5

SECTION 3

The following statements relate to the **performance of your organisation in the last three years**. Please indicate the extent to which you agree or disagree with the statements by circling the appropriate number *where 1=strongly disagree and 5=strongly agree*.

ITEM	Strongly disagree				Strongly agree
The duplication of work has been reduced	1	2	3	4	5
Error occurrence have been minimised	1	2	3	4	5
The generation of novel ideas through knowledge sharing has been increased	1	2	3	4	5
Customer satisfaction has been improved through the sharing of best practices	1	2	3	4	5
Our service /product quality has improved	1	2	3	4	5
Our response to key issues has been enhanced	1	2	3	4	5
The creation of new business opportunities has been enhanced	1	2	3	4	5
The facilitation of sharing knowledge, ideas and expertise has been improved	1	2	3	4	5
The capacity to quickly adapt our goals and objectives to industry changes has been improved	1	2	3	4	5
There has been improvement in the time taken to launch new products / services	1	2	3	4	5
There has been improvement in facilitating the combination of knowledge, ideas and expertise	1	2	3	4	5
There has been improvement in the time taken to share knowledge, ideas and best practices	1	2	3	4	5

The following statements relate to the **performance of your organisation in the last three years relative to all other direct competitors in terms of profitability**. Please indicate the extent to which you agree or disagree with the statements by circling the appropriate number *where 1=strongly disagree and 5=strongly agree*.

ITEMS	Strongly disagree				Strongly agree
Our organisations' new product/service success rate has improved	1	2	3	4	5
My organisations' percentage of sales from new products grew	1	2	3	4	5
My organisations' annual average sales growth was enhanced	1	2	3	4	5
My organizations' return on assets improved	1	2	3	4	5
My organisation increased its market share	1	2	3	4	5
Work productivity in my organisation was improved in the last three years	1	2	3	4	5
Our profits grew in the last three years	1	2	3	4	5
Innovation on products/services has improved	1	2	3	4	5
Our return on capital employed improved	1	2	3	4	5
Our production /operation processes have been become more flexible	1	2	3	4	5
Our return on investments improved	1	2	3	4	5

Thank you very much for your co-operation and contribution.

If you would like a summary of the results please provide your contact details or attach your business card.

Name

Address

.....

.....

Hello,

I've filled this in - good luck!

From: Neneh Akamavi <N.Akamavi@2012.hull.ac.uk>
To: ">
Date: 27/04/2015 12:52
Subject: UCXPO Olympia (Meeting)

Dear,

Further to our brief conversation at the UCXPO Olympia, I am forwarding the survey questionnaire and the cover letter below. I would be very grateful if you and your colleagues complete the survey. Your help and contribution will enable me to complete my PhD study.

Please be reassured that your individual responses will be ***analysed anonymously and held in strict confidence***. Hence, neither you nor your organisation will be identified during the analysis and report stages of the research project.

In appreciation for your participation I will send you a **summary** of the research findings when the study is completed. In addition, I could make a presentation of the results on completion of the study if you are interested. The results will be of benefit to your organisation where sharing knowledge, ideas and expertise of individuals is valuable. Please I do need your help to accomplish this.

Yours Sincerely,
Neneh Akamavi