

2011

# The impact of the perceived usefulness of workplace social networks upon the innovative behaviour of SME employees: a social capital perspective

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## Publication details

Pre-print of: Xerri, M & Brunetto, Y 2011, 'The impact of the perceived usefulness of workplace social networks upon the innovative behaviour of SME employees: a social capital perspective', *International Journal of Innovation Management*, vol. 15, no. 5, pp. 959-987. The publisher's version of this article is available at <http://dx.doi.org/10.1142/S1363919611003350>

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**Title:** The impact of the perceived usefulness of workplace social networks upon the innovative behaviour of SME employees: A social capital perspective

**Article Type:** Research Paper

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**Abstract:**

This research includes an examination of the impact of three organisational factors upon the perceived usefulness of workplace social networks for problem solving in engineering SMEs. As well this research examines the impact of the perceived usefulness of workplace social networks upon the innovative behaviour of engineering SME employees. More specifically, the dimensions of Social Capital Theory are applied as a lens to develop an understanding into the effect of the strength of workplace social network ties, sociability and organisational culture upon the perceived usefulness of workplace social networks for problem solving. This study examines the proposed model by applying mixed methods. The research method includes a survey with engineering employees' and interviews with senior management. The findings confirm that the organisational factors tested (tie strength, sociability and organisational culture) impact upon the perceived usefulness of workplace social networks for problem solving. Furthermore, the findings also confirmed that the perceived usefulness of workplace social networks affects the innovative behaviour of engineering SME employees. Therefore, this research adds to the current body of literature by providing insight into the usefulness of workplace social networks for problem solving and the impact this has on the innovative behaviour of engineering SME employees.

**Keywords:** Network content, social networks, Social Capital Theory (SCT), innovative behaviour, small to-medium-sized enterprises (SMEs), tie strength, sociability, knowledge-based firms

## **Introduction**

Developing innovative business practices has become an imperative function in today's organisations. The constantly changing global economy, within which firms operate, is forcing organisations to develop competitive practices that can provide innovative solutions to work based problems. The transfer of knowledge is a key factor in providing employees the resources to solve work based problems innovatively. Considering that innovation is a vital factor in the development of a competitive advantage, there is a lack of research examining the workplace network factors that impact upon a small-to-medium sized enterprise (SME) employees innovative behaviour and their ability to produce innovative solutions to work based problems.

Current literature describes innovative behaviour as a three-step process. The first step is to identify a work based problem, the second step is to create new ideas and solutions for problems, and the last step is to create support for the new ideas and solutions for integration into the firm (Carmelli, Meitar, & Weisberg, 2006). However, this process assumes an easy flow from one step to another. Instead, the process of fostering innovative behaviour may be quite the opposite. This paper examines the role of workplace social networks in affecting the second step, solving workplace problems. The significance of workplace social networks becomes apparent because in spite of the advancement of decision making tools and decision support systems, it is proposed that in an organisational context employees' still prefer to communicate with others who form their workplace social network as a way of gathering important information for decision making (Nebus, 2006). Therefore, the aim of this study is to examine the content of the workplace network and how sociability, organisational culture and the strength of workplace social network ties impact upon the perceived usefulness of workplace social networks for problem solving.

The development of effective workplace social networks is believed to impact on the perceived usefulness of such networks for problem solving (Adler & Kwon, 2002; Lin, 2001). Furthermore, the ability of an employee to solve a problem efficiently and effectively and the support they are given will have a direct impact upon the innovative behaviour of SME employees (Janssen, 2005). So far, there have been several studies that examine the impact of organisational factors upon the innovative behaviour of employees (Carmelli, et al., 2006; Janssen, 2005; Maqsood, Walker, & Finegan, 2007; Scott & Bruce, 1994). However, there has been a paucity of research about the innovative behaviour of employees in SME's,

particularly in the service sector (Scozzi, Carvelli, & Crowston, 2005). As such, this study aims to provide insight into SMEs and the service sector by examining a small-to-medium sized engineering consultancy. Moreover, a review of the literature suggests no studies that examined the impact of the perceived usefulness of workplace social networks upon the innovative behaviour of SME employees. Therefore, the examination of the relationship between these two factors provides new information about the connection between workplace social networks and innovative behaviour. Innovation is a popular topic amongst practitioners and researchers alike, because SMEs currently require the development of innovative business practices if they are to compete with larger organisations, especially when operating within competitive markets (Brunetto & Farr-Wharton, 2007; Huang & Rice, 2009). Therefore, this study contributes new knowledge for academics and practitioners alike.

Social Capital Theory (SCT) will be utilised as a lens for examining the direct impact of some organisational factors upon the perceived usefulness of workplace social networks for problem solving and the indirect impact upon the innovative behaviour of SME employees. The premise of SCT is that the quality and quantity of workplace social network relationships impacts upon an employees' ability to be able to source appropriate information and resources (Adler & Kwon, 2002; Lin, 2001; Tsai & Ghoshal, 1998). Past literature suggests that the quality of network relationships that are used to tie together two or more employees is reliant on whether there is a culture developed around obligations behaviour, mutual trust and reciprocity (Akdere, 2005; Al-Alwai, Al-Marzooqi, & Mohammed, 2007; Dobni, 2008; Koeberg & Chusmir, 1987). Such a culture is the platform upon which relationships are developed because this is how members determine whether they are exhibiting appropriate workplace actions and behaviour (Scott & Bruce, 1994). This research is imperative for organisations' seeking to gain a competitive advantage through the development of workplace social networks. Such networks are intended to directly facilitate the development of workplace social networks, which are designed to support the solving of work based problems and provide a platform for the development of the innovative behaviour of employees.

There are several facets that emphasise the significance of carrying out this research. These facets include the deficient amount of empirical research about SMEs regarding how to generate, maintain and transmit innovative knowledge (Johnson, 2002; Nelson, Brunetto, Farr-Wharton, & Ramsay, 2007; Scozzi, et al., 2005). This study is

designed to examine the impact of three organisational factors upon the perceived usefulness of workplace social networks and the impact the perceived usefulness has upon the innovative behaviour of SME employees. More specifically, the research is conducted to examine workplace social networks functionally by analysing the role of particular organisational factors in relation to the transfer of important work-based information. For that reason, the subsequent primary research questions were developed to guide the direction of the study, in particular the data collection.

*“What is the impact of the tie strength, sociability and culture upon the perceived usefulness of workplace social networks in SMEs?”*

*“What is the impact of the perceived usefulness of workplace social networks upon the innovative behaviour of employees in SMEs?”*

This paper is written in three parts. The first part explains the theory and concepts from which the hypotheses emerge. The next part outlines the methods utilised. Then finally the results and discussion are used to test and support the hypotheses.

## **Background**

### **Social Capital Theory**

Past research suggests that there are three organisational dimensions that can be used as a lens for examining the level of social capital within an organisation (Nahapiet & Ghoshal, 1998). They include the structural dimension (examining strength and content of network ties), relational dimension (examining sociability) and the cognitive dimension (examining culture) (Adler & Kwon, 2002; Akdere, 2005; Nahapiet & Ghoshal, 1998; Tsai & Ghoshal, 1998). Firstly, such structures include the quality of the bonds between workplace social network members (tie strength), as well as the quantity of members within a workplace social network (network content). Therefore, to promote tie strength and the development of effective workplace social networks organisations must embed mechanisms (structures) as support. Secondly, the relational dimension provides a lens for examining the impact of relational factors such the sociability of employees (the social skill required to develop effective workplace social networks) upon the perceived usefulness of workplace social networks. Taylor, Jones and Boles (2004) suggest that to develop a supportive culture and successfully leverage the knowledge of network members, social relations must be effectively facilitated by the organisation. Lastly, the cognitive dimension provides a theoretical lens for

examining the influence of cultural resources (organisational culture) in developing a common perception of the organisation's vision, values and protocol within a social system. The effective development of organisational culture can be facilitated by embedding structures and policies that clearly outline the organisation's vision and values (Akdere, 2005). However, in practice developing a culture that supports the development of workplace social networks has proved to be a major organisational challenge.

## **Examining the structural dimension of Social Capital Theory**

### ***Tie Strength***

The structural dimension of SCT is usually examined using tools from networking literature. Current literature suggests that the information and resources that could be derived from a social network are dependent on the strength of ties amongst workplace social network members (Levin & Cross, 2004). Social capital is said to be a result of social relations because of the quantity and quality of relationships between dyads, the cultural support mechanism and the structure of the network (Adler & Kwon, 2002; Nahapiet & Ghoshal, 1998). A dyad is the development of a relationship between two people and can be analysed by examining the strength of the relationship or tie. Tie strength can be defined as the level of proximity between two workplace social network members. Granovetter (1973) suggests four determinants of tie strength the amount of time, the emotional intensity, the intimacy and the reciprocal services which characterise the tie. Therefore, increased contact over a period of time will allow greater opportunity for workplace social network members to form bonds and to develop a rapport.

Social network theory is a growing body of knowledge that argues that social interaction enhances or constrains access to valued resources (Sparrowe, Liden, Wayne, & Kraimer, 2001). Current literature suggests that social network ties support collaborative thinking and the sharing of knowledge (Dooley & O'Sullivan, 2007; Fliaster & Spiess, 2008). In addition, such collaboration plays a pivotal role in developing an effective workplace social network to support problem solving. A network with strong ties means that network members have formed close relationships, beneficial for problem solving. In contrast, a network with weak ties provides network members with access to a range of diverse perspectives and new information (Levin & Cross, 2004).

Organisations that facilitate a culture that supports the transfer of knowledge and resources between workplace social network members are more likely to develop useful

network ties for problem solving. Developing large numbers of interpersonal linkages by focusing on structure, relationships and culture is by no means an easy task for organisations (Granovetter, 1973; Li, 2007). Allen, James and Gamlen (2007) suggest that there are two main types of workplace networks that should be developed within an organisation, formal and informal. Formal networks are a result of organisational structure and are considered beneficial for solving work based problems. In contrast, informal networks are the social interactions that form in the workplace and are considered to be facilitated by the formal networks constructed in an organisation. Therefore, an effective social network will consist of both formal and informal relationships, which are designed to disperse information and reduce the propensity of ambiguity in the workplace. Therefore, shared knowledge generates a support platform, and increases the usefulness of workplace networks for problem solving. However, what organisational factors will ensure the development and sustainability of an effective knowledge sharing environment that will promote the development of both strong and weak ties, which in turn will impact on the usefulness of workplace social networks for problem solving? Therefore, the first hypothesis is:

*H1: The strength of ties between workplace social network members will be positively and significantly associated with the perceived usefulness of workplace social networks for problem solving in SMEs.*

### ***Network Content***

As previously stated, social capital is derived from the formation of effective workplace social networks. Past literature suggests that the structural dimension of SCT is a combination of both the form (structure, appearance) and content of workplace social network relationships, which are developed as intangible ties are formed between employees and are based on several interactions over a period of time. One way of examining the usefulness of workplace social networks is by analysing their network content (Hoang & Antoncic, 2003). Hite, Williams and Baugh (2007) suggest that network content is the information or resources that flows through the network of relationships embedded within firms. However, this study refers to network content as the actual workplace social network ties (relationships) that either facilitate or prevent the transfer of important work based information (Allen, et al., 2007). This information is captured by identifying how many people contacted a colleague when faced with a workplace problem. Subsequently, accessing network content also depicts the informal social network and identifies the path an

individual takes when faced with an initially unresolvable work based problem. Therefore, this supports the notion that the usefulness of a workplace social network is dependent on the content of the network and the strength of the ties that binds together members within a social unit.

To examine the content of the workplace social network, it is essential to examine the advice network that has formed informally within the organisation. An advice network is referred to as an internal network of professional relationships, which are developed through social interactions when employees seek information and advice from colleagues to aid their problem solving (Gibbons, 2004). Lazega, Lemerrier and Mounier (2006) suggest that an advice network represents a set of connections through which information is disseminated among network members. Furthermore, an appropriate advice network can aid the development of mentoring relationships within the organisation. Mentoring can be defined as a process where an influential individual with advanced knowledge and experience, provides support and advice to their mentee or protégé (Hetty Vanemmerick, 2004). Furthermore, Hetty Vanemmerik (2004) suggests that it is increasingly acknowledged that it is not only important to have appropriate mentoring relationships within the organisation, but to have developmental networking relationships between employees and/or management. Therefore, to effectively examine the workplace social network, it is necessary to ascertain who employees approach for help when problem solving. Thus, the secondary research question of this report is:

*SRQ 1: Who do engineers' approach for advice, what is the content of their workplace social network for solving work based problems?*

## **Examining the relational dimension of Social Capital Theory**

### ***Sociability***

SCT literature suggests that relations need to be effectively developed and supported if the organisation is to develop social capital. The relational dimension of SCT refers to examining the development of social capital by analysing the role of the factors affecting the quality of relationships. Sociability is the social skill, competence, intelligence or interdependence necessary to develop effective social ties and workplace social networks (Ferris, Witt, & Hochwarter, 2001; Lizardo, 2006). When examining the factors that influence the perceived usefulness of workplace social networks it is imperative to examine how well employees are able to develop friendships and workplace networks. Nie (2001)



suggests that each employee will possess a different level of sociability, thus some employees may be better than others at developing relationships or gaining network ties. More specifically, an employee with a high level of social skill will not only possess an advantage when forming friendships and network ties, but will also be able to sustain these relationships over a period of time more effectively than someone with a lower sociability (Ferris, et al., 2001). Therefore, current literature supports the theory that the sociability of employees will impact on the perceived usefulness of the workplace social network.

Literature has explained social skills as the ability to effectively predict, understand, and control social interactions. Social skill literature can be attributed to the early work on social intelligence by (Thorndike, 1920). Ferris et al. (2001) suggest that workers who demonstrate high levels of social skills are more likely to be able to influence others to cooperate than those with low social skills. In addition, social skills include the ability to be able to clearly articulate to another in conversation, while at the same time being well aware of the different social situations, roles and norms (Riggio & Reichard, 2008). Social competence is a person's ability to be able to effectively interact with others based on their social skills (Baron & Markman, 2000). When examining sociability within a workplace it is important to determine if employees have the skills or competence required for effective social interaction and if the organisation has provided appropriate resources to support the social interaction between employees (Totterdell, Holman, & Hukin, 2008).

Moreover, while it is important that employees develop the skills to communicate and develop networks, it is also vital that employees have the sociability to develop and sustain social network ties. Furthermore, the organisation can also assist in developing social networks, by outlining formal relationships in policies, job descriptions and organisational charts (Allen, et al., 2007). Formal relationships provide the contact between employees, facilitating the development of informal ties or social networks. It is also important there be a mix of strong and weak ties, although weak ties provide new information to aid creativity and innovative behaviour, strong ties are important, because they provide relationships that are beneficial for problem solving (Li, 2007). Therefore, it is important that the organisation provides an appropriate organisational structure and communication tools. As well as, ensuring employees have an appropriate level of sociability, to support the development of social networks and support problem solving and innovative behaviour. For this reason, it is important to examine the impact of sociability upon engineers' perceptions of the usefulness of workplace networks, and therefore the following hypothesis is proposed:

*H2: The sociability of SME employees' is positively and significantly correlated with the perception of the usefulness of their workplace social networks.*

## **Examining the cognitive dimension of Social Capital Theory**

### ***Innovative culture***

Past literature defines organisational culture in a plethora of different ways. (Schien, 1990) suggest that organisational culture is a construction of a collective values, beliefs, attitudes and assumptions that generates the standard of behaviour in the organisation. Another way to describe organisational culture is a shared perception of thoughts, feelings and bonds that motivates employees and it manages the way employees interpret information and values (McAleese & Hargie, 2004). To summarise the definitions it can be seen that organisational culture is related to how the employees perceive the organisations collective goals and etiquette within a social system. Additionally, Dobni (2008) suggests that an organisation with an innovative culture will have an intention to be innovative, the appropriate infrastructure to support innovative problem solving and the operational behaviours and environment to be able to support innovative behaviour. Dombrowski, et al. (2007) proposes several elements associated with innovative cultures including: innovative vision and mission statements, democratic communication, flexibility, teams or units with resources to support facilitation, collaboration, incentives and leadership that support innovative behaviour.

To show employees that an organisation values innovative problem solving, it is important that incentives and rewards are associated with innovative behaviour. Moreover, management can indirectly encourage innovative problem solving and behaviour by being flexible and treating mistakes as a knowledge building process (Scott & Bruce, 1994). Also it is important to support the desired behaviour by ensuring an appropriate amount of time and resources are available. Furthermore, there are several factors of organisational culture that can support the innovative behaviour of employees, including strategy, structure, support mechanisms, particular behaviours and communications (Martins & Treblanche, 2003). This study will focus on outlining some of the determinants of organisational culture that impacts upon the perceived usefulness of workplace networks for problem solving and the innovative behaviour of employees.

Following a review of current literature, it was found that organisational culture can both encourage and support the transfer of knowledge for problem solving (Dodgson, Gann,

& Salter, 2002). Firstly, the strategy of the organisation should support and encourage a culture of innovation and change, which should be communicated through the mission and vision statements (Dobni, 2008). Moreover, communication is not enough, it is also imperative to ensure that employees and the organisation itself support the organisational mission and vision (Kotter, 1995). In addition, the support of employees can be achieved by developing a supportive structure, mechanisms and exhibiting behaviour that encourages innovative behaviour and the use of workplace networks for problem solving. The culture of the organisation should be one of flexibility and freedom that is poised for change, which can be achieved by sharing information and decision making with employees, leaving them with a sense of empowerment and autonomy (Johlke & Duhan, 2000). Furthermore, mechanisms should also be developed that are supportive of an innovative culture. Such mechanisms include rewarding and recognising the innovative behaviour of employees and by making resources available to employees through a workplace social network (Martins & Treblanche, 2003). However, even with flexibility and support it is still important that leaders exhibit behaviours that encourage an innovative culture. This can be achieved through the effective handling of employee mistakes, risk taking and conflict. In conclusion, there are several factors that can support the innovative culture of an organisation which sustains and encourages innovative problem solving. For the purpose of this study the importance of an innovative culture and its impact upon the perceived usefulness of workplace social networks will be examined.

*H3: An organisation's innovative culture is positively and significantly correlated to the perceived usefulness of workplace social networks to solve work based problems in SMEs.*

### **The perceived usefulness of workplace social networks**

Knowledge sharing through informal workplace networks is not only a platform for the development of the innovative behaviour of employees, but can also be used for everyday problem solving. Empirical research suggests that networks are pivotal in the problem solving process and that some employees have high centrality and function as connectors within the network (Chang & Harrington, 2007). The importance of the social network concept becomes evident particularly in KBFs, because creating an environment where knowledge is transferred helps employees solve complex and often ambiguous problems (Cross, Parker, Prusak, & Borgatti, 2001). Access to such knowledge supports an employee

during the decision making process by providing them with the appropriate information to solve complex work based problems, empowering the employee to perform beyond their own personal capabilities (Borgatti & Cross, 2003; Branchos, Kostopoulos, Soderquist, & Prastacos, 2007; Marouf, 2007). In summary, access to resources and knowledge provides workplace social network members with the information they require to solve work based problems; however, it is their perception of the usefulness of the network that is imperative to its success.

While the value of social networks for decision making cannot be disputed, its value as perceived by employees will determine the effectiveness and sustainability of a workplace social network for solving problems. For example, if employees consider that the process of attaining new knowledge to solve a problem is too difficult, time consuming or will not provide appropriate help they may choose to use an inefficient, but tried and tested method to solve a problem (Gibbons, 2004; Hoang & Antoncic, 2003). This study will therefore examine amongst other things how social capital enablers such as sociability, tie strength and organisational culture impact upon the perceived usefulness of workplace social networks for solving work based problems. Therefore, the justification for examining the perceived usefulness of workplace social networks is highlighted by the requirement of knowledge based SMEs to develop the innovative behaviour of employees if they are to develop sustainable business practices (Alvesson, 2000; Brunetto & Farr-Wharton, 2007; Grant, 1996).

### **Innovative Behaviour**

Innovative behaviour is defined as the process of bringing new problem solving ideas into use, thereby enhancing a product, service or process. Furthermore, Innovation diffusion is the process by which, over a period of time, the innovation is communicated throughout a social system linked by a network. Subramaniam and Youndt (2005) emphasise that, innovation, like many business functions, is a management process that requires specific tools, rules, discipline and management support. Innovation begins with individuals in an organisation or team, working on a specific project mainly through the generation of creative ideas. However, these ideas need to make a positive change in a product or service for the innovation cycle to be completed. Furthermore, none of this can happen without organisational support, such as the facilitation of appropriate workplace social network ties and an organisational culture focused towards supporting innovative behaviour.

Bratton and Gold (2003) defines innovative behaviour in KBFs as the development of what is known or introduction of something new by valuing the collection, dissemination and utilisation of new knowledge. Luecke and Katz (2003) suggest that innovative behaviour is generally understood as the successful introduction of a new thing or method. Innovative behaviour in a KBF is the embodiment, combination, or synthesis of knowledge in original, relevant, valued new products, processes, or a service which gives an organisation a competitive edge. However, following a review of current literature it is quite clear that most of the literature is either related to big business, the manufacturing sector or very generic. Hence, literature on innovation specifically associated with SME KBFs is quite scarce. Nevertheless, due to some of the similarities with other services and manufacturing sectors it might be possible to generalise some of the activities (and associated indicators) from these associated sectors. However, before this can be achieved it is proposed that there is a need to look at innovative behaviour from the lens of social capital enablers (tie strength, network content, sociability, organisational culture) associated with it, and the knowledge transfer required to support the development of social capital.

Brokel and Binder (2007) suggest that the use of face-to-face contact to transfer tacit knowledge is commonly thought to be the source of a number of opportunities including learning and innovative behaviour. Current literature explains that tacit knowledge cannot be articulated easily as it exists only in people's minds and bodies and is displayed by their actions (Perounce, 2007). Furthermore, people are more likely to engage in innovative behaviour (creating innovative solutions or transferring complex innovative ideas) to the point that they believe they will be listened to and will share in the accumulated benefits (Brokel & Binder, 2007; Clegg, Unsworth, Epitropaki, & Parker, 2002). Although innovative behaviour is widely known to improve organisational effectiveness, the high risk for an employee who takes an innovative approach is often overlooked (Janssen, 2005). This can be attributed to the fact that innovative behaviour deviates from traditional linear behaviour, bringing uncertainty and a risky learning process (Kriegsman, Kley, & Schwering, 2007). Furthermore, past literature suggests that only in a culture where mistakes can be made without fear of retribution will risky innovative behaviour increase to bring order to a chaotic business environment.

*H4: The perceived usefulness of workplace social networks will be positively and significantly correlated with the innovative behaviour of SME employees.*

## **Time in Company Moderator**

The relationship between sociability and usefulness of workplace social networks is thought to be moderated by the amount of tenure an employee (social network member) has had within the company. More specifically, it is hypothesised that an employee's ability to develop workplace social networks would improve as an employee's time in the company increases. Such a concept was formulated from Granovetter's (1973) conclusion that over a period of time and through numerous encounters employees will develop ties between one another. The moderating relationship suggests that as an employee's time in the company increases this will increase their leverage and ability to form social networks that are useful for solving work based problems. Therefore, this study seeks to examine amongst other things the impact of an employee's time in the company upon the relationship between sociability and the perceived usefulness of workplace social networks.

*H5: Time in the company will be positively and significantly correlated to sociability and the perceived usefulness of workplace social networks in SMEs.*

## **Methods**

### ***Sample and Procedure***

This study uses mixed methods to examine the usefulness of networks for problem solving and innovative behaviour for one national organisation. The mixed methods research design is used to gather data from professional engineers' working within an SME. Further, the findings are compared with current literature about other engineers' working within SMEs in the service sector. The hypotheses were tested using a sample of 150 engineers selected randomly from an engineering SME in Australia. Surveys were emailed to participants and 85 engineers returned useable surveys, concluding a response rate of 56.67%. The sample was selected based on industry and employee typicality to ensure the sample was representative of Australian engineering SMEs.

An engineering SME was selected for this study because this is an example of the type of firm that requires the continual generation of new knowledge, so as to maintain its competitiveness. Grant (1996) suggests that KBFs add value through the development of knowledge, especially where this knowledge is generated by employees within the organisation. As such, this type of firm was selected because it is a SME that states in its mission that it actively promotes innovative behaviour in its employees. An engineering SME was chosen for this study because they are required to develop innovative business practices if they

are to remain competitive, especially during a period of intense competition (Brunetto & Farr-Wharton, 2007). That is both engineering firms and SMEs require the generation and transfer of knowledge, to facilitate innovative behaviour which contributes to gaining a competitive advantage. Therefore, past research suggests that the employee is of utmost importance because without them there is no knowledge and there would be no competitive edge for the organisation (Herling & Provo, 2000). In particular, past literature suggests that KBFs have the following attributes: they have a problem solving capability and may in some cases work in non-standardised production areas; employees are highly creative; employees in most cases are highly educated; the central assets for delivering value are not the tangible assets but instead the employees, client networks, customer relationships, tacit and explicit knowledge (Alvesson, 2000; Grant, 1996; Herling & Provo, 2000). Furthermore, Alvesson (2000) considers a KBF to be one where knowledge is related to individuals/employees rather than the organisation, machines and technologies and where the majority of the workforce is well educated.

### *Instruments used*

The **Tie Strength** instrument (Levin & Cross, 2004) was selected to examine the strength of workplace social network ties and their impact on the usefulness of workplace social networks. This instrument includes three closed ended questions examining the tie strength between engineers in a workplace social network. The **network content** instrument was constructed based on the work of Granovetter (1973). The **Sociability** instrument included four sub-scales (propensity to make friends, propensity to make acquaintances, propensity to join others and propensity to belong to groups) to examine the sociability of workplace social network members. The instrument used for the survey was developed from Totterdell, Holman and Hukin (2008). This instrument examines whether engineers have the socially embedded skills or sociability to be able to develop social networks rich in strong and weak ties. The **Innovative organisational culture** instrument was developed by Scott and Bruce (1994). This instrument examines whether engineers surveyed perceive their organisation to value an innovative culture. Furthermore, it is suggested that organisations that value an innovative culture should have a greater amount of innovative employees than other organisations who do not value an innovative culture (Scott and Bruce, 1994). The perceived **usefulness of workplace social networks** instrument was developed from Brunetto, Farr-Wharton and Shacklock (2010). The **Innovative behaviour** instrument was developed by Janessen (2005) which was a modified version of Scott and Bruce's (1994)

measure of innovative behaviour. This instrument contains nine items and has been selected to examine how innovative behaviour is affected by the perceived usefulness of a workplace social network.

### ***Analysis***

A standard regression analysis was conducted to test the hypotheses. The regression analysed the relationship between three organisational factors (tie strength, sociability and organisational culture) and the perceived usefulness of workplace social networks for problems solving. Additionally, a regression analysis was also used to examine the relationship between the perceived usefulness of workplace social networks and the innovative behaviour of SME employees.

## **Results**

### **Quantitative results**

The sample selected consisted mostly of males (69.4%), with a wide spread of age up until fifty years (see Table One). With regards to employment length, 55.3% of employees have been with the company for 2 years or less. Also, 70.5% of employees have at least an undergraduate degree. In summary, the demographic results portray diverse group of ages with high levels of education and low levels of employment length.

**Table One. Demographics**

<b>Surveys</b>	<b>Engineering employees (N=85)</b>	<b>%</b>
<b>Gender</b>		
Male	59	69.4
Female	26	30.6
<b>Age</b>		
16-23	26	30.6
24-30	28	32.9
30-50	23	27.1
50+	8	9.4
<b>Employment Length</b>		
<1	13	15.3
1-2	34	40.0
2-3	16	18.8
3+	22	25.9
<b>Education</b>		
High School	9	10.6
TAFE	19	18.8



Undergraduate	42	52.9
Postgraduate	15	17.6
<b>Employment status</b>		
Full-Time	81	96.4
Part-Time	2	2.3
Casual	2	2.3
<b>Office Location</b>		
City 1, State 1	44	51.8
City 2, State 2	15	17.6
City 3, State 3	8	9.4
City 4, State 4	18	21.2

### *Descriptive Statistics*

Table Two depicts the means, standard deviations, coefficient alphas and inter-correlations for all variables included within this study. All variables are significantly correlated to the perceived usefulness of workplace social networks which is significantly correlated to the innovative behaviour of engineering employees. The only variable that not significantly correlated was the age of employees (control variable).

**Table Two. Means, Standard Deviations and Correlations of the organisational factors tested**

Variable	Mean	SD	Usefulness of Networks	Innovative Behaviour	Tie Strength	Sociability	Innovative Culture	Time in company	Age
Usefulness of Network	4.15	.77	(.895)						
Innovative Behaviour	3.55	.90	.666**	(.924)					
Tie Strength	2.77	.96	.564**	-.153	(.913)				
Sociability	2.99	.86	.654**	.946**	-.196	(.873)			
Innovative Culture	3.79	.56	.769**	.978**	.164	.938**	(.812)		
Time in company	2.55	1.04	.114*	.275*	-.229*	-.095	.100	1.000	
Age (Control)	2.0706	.25	-.076	-.198	-.014	-.168	.202	.222*	1.000

N= 85. Numbers in parentheses on the diagonal are the Cronbach's Alpha in coefficients of the composite scales

\*. Correlation is significant at the 0.05 level (2-tailed).

\*\*. Correlation is significant at the 0.01 level (2-tailed).

### **Secondary Research Question**

To examine who engineers' approach for help and therefore identify the content of their workplace social network for problem solving, engineers were sought to respond to the following question:

*Who do you normally approach with frustrating work-based problems? This may be different for each specific problem you have, however, please place a (1) next to the person you approach the most and a (2) next to the position/person you approach the next most and so on.*

**Table Three. Advice network**

<b>Position/ Person</b>	<b>Approach 1 (%)</b>	<b>Approach 2 (%)</b>
Managing Director	5.9	5.9
Principal	31.2	29.4
National Manager	21.7	8.26
State Manager	11.7	5.9
Associates	5.9	23.5
Senior Engineers	11.7	15.1
Engineers	3.5	7.26
Graduate Engineers	2.4	1.18
Designers	0	3.5
Drafters	0	0

The results of the network content of engineers suggests that engineers approach mostly their state managers and principals when they require support in solving work based problems. Additionally, only 22% of engineers had 2 or more network contacts that they could approach with work based problems and 8% approached no contacts when faced with a frustrating work based problem (see table four). Therefore, the findings depict that the majority of engineer's possess minimal network contacts, this is likely to impact negatively on their ability to seek necessary information for problem solving.

**Table Four. Network Content**

<b>Number of contacts</b>	<b>Amount of employee's</b>	<b>Percentage</b>
<b>0</b>	<b>7/ 85</b>	<b>8.24%</b>
<b>1</b>	<b>23/ 85</b>	<b>27.06 %</b>
<b>2</b>	<b>36/ 85</b>	<b>42.35</b>

<b>3</b>	<b>10/ 85</b>	<b>11.76 %</b>
<b>4</b>	<b>6/ 85</b>	<b>7.06%</b>
<b>5</b>	<b>3/ 85</b>	<b>3.53 %</b>

***Hypothesis 1***

The coefficient value of .913 suggests that the tie strength variable has a high reliability rating. Hypothesis 1 declared that the strength of ties between workplace social network members will be positively and significantly associated with the perceived usefulness of workplace social networks for problem solving in SMEs. The findings provide full support for this hypothesis, the linear regression indicated that the strength of workplace social network ties is significantly and positively associated with the usefulness of workplace social networks ( $F = 32.66$ ,  $R^2 = 27\%$ ,  $p < .000$ ). Additionally, the  $R^2$  value suggests that tie strength contributes to 27 percent of the variance related to the usefulness of workplace social networks.

***Hypothesis 2***

The coefficient value of .873 suggests that the sociability variable has a high reliability rating. Hypothesis two declared that the sociability of SME employees' is positively and significantly correlated with the perception of the usefulness of their workplace social networks. This hypothesis is supported by the findings because the linear regression analysis indicates that the sociability of employees' is significantly and positively associated with the perceived usefulness of workplace social networks ( $F= 120.02$ ,  $R^2= 58.6\%$ ,  $p < .000$ ). Additionally, the  $R^2$  value suggests that the sociability of an employee contributes to 58.6 percent of the variance in the usefulness of workplace social networks. The results suggest that the perceived usefulness of workplace social networks for problem solving is highly dependent upon the sociability of the employee.

***Hypothesis 3***

The coefficient value of .812 suggests that the innovative culture instrument has a high reliability rating. Hypothesis three stated that an organisation's innovative culture is positively and significantly correlated to the perceived usefulness of workplace social networks to solve work based problems in SMEs. This hypothesis should be accepted because the findings from the linear regression analysis indicate that an innovative

organisational culture is significantly and positively associated with the usefulness of workplace social networks for problems solving ( $F= 39.45$ ,  $R^2= 32.2\%$ ,  $p< .000$ ). Additionally, the  $R^2$  value suggests that innovative culture contributes to 32.2 percent of the variance in the usefulness of workplace social networks for problem solving. The results suggest that an organisation that supports innovative behaviour will inevitably be supporting the usefulness of social networks for problem solving. The support mechanism supports both innovation and workplace social networks because the two are highly interrelated.

#### ***Hypothesis 4***

The coefficient value was .924 suggesting that the innovative behaviour instrument had a high reliability rating. Hypothesis four stated that the perceived usefulness of workplace social networks will be positively and significantly correlated with the innovative behaviour of SME employees. The hypothesis received full support because findings from the linear regression indicate that there is a significant association between the usefulness of workplace social networks and the innovative behaviour of SME employees ( $F= 66$ ,  $R^2= 44.3\%$ ,  $p< .000$ ). Additionally, the  $R^2$  value suggests that the usefulness of workplace social networks on their own contributes to 44.3 percent of the variance in innovative behaviour of employees. The results infer that a useful workplace social network geared towards supporting employees when solving work based problems is also likely to facilitate the development of innovative behaviour.

#### ***Hypothesis 5***

Hypothesis five stated that time in the company would be positively and significantly correlated to sociability and the perceived usefulness of workplace social networks in SMEs. The examination of this hypothesis suggests that an employee's time within the company would moderate the relationship between sociability and the perceived usefulness of workplace social networks for problem solving. An independent sample t-test was conducted to compare the usefulness of workplace social networks for employee's that have been with the company for 2-3 years and more than 3 years. Additionally, a second independent t-test was conducted comparing the sociability of employee's that have been with the company for 2-3 years and for more than 3 years. There was a significant difference when examining the usefulness of a workplace social network when comparing employee's that had been with the company for 2-3 years and employee's that had been with the company for more than 3 years. In addition, there was not a significant difference when examining the sociability of employee's when comparing those that have been with the company for 2-3years and to those that have had more than 3 years with the company. The results from the t-test proposes a

contrasting view to current literature and suggests that employee's that have been with company for more than 3 years found the workplace social networks less useful than those that had been with the company for 2-3 years.

**Table Five. Independent T-test of sociability and usefulness of workplace social networks**

Variable	Mean Score		Degrees of freedom		Two tail probability
	2-3 years	3+ years	t-value	df	P-value
Usefulness of workplace social networks	4.33	3.98	1.51	36	.048
Sociability	4.19	3.88	.989	36	.165

### Qualitative Results

Semi-structured interviews were conducted with fifteen engineering managers to provide insight and a greater understanding into the quantitative results. The interview participants were asked a total of seven questions (see appendix 1). The first three questions addressed whether the organisational culture is supportive of innovative behaviour. In addition, questions four and five examine the workplace social network and its perceived importance. Moreover, questions six and seven address managements' perception of employee social skill and the best thing about working in the organisation respectively.

The first question asked interview participants to describe in their own words the values, vision and mission of the organisation. A review of the responses found that while all participants were aware and able to recite the mission and vision; five participants suggested that current practice is not aligned with organisational policy (mission and vision). This means that a third of the engineers identified a difference between the organisational policy and practice of the firm. The second question addressed how management supports the creativity of their employees'. In response, 20% of participants suggested that support is provided by the allocation of time, 27% suggested that support is provided by resources, incentive and rewards, and public recognition; while 53% of participants suggested that support was not adequate to develop a supportive workplace social network or to foster innovative behaviour. This means that the majority of employees experienced poor levels of

support from management. The third question addressed how much time is available to support creative ideas and whether or not this time is adequate. In response, 40% of participants responded that not enough time is provided to support creative ideas; 33.3% suggested the time provided was below average; while 6.7% suggested the time provided was both adequate and above average if compared to other engineering SMEs. In addition, 13.3% of participants suggested that employees' needed to be motivated and trained in time management skills in order to support innovative behaviour. In summary, the findings suggest that participants perceive that not enough support or time is allocated to support and facilitate innovative behaviour in the workplace.

The fourth question examined how often participants used their workplace social network to solve work based problems innovatively. In response, 73% of participants suggested that they used their workplace social network one to five times per week; 20% suggested they used their workplace social network six to ten times per week; while only 7% suggested they used their workplace social network more than eleven times per week. The fifth question addressed how participants would rate the importance of their workplace social network in assisting them to solve work based problems innovatively. In response, 13.10% of participants suggested that the workplace social network was somewhat important; 13.57% suggested that the workplace social network was important; while 53.33% of participants suggested that their workplace social network was essential for assisting them to solve work based problems innovatively. What the findings from question four and five suggest is that the majority of participants only used their workplace social networks a limited number of times per week (1-5), even though the majority of participants suggested that their workplace social network was essential for assisting them in solving work based problems.

The sixth question examined whether participants perceive that engineers possess the necessary skills to develop a vast workplace social network for which to attain and transfer knowledge. In response, 60% of participants suggested that engineers do not possess the necessary social skills to be able to develop a vast workplace social network themselves; while 30% of participants suggested they think that engineers do possess the necessary social skills to be able to develop vast workplace social networks themselves. The seventh question examined what participants perceive is the best thing about working for the organisation under examination. In response, 16% of participants suggested that the best thing was the people; also 16% of participants suggested that the best thing was the organisation's culture; 24% of respondents suggested that the best thing was the opportunity for career development;

while 52% suggested that the best thing about working for the organisation under examination was the projects they were able to undertake. Overall the qualitative findings suggest that while the organisation is winning projects that require problems to be solved innovatively, support for creativity by management is not provided, there is not enough time to be innovative and while there is a workplace social network that is considered essential, it is not used enough to assist in solving work based problems.

## **Discussion**

This study used the three dimensions of SCT as a lens to examine the relationship between some organisational factors and the perceived usefulness of workplace social networks for problem solving and the impact of this network upon the innovative behaviour of SME employees. Using a social capital lens, it was expected that those employees that are embedded in effective workplace relationships are the same employees that would have access to more information and resources for solving work-based problems innovatively. The aim of this study was first to examine the content of the workplace social networks for problem solving and then to examine the impact of tie strength, sociability and organisational culture upon the perceived usefulness of workplace social networks. As such, the study tested and confirmed the proposed model about the impact of tie strength, sociability and organisational culture upon the perceived usefulness of workplace social networks. The study also tested and confirmed the impact of the perceived usefulness of workplace social networks for problem solving upon the innovative behaviour of SME employees. Therefore, following the premise of structural social capital, it was expected that engineers' would be part of a workplace social network that contain network contacts which include both strong and weak ties.

However, the findings from this study suggest that the majority of ties between engineers' are strong ties and that most engineers' usually only rely on one or two workplace social network contacts when faced with an unresolved work based problem. In addition, current literature suggests that relying on a small group of network contacts will limit the perspectives from which network members can gain knowledge, information and ideas from which to solve work based problems (Cole, Schaninger, & Harris, 2002; Gibbons, 2004; Hetty Vanemmerick, 2004). Therefore, based on the findings of this study the usefulness of workplace social networks is dependent upon the strength and number of workplace social network ties. In summary, based on the theory and the findings from this research, by

increasing the number of workplace social network ties that engineers' rely when solving work based problems should increase the perceived usefulness of workplace social networks for problem solving.

In addition, based on an analysis of Table three; the findings suggest that the two hierarchical positions most approached by engineers' when faced with a work based problem were the principal and national manager, whom can be categorised as middle to senior level management. There are two interpretations of the data. Using one theory, the findings suggest that engineers do at least have effective networks in place for solving problems. On the other hand, using another theory the findings present a problem, because the same people are being approached each time. This could mean that these people are very knowledgeable and have all the answers. Although, there seems to be two main problems with this approach. Firstly, gathering information from the same people is not providing engineers with access to diverse perspectives on the one problem. Secondly, relying on one or two people can pose a serious problem for engineers if help is not available when they need it. Moreover, another interpretation of the same data is that the engineers' workplace social network was limited in number and therefore the capacity for innovative solutions was probably reduced by the fact that engineers had such a limited network from which to gather information, knowledge, resources and support. Additionally, such a problem is becoming more frequent with the increasing work load of engineering managers. Therefore, a gap has emerged between the conditions required for the development of social capital and the current practice of engineering SMEs.

Previous research findings identified that weak ties or weaker relationships are typically beneficial for creativity and innovation (Gummesson, 2007; Levin & Cross, 2004; Perry-Smith, 2006). In contrast, the results from this study suggest that employees currently use their intra-office networks to solve problems and gather information and from the quantitative findings it has already been established that these networks are dense in strong ties. What this means is that while the organisation already has strong ties for problem solving, the networks are small and this infers that the central network contacts (advisors) may not always be available to assist in solving work based problems. Furthermore, the development of weak ties throughout the organisation will facilitate the transfer of new and unique knowledge and will promote the innovative work behaviour of employees.



Moreover, the development of network ties will only support the effective problem solving and innovative behaviour of professionals if they are part of a professional's culture that has embedded a process that passes on information and improves the profession. In contrast, the findings from this study contradict current literature suggesting that the usefulness of workplace social network ties is dependent on the strength of network ties both strong and weak. Also the development of inter office network ties are imperative to engineers as each office and division can learn from one another and benefit from new and unique knowledge within their network (Marouf, 2007). Additionally, formal networks can be utilised to facilitate the development of network contacts for engineers between divisions and offices. The findings from this study suggest that the usefulness of workplace social networks are dependent upon the support function of the organisation's culture, strength of workplace social network ties and the sociability of network members.

Under ideal conditions SCT would suggest that both strong and weak ties can be developed between offices by developing effective online communication channels and ensuring that employees have the socially embedded skills required to form informal social networks rich in weak and strong ties (Nie, 2001). For example, what this means is that to develop relationships across state borders it is important that the organisation has in place communication technologies that allow employees to communicate easily and in this case all over Australia. However, having the right type of communication technologies will not improve communication unless employees have the social skills to be able to interact with one another and to build networks in an online setting. Additionally, past literature suggests that the development of formal networks will assist in facilitating the development of informal workplace social networks. Therefore, under ideal conditions it is expected that the structures embedded within the organisation will support high quality relationships that will promote the development of both strong and weak ties that are appropriate for problem solving and the disseminating of knowledge between workplace social network members.

This study also aimed to examine the relationship between relational factors such as sociability and the perceived usefulness of workplace social networks for engineers. This relationship was examined through the lens of the relational dimension of SCT. The relational dimension theory suggests that under ideal conditions workplace social networks are developed and sustained depending on the social skill (sociability) of engineers' in the workplace. Moreover, the results suggest that employees' perceive that they have an appropriate level of social skill to be able to effectively develop workplace social network

relationships. However, in contrast the results suggest that the development of inter-division or inter-office networks is almost not existent. Subsequently, while engineers perceive their level of sociability to be high, the results of developing vast workplace social networks rich in both strong and weak ties has yet to be achieved.

Moreover, to develop social capital (innovative and effective problem solving) it is imperative that organisations embed structures, facilitate the development of relationships and develop a supporting culture. Additionally, under ideal conditions the cognitive dimension, suggests that to develop an organisation that supports innovation and the continuous exchange of knowledge, innovation will be embedded into the culture of the organisation. It is important that an organisation have in place appropriate policies and organisational documents that supports their vision to be innovative through effective problem solving and, to effectively transfer knowledge between employees (Dobni, 2008). However, the results suggest that while innovative problem solving seems to be promoted amongst engineers it is not appropriately supported. More specifically, the results suggest that there is not an appropriate amount of time, resources and rewards to support the development of effective workplace social networks for problem solving. Therefore, if employees' perceive that that the organisation does not demonstrate that they value the use of workplace social networks for problem solving, there is no incentive for employees to develop workplace social networks.

### **Conclusion, Limitations and Further Research**

This study has made several contributions to current literature including SCT, innovation and SME literature. The contribution to SCT was conducted by applying three social capital dimensions to examine the propensity to develop useful workplace social networks to assist in solving work based problems. The second contribution was to innovation literature by linking the role of social networks to the second step of developing innovative behaviour, solving work based problems. The third and final contribution was to SME literature examining the workplace social networks of engineers' impacts upon their ability to solve work based problems within an SME. In summary, this study made three separate contributions to current literature.

This study also contributed to the implication that it is management's responsibility to embed practices that facilitate and support the development of workplace social networks in any organisation and not simply SMEs and KBFs. In addition, it is imperative that

management embed workplace social networks in their organisation so that employees' have access to people resources (support, information and knowledge) and can use this to build on their own capability and creatively address work based problems. As such, it is in the firm's best interest to assist engineers in developing effective workplace social networks, because it improves the capacity of individual engineer's to address workplace problems.

The results of this study open up a number of areas that are recommended for further research and outline some limitations that may impact on the generalisability of the study. For example, although the model proved advantageous in this study, further research using a larger sample of employees and a larger sample of organisations, will increase the generalisability of the results and provide further clarification and refinement of the model. Moreover, greater in-depth research into the organisational factors that impact on an employee's innovative behaviour is also recommended due to the post-positivist methodology undertaken in this study. More specifically, although this study was rich in quantitative findings there was a lack of in-depth qualitative findings that an interpretivist style study may obtain. In addition, this study was only investigated from an organisational perspective. Therefore, an examination into the innovative behaviour within several projects might provide an alternative explanation of the factors that impact on an employee's innovative behaviour.

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## Appendix 1: Interview themes

	Questions	Responses
1	Describe in your own words the organisations values, vision and mission? Are they currently being met?	All fifteen participants were able to recite the current vision and mission. However, five participants stated the current values and practices do not support the current mission and vision.
2	How does management support the creativity of employees?	Support with time allocation = 20% Support with resources = 6.7% Incentives and rewards = 13.3% Public recognition = 6.7% 53% of participants suggested there needs to be more support for innovation and creativity.
3	How much time is available to support creative ideas? Is this adequate?	Not enough = 40% Above average = 6.7% Below average = 33.33% Too much = 0.0% Adequate = 6.7% 13.3% of participants suggested employees needed to be motivated and trained in time management skills to support innovative behaviour.
4	How often would you use your social network during a week to solve work based problems innovatively?	0 = 0% 6-10 = 20% 1-5 = 73% 11+ = 7%
5	How would you rate the importance of your workplace social network in assisting you to solve work-based problems innovatively?	Not important = 0% Somewhat important = 13.10% Important = 13.57% Essential = 53.33%
6	Do you think that engineers possess the necessary social skills to develop a vast workplace social network from which to attain and transfer knowledge?	No = 60% Yes = 30%
7	What is the best thing about working at this organisation? Please name a few.	The people = 16% The projects = 52% The culture = 16% Opportunity for career development = 24%