Evaluating the role of social capital, tacit knowledge sharing, knowledge quality and reciprocity in determining innovation capability of an organization

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Abstract

Purpose – *Knowledge sharing has become an integral part of organizations' business strategies, along with aiding organizations to grow and innovate in the market, and gain competitive advantage. This paper aims to concentrate on the role of tacit knowledge sharing in fostering innovation capability of an organization. Specifically, the study considers social capital (relational, cognitive and structural) as an important precursors to tacit knowledge sharing, which in turn, influences innovation capability of an organization. The study further discusses the role that knowledge reciprocation plays in successful tacit knowledge sharing. The relation between knowledge quality and innovation capability is also discussed in the paper.*

Design/methodology/approach – *The investigation started with a review of extant literature in the field of knowledge sharing and innovation to derive a set of constructs. A set of hypotheses was developed based on the identified constructs, which was subsequently validated through a primary survey based on a structured questionnaire on a sample size of 190 respondents from the Indian industrial domain. The survey responses were subsequently analysed using the statistical technique of structural equation modeling and conclusions were drawn from the findings. Additionally, careful attention was paid in eliminating the common method bias, which is often associated with a primary survey.*

Findings – *A set of six hypotheses were derived based on the identified constructs and were subsequently validated. While validating the hypotheses, it was observed that while knowledge reciprocity, relational social capital and cognitive social capital was positive associated with tacit knowledge sharing, structural social capital did not have a significant effect on the same. Additionally, it was also observed that both tacit knowledge sharing and the quality of knowledge were positively associated with innovation capability.*

Practical implications – *The present day business marked by intense competition requires firms to be more aware of their innovative capabilities. Effective sharing of knowledge or information can be deemed as a vital component in achieving this objective. Organizations that practice and nurture innovation activities can use the findings of the current study as a part of their knowledge management strategy. In addition to using the explicit knowledge, which are structured in nature, organizations can also start using tacit knowledge to harness their innovation potential – and the findings from the current study can act as a motivational tool for them to do so.*

Originality/value – *Although there is a growing body of literature concerning the role of knowledge management in innovation, there still a dearth in discussing the role of tacit knowledge sharing in exploiting the innovation capability of an organization. The main discussion of this paper brings together a set of important constructs that exhibits the significant role that tacit knowledge sharing plays in determining the innovation capability of an organization. Furthermore, it tries to marry the concepts of social capital and tacit knowledge sharing with innovation capability, therefore adding significantly to the body of literature in knowledge management as well as innovation.*

Keywords *Social capital, Tacit knowledge, Tacit knowledge sharing, Knowledge quality, Innovation capability, Knowledge reciprocity*

Paper type *Research paper*

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1. Introduction

Innovation capability is one of the primary organizational tools to survive external unpredictability (Johnson *et al.*, 1997; Hussein *et al.*, 2016; Calantone *et al*, 2002). It is an idea, practice or commodity deemed new by the unit of adoption (Rogers, 2003; Zaltman *et al.*, 1973). Adding to the discussion on the importance of innovation, researchers have studied innovation capability as a central factor to improved business performance, survival, growth and competitive advantage (Calantone *et al*, 2002; Coad and Rao, 2008; Cefis and Marsili, 2005). Innovation capability of an organization can be stated as the knowledge and competencies required for creating new products and/or technologies, as well as improving the existing ones (Lall, 1992; Romijn and Albaladejo, 2002). Innovation capability provides a firm with a sustainable competitive advantage and in the implementation of the entire strategy (Rajapathirana and Hui, 2018) and is tacit and non-modifiable, as well as being closely related to *experimental acquirement* and *interior experiences* (Guan and Ma, 2003). This has led to widespread acceptance among scholars and practitioners that "innovation is power" for firms and other organizations (Drach-Zahavy *et al.*, 2004; Kamaşak and Bulutlar, 2010; du Plessis (2007), in her study on the role of knowledge management on innovation, stressed the fact that through an innovation process, firms continue to make improvements, which not only led to using the current resources but also in bringing new, intangible assets to the firm. Additionally, it has also been observed that there exists a direct relationship between innovation capability and superior business performance, which in turn leads to a competitive advantage in the market.

Antecedents to innovation capabilities have also drawn generous attention. Extant literature on the innovation of an organization has identified information technology and knowledge management (Del Giudice *et al.*, 2015; Del Giudice and Della Peruta, 2016; Soto-Acosta *et al.*, 2015; Soto-Acosta and Cegarra-Navarro, 2016; Soto-Acosta *et al.*, 2016a; Soto-Acosta *et al.*, 2016b) to be important factors. The current study focusses on knowledge management which embraces all knowledge related activities and harnesses to create organizational value (Ganguly *et al*, 2013). Knowledge sharing, which is defined as "the exchange of knowledge between and among individuals, and within and among teams, organisational units, and organisations" (King, 2006, p. 498), is one of the most unique, valuable, and critical resources for an organization to achieve competitive advantage (Nonaka and Takeuchi, 1995; Prahalad and Hamel, 1990). Knowledge sharing is a facilitator to competitive advantage by reducing cost, improving team performance and innovation capabilities (Cummings, 2004; Darroch, 2005; Lin, 2007). For example, an organization that has successfully used knowledge sharing to gain substantial competitive advantage has been Toyota (Dyer and Nobeoka, 2000). Furthermore, prior research studies had exhibited the fact that that knowledge donation and collection, the two fundamental pillars of knowledge sharing, play an important role in fostering the innovation capability of an organization (Lin, 2007; Podrug *et al.*, 2017).

Nonaka (1994) classified knowledge as explicit and tacit. Explicit knowledge is based on documented and universally acceptability, tacit knowledge stems more from experience and is more undocumented in nature. In spite of being difficult to interpret and transfer, thus accounting for their stickiness (Cavusgil *et al.*, 2003; Szulanski, 1996), tacit knowledge is regarded as the root of all organizational knowledge (Nonaka and Takeuchi, 1995). This is especially true in case of innovation, where a lot of the work-related knowledge is highly tacit in nature, and therefore sharing those makes it even more crucial for creating higher collective performance (Käser and Miles, 2002). It has been observed that most studies look at explicit knowledge sharing in lieu of knowledge in general. However, given the importance of tacit knowledge in innovation capability, there is a need to determine to what extent is it "shareable"? To investigate this underexplored topic, the current study also

incorporated knowledge quality (Yoo *et al*, 2011) and knowledge reciprocity (Linton, 2000) in the research framework.

The authors' further grounded the research on social capital theory to understand how it explicates the tacit knowledge sharing. Social capital acts as a vehicle of advantage to leverage valuable resources embedded in relational ties (Granovetter, 1992). While the other forms of capital are based on assets, the foundation of social capital lies in the relationships between individuals and their interaction with their communities (Putnam 1995b). Social capital has been stressed as an important factor in fostering innovation in an organization (Akhavan and Hosseini, 2016; Alguezaui and Filieri, 2010; Landry *et al*., 2002; Tsai and Ghoshal, 1998). Finally, the default mode of explanation of the social phenomenon has shifted from an individualistic attribute to the relational approach (Borgatti and Li, 2009). All these prompted the authors to look at social capital as a construct in the current framework. However, outputs of social capital and knowledge sharing are contextual (Widen-Wulff and Ginman, 2004) which led the authors' to raise the question that does social capital to have an influence on tacit knowledge sharing? In the context of developing social capital, does tacit knowledge sharing also improve innovation capability of an organization?

A study of the extant literature on knowledge sharing and innovation indicated that while there have been prior studies on these topics, there still exists a dearth of literature connecting the concepts of social capital, tacit knowledge sharing and knowledge reciprocity in evaluating a firm's innovation capability, along with the role that knowledge reciprocity and quality of tacit knowledge might play in achieving the same. Although Akhavan and Hosseini (2016), in their study of R and D teams in Iran, has discussed knowledge sharing, social capital and innovation capability, the current study aims to advance this by incorporating knowledge reciprocity and quality in the model and add to the body of literature in the process. Consistent with examining the role of knowledge sharing in innovation capability, the current study tries to extend the existing body of knowledge by examining the collective role of social capital, tacit knowledge sharing, knowledge quality and reciprocity in fostering the innovation capability of an organization.

Beginning with an overview of the theoretical foundation of the concepts, the paper subsequently goes on to develop a set of hypotheses to investigate the understanding of the relationship among social capital and knowledge reciprocity on tacit knowledge creation. The study also determines if the relationship between tacit knowledge sharing and innovation capability is also influenced by the quality of knowledge. The developed hypotheses are subsequently validated through the statistical analysis of structural equation modeling (SEM) conducted on a set of primary survey. The results of the analysis are discussed in the context of the extant literature and conclusions and recommendations are drawn from them. As knowledge management strategies have become a major competitive weapon in the hands of the current day business organizations, the findings of the current study are expected to serve as a valuable guideline to the organizations using knowledge management to strive for continuous innovation.

2. Literature review and hypothesis development

This section of the paper is devoted to casting light on the theoretical background of the major constructs used in the current study: social capital, tacit knowledge, knowledge reciprocity, and innovation capability.

2.1 Tacit knowledge and innovation capability

The concept of *tacit knowing*, which was first proposed by Micheal Polanyi (Polanyi, 1962, 1967) has proven to be an influential concept in the field of management, where it is more commonly known as *tacit knowledge*. Tacit knowledge is defined as "knowledge which is

intuitive, unarticulated, non-verbalized or even non-verbalizable" (Hau and Evangelista, 2007, p. 1154) and is largely based on an individual's own experience and reflections, which makes it more complicated to be expressed and coded (Nonaka, 1994; Hau and Evangelista, 2007). Nonaka (1994) refers to tacit knowledge as being highly context-specific and having a personal quality attached to it, thereby making it extremely difficult to formalize. The process of creation of knowledge begins with the creation and sharing of tacit knowledge, which stems from socialization, facilitation of experience and interactive capacity of individuals with their coworkers (Astorga-Vargas *et al.*, 2017; von Krogh, 1998). Additionally, the factors that encourage employees to share knowledge play an important role in the success of knowledge management, as indicated by (Han and Anantatmula, 2007) in their case study pertaining to the IT sector. Additionally, Liao *et al.* (2007) through a case study on the Taiwanese finance and security firms, determined that a harmonious relationship between an organization and its employees catalyses sharing of knowledge and experience with colleagues voluntarily and unconditionally. Referring the original ideas of Polanyi (1962) pertaining to ineffability of tacit knowledge, Tsoukas (2005) argues that conversion of tacit knowledge to explicit as proposed by Nonaka and Takeuchi, 1995 is not feasible, however, tacit knowledge can be discussed and shared and further, it can be learned through social practice (Nonaka and Von Krogh, 2009). Furthermore, knowledge creation involved organizations and it's individual transcending the boundaries of the old to the new by acquiring new knowledge (Nonaka and Toyama, 2003), which is considered to be mostly tacit in nature. According to Nonaka and Toyama (2003), knowledge creation stems from socialization, which is the "process of converting new tacit knowledge through shared experiences in day-to-day social interaction" (p. 4) and can mostly be acquired through direct experience. Therefore, the transfer of tacit knowledge – can result from formal gatherings such as conferences and training programmes, but the majority of tacit knowledge transfer takes place through informal, social networking and employee interactions (Holste and Fields, 2010; Marquardt, 1996). Additionally, the key to tacit knowledge sharing lies in the willingness and capacity of individuals to share what they know (knowledge donation) and to use what they learn (knowledge collection) (Foos *et al.*, 2006; Holste and Fields, 2010).

Creation and sharing of knowledge have been observed to create opportunities and solutions that provide organizations with innovation capabilities, which in turn can translate into a competitive advantage (Akhavan and Hosseini, 2016; Reid, 2003). Innovation capability of an organization can be termed as "comprehensive set of characteristics of an organization that supports and facilitate innovation strategies". (Burgelman *et al.*, 2004). It has been proposed by multiple researchers that knowledge sharing is one of the utmost important antecedents contributing to a successful innovation capability at various organizational levels (Liao *et al.*, 2007; Lin, 2007; Yeşil *et al.*, 2013). Lin (2007) further argued that knowledge sharing among employees, which is expected to improve the knowledge resource available to the organization, is likely to generate new ideas, thus influencing the innovation capability of an organization.

Cavusgil *et al.* (2003), in their article pertaining to the role of knowledge sharing in facilitating innovation capabilities, suggested that a firm striving for innovation uses a "learning-by-doing" (Arrow, 1962) effect, which makes it very difficult for competitors to imitate and that the difficulties are further intensified by the large tacit component of RandD. Additionally, although not directly concatenated to the current study, tacit knowledge may also play a huge role in the diffusion of innovation (Rogers, 2003), which discuss the phenomenon of an innovation spreading (or diffusing, according to Rogers) across the population over time. Rogers (2003) theory of innovation diffusion can also be loosely applied to the innovation capability of an organization, where diffusion of tacit knowledge might also play a substantial role in fostering the innovation capability. Additionally, the intractable nature of tacit knowledge holds the seeds to a powerful strategic advantage and breakthrough innovation results from the proper harnessing of tacit knowledge (Mascitelli,

2000). Brown and Diguid (2000) hold a similar disposition that practice component of knowledge needs to be embedded in groups of practice in similar contextual circumstances. They posit that ignoring practice component of knowledge would further add to "stickiness of knowledge" (Szulanski, 1996) which would adversely affect innovation capabilities. Therefore, firms with a large "tacit" component in their knowledge can be expected to achieve a greater capability for innovation – thereby further emphasizing the importance of tacit knowledge in innovation. Based on the above, the following hypothesis was proposed:

H1. Tacit knowledge sharing is positively associated with innovation capability.

2.2 Quality of knowledge and innovation capability

Over the years, researches on knowledge management have repeatedly drawn attention towards the insightfulness and quality of the shared knowledge (Björk and Magnusson, 2009;Haas and Hansen, 2007; Ghobadi and D'Ambra, 2012). It has also been established that the success of shared knowledge often depends on the extent to which the recipients were satisfied with the knowledge being shared (Ghobadi and D'Ambra, 2012; Li and Hsieh, 2009). This, therefore, warrants a brief discussion on knowledge quality. Knowledge quality, which has been defined as "the acquisition of useful and innovative knowledge" (Soo *et al.*, 2004, p. 3), can be referred to the degree to which people are satisfied with the quality of the shared knowledge and find it useful in accomplishing their activities (Ghobadi and D'Ambra, 2012), Soo *et al.* (2004) further mentioned that the quality of knowledge can be measured by frequency, usefulness and innovativeness, and can be innovative or new for the system or organization. However, if the knowledge is not beneficial to achieving the objective of the objective of the organizational development or creating new innovation in the organization, then it does not fulfill the criteria of knowledge quality (Soo *et al.*, 2004; Waheed and Kaur, 2016). Additionally, Waheed and Kaur (2016) further identified six dimensions on knowledge quality, namely, adaptability, innovativeness, applicability, expandability, justifiability and authenticity, and argues that these dimensions need to work in harmony for ensuring quality knowledge as compared to non-quality in knowledge. Additionally, the relative quality of the knowledge a rotating member possesses compared to a group's existing knowledge can also affect the overall quality of knowledge among a group (Kane *et al.*, 2005). Furthermore, the common goals and interests that members of an innovation team share will help them see the meaning of their knowledge sharing, which in turn will increase the quality of their knowledge sharing (Chiu *et al.*, 2006). Nonaka (1994) espoused the hierarchical relation between knowledge, data and information quality while the multidimensional nature of knowledge quality is manifested in the literature where frequency, usefulness, innovativeness, accuracy, consistency context, usefulness (Soo *et al.*, 2004; Kulkarni *et al*, 2006) all have been used to define various dimension of knowledge management. In this study, we have adopted a reliable and validated scale used by Chiu *et al.*, 2006, which takes into consideration relevance, ease of understanding, accuracy, reliability and timeliness of availability. All these dimensions considered in this scale are intuitive and are consistent to Yoo *et al.'s* (2011) argument of quality comprising three factors, namely, intrinsic knowledge quality, contextual knowledge quality and actionable knowledge quality.

Tacit knowledge, unlike its explicit counterpart, mostly consists of perceptions and is often unstructured and non-documented in nature. Therefore, mental models, justification of beliefs, heuristics, judgments, "gut feelings" and the communication skills of the individual can influence the quality of tacit knowledge (Erden *et al.*, 2008; Maqsood *et al.*, 2004; Varela *et al.*, 1991). Therefore, quality of knowledge can greatly influence the subsequent chain of decision-making and actions in an innovation process, which might translate to an increase or retardation in an organization's innovation capability. The importance of quality of tacit knowledge has been further discussed by Doran (2004), Nonaka (1994) and

Sanders (2004), among others. Erden *et al.* (2008) further mentioned that the ability of the group to act collectively depends on the quality of their tacit knowledge. Additionally, Yoo *et al.* (2011) argued that a higher level in the quality of knowledge aids an organization to be more productive, reducing costs and increasing sales in the process, along with influencing innovation in an organization. Furthermore, the basic quality of innovative ideas can also stem from the quality of knowledge shared Björk and Magnusson (2009), and therefore it was thought worthwhile by the authors to include knowledge quality as one of the constructs on the current study Furthermore, Björk and Magnusson (2009), in their research involving measuring the quality of innovation idea, argued in favour of the "idea quality" having a substantial bearing on the success of innovation. Therefore, based on the above argument, the authors propose the following hypothesis:

H2. Knowledge quality is positively associated with innovation capability.

2.3 Social capital

The notion of social interactions has its implicit implications in the creation and sharing of tacit knowledge (Nonaka *et al.*, 2000). Knowledge creation requires socialization and particularly, the creation of tacit knowledge occurs through close social interactions and experience sharing (Nonaka and Toyama, 2003). The intensity and efficiency of social interactions are determined by the level of social capital of the interacting individuals' or groups' or organizations' possess (Leana and Van Buren, 1999; Portes and Sensenbrenner, 1993). The extant literature recognizes the critical role of social capital in the creation and sharing of knowledge, more particularly the tacit knowledge (Hansen, 1999; Inkpen and Tsang, 2005; Nahapiet and Ghoshal, 1998).

Social capital, which can be broadly defined as "features of social organization, such as networks, norms, and social trust, that facilitate coordination and cooperation for mutual benefit" (Putnam, 1995a, p. 67) can be conceptualized as a set of resources embedded in the social relationship among social actors, and can also be regarded as a valuable asset that secures benefits for social actors ranging from individuals to organizations (Adler and Kwon, 2002). The central proposition of this theory is that networks of relationships constitute a valuable resource for the conduct of social affairs, in the process providing their members with collectivity owned capital (Nahapiet and Ghoshal, 1998). Therefore, social capital consists of both the social network along with the assets that may be mobilized through that network (Bourdieu, 1986; Burt, 1992; Nahapiet and Ghoshal, 1998).

Putnam (1995a), in his seminal article on social capital, discussed that social capital is not uni-dimensional in nature, but rather comprises of a plethora of facets. The multidimensional concept of social capital has been posited by several scholars. Coleman (1988) describes social capital in three forms namely "trustworthiness", "Norms and Sanctions' and Information-flow". Several scholars focusing on the network structure, ideas of structural hole (Burt, 1992) and strength of weak ties (Granovetter, 1983) consider social capital in two dimensions as "Bonding" and "Bridging (Davidson and Honig, 2003; Ellison, Steinfield, and Lampe, 2007; Kawachi *et al.*, 2008). Taking the network perspective, Woolcock and Narayan (2000) considered similar two dimensions of social capital at community level namely bonding (intracommunity ties) and bridging (extracommunity network).

From the informational benefit perspective of social capital, Koka and Prescott (2002) suggested three dimensions, namely, "Information diversity", "Information volume" and "Information richness". In studying the influence of social capital on the start of occupational career, Flap and Boxman (2001) considered three facets of social capital as "willingness of network members to support" referring to strength of ties and resources available, the second one as "Structural Autonomy of individual in their own network" referring to the structure of ego's personal network and "Position generator" referring to the strengths of positions. Krishna and Shrader (1999) in developing an assessment tool of social capital,

conceptualized at macro and micro level. At the macro level, it includes formal relationship and structure in terms of law, rules, level of decentralization, etc., and at the micro level, they conceptualized two dimensions of social capital: cognitive and structural. The cognitive dimension includes values, beliefs, attitudes, social norms. However, three dimensions of social capital proposed by Nahapiet and Ghoshal (1998) is widely applied, particularly, in the field of knowledge management (Chang and Chuang, 2011; Chiu, Hsu, and Wang, 2006; Chow and Chan. 2008; Inkpen and Tsang, 2005; Liu and Besser, 2003; Wasko and Faraj, 2005). Nahapiet and Ghoshal (1998) clustered social capital into three distinctive clusters – relational, structural and cognitive. While structural social capital refers to the overall connections (or relationship among the social actors) (Nahapiet and Ghoshal, 1998; Van den Hooff and Huysman, 2009; Yang and Farn, 2009), relational social capital is more concerned with the assets created and leveraged through ongoing relationship among the social actors (Nahapiet and Ghoshal, 1998; Van den Hooff and Huysman, 2009). Finally, cognitive social capital involves a common understanding among social actors through shared languages codes, shared beliefs and narratives (Van den Hooff and Huysman, 2009; Yang and Farn, 2009).

According to Hau *et al.* (2013), prior studies in knowledge management have indicated the role of social ties, shared goals and social trust as the major constructs representing the structural, cognitive and relational dimensions of social capital, respectively. This, therefore, has led to the belief that social capital plays a very important role in the process of knowledge creation and sharing. This is especially true in the case of tacit knowledge, which has been observed to be socially driven in nature (Yang and Farn, 2009). Lin (2017) argues that the extent of accessibility of the embedded resources in the network is related to the mobilization of these resources which in turn results in purposive actions of individual actors in the network. Lin further clarifies that accessibility to the embedded resources is facilitated by collective assets in terms of trust, values, and norms and structural dimension of a network. Social capital, through providing access to people with relevant knowledge, a common interest and an atmosphere of mutual trust and appreciation, and sharing a common ability helps in correctly interpreting other people's knowledge (Akhavan and Hosseini, 2016; Van den Hooff and Huysman, 2009). It is, thus, likely to generate new ideas and develop new business opportunities, thus facilitating innovation activities in an organization (Darroch and McNaughton, 2002). This, in turn, might increase the willingness to share tacit knowledge with their co-workers and teammates, expanding the pool of tacit knowledge in the process.

Nooteboom (1999a) though not denied the trust requirement (subject to appropriate governess mechanism) among the knowledge exchange partners but argues that trust may create, at times, rigidity in creating knowledge for innovation. Extending the concept of "strengths of weak ties" introduced by Granovetter (1983), Nooteboom, 1999a and Nooteboom, 1999b) further argues that while socialization is crucial in knowledge exchange for incremental as well as radical innovations, organizations need to maintaining optimal cognitive distance to access non-redundant valuable knowledge and or have complementary cognition for developing innovation capability. He also emphasizes the criticality of tacit knowledge to prevent the spillover of knowledge for innovation that entails social interactions within and outside the organization. Nooteboom (1999b), however, clarifies that radical innovation requires a novel combination of cognition. Weak ties with optimal distance are necessary for such a novel combination but transfer of tacit knowledge may be problematic, which may be overcome by joint 'community practices' between parties engaged in knowledge exchange.

Several scholars have studied the relationship between knowledge sharing and social capital. Most of studies have measured such relationship taking specific dimension of social capital (Collins and Hitt, 2006; Dhanaraj *et al.*, 2004; Holste and Fields, 2010; McFadyen and Cannella, 2004; Yang and Farn, 2009) or social capital as a single dimension variable

or as a second level variable combining its all dimensions together (Hau *et al.*, 2013; Subramaniam and Youndt, 2005). Unlike explicit knowledge, tacit knowledge sharing involves risk and uncertainty (Foos *et al.*, 2006). It involves collective action and the intrinsic motivation of individuals (Bock *et al.*, 2005). While trust (relational dimension) may reduce risk and uncertainty (Bock *et al.*, 2005), the intellectual interactions underlying the shared goal and language (cognitive dimension) likely to foster intrinsic motivation (Lin, 2007). Each dimension of social capital, therefore, may have a diverse extent of effect in tacit knowledge sharing. To make the study more robust and meaningful from the point of managerial implication, the authors thought it appropriate to study the relationship of each dimension of social capital separately with tacit knowledge sharing.

2.3.1 Structural dimension of social capital and tacit knowledge. Structural dimension of social capital includes network ties, density, configuration and appropriateness. Granovetter's (1983) concept of "strength of weak tie" remains the foundation of the subsequent development of concepts of the structural dimension of social capital. The concept of "strength of weak tie" posits that week ties lead to efficient knowledge sharing because they provide access to novel information by bridging other disconnected groups and individuals, which strong ties cannot because of the potentiality of knowledge redundancy. Coleman (1988) introduced the concepts of the closure of the network. He argues that the closure network guides and monitors the actions and behaviours of the actors in the network structure through norms and sanctions. Burt (2000) conceptualizes the social structure of the network through the lens of 'structural holé. According to him, the structural hole refers to the relationship of non- redundancy between two contacts. According to Burt "*social capital is more of a function of brokerage across structural holes than closure within a network*" (2000, p. 345). Burt (2000) further adds that both the network mechanisms, i.e. closure network and structural hole together provide the appropriate social network structure for developing valuable social capital.

The social network theory suggests that network ties provide access to the resources that are embedded in social relationships within the actors (Coleman, 1988; Nahapiet and Ghoshal, 1998; Putnam, 1995a). Knowledge is the most valuable resource that is embedded in the social relationship (Inkpen and Tsang, 2005). The characteristics of social network structure have a strong relationship with knowledge creation and sharing in an organization (Borgatti and Cross, 2003). Studying the effect of strong ties as well as a cohesive network structure, Reagans and McEvily (2003) find that both these features of the structural dimension of social capital contribute in effective knowledge transfer between the actors in the network. A major component of knowledge is tacit which is difficult to share or transfer without social interactions (Kogut and Zander, 1996; Szulanski, 1996). Strong ties facilitate the transfer of tacit knowledge more than codified knowledge (Hansen, 1999; Reagans and McEvily, 2003). A high intensity of social network with close and frequent interactions leads to increased transfer of tacit knowledge (Krackhard, 1992; Sorenson *et al.*, 2006). Based on these theoretical insides, we develop the following hypothesis.

H3a. Structural social capital positively influences tacit knowledge sharing.

2.3.2 Relational dimension of social capital and tacit knowledge. Following Granovetter's (1983) arguments of the history of interconnection in developing relationships, and also "norms and sanctions" concept of Coleman (1988), Nahapiet and Ghoshal (1998) explain the relational dimension as "relations embeddedness" in the actors' bonds where the key characteristics are trust and trustworthiness. Power of social capital inheres in the close personal relationships in the social network structure that leads to meaningful individual and collective actions (Coleman, 1988). The core component of the definition of social capital as provided by Adler and Kwon is goodwill and "*it lies in the structure and content of actors' social relations*" (2000, p. 23). The key feature of goodwill they refer as trust. Tsai and Ghoshal (1998) in their empirical study observe that trust as a relational dimension of social capital has a significant effect on resource exchange and combination. They further

observe that trustworthiness is also significantly related to the other two dimensions of social capital, i.e. structure and cognitive. Hughes *et al.* (2014) conceptualize the relational dimension of social capital as "resource interdependency". They argue that "resource interdependency" view provides a behavioural choice to the focal actors to build ties with others that exhibit trust as well as an opportunity of value creation. Their resource interdependency concept further suggests that trust is the key component in these ties that prevent the opportunistic behaviour. According to them intensified resource interdependence with repeated interactions increase knowledge transfer between the parties. Inkpen and Tsang (2005) argue that an atmosphere of trust, underlying the relational embeddedness between parties, sanctions opportunist behaviours and contributes to free knowledge exchange.

The trusted relationship among parties engaged in knowledge exchange is crucial for the creation and sharing of tacit knowledge (Collins and Hitt, 2006; Holste and Fields, 2010; Nonaka and Von Krogh, 2009). Several scholars considered trust as multidimensional in nature. Drawing from the Mayer *et al.*'s (1995) concept and definition of trust, Levin and Cross (2004) conceptualize trust in two dimensions: benevolence based trust and competency-based trust. Their empirical study suggests that both perceived benevolence and competency-based trust mediate the relationship between strong ties and receipt of useful knowledge but in their absence, in line with the proposition of Granovetter (1983), weak ties are effective in exchange. They further observe that perceived competency-based trust facilitates tacit knowledge exchange while benevolence based trust facilitates both explicit and tacit knowledge exchange. Their finding, thus, indicates that the relational dimension of social capital represented by trust and trustworthiness is essential for dense social network structure for it to be effective antecedents of knowledge acquisition and assimilation. McAllister (1995) considers affect-based trust and cognitive-based trust with regards to the relational facet of social capital. The author conceptualization of the affect-based trust is similar to the concept of benevolence based trust implying mutual care and concerns and conceptualization of cognitive-based trust is similar competent-based trust implying reliability and competence of the actors in the social network. His study found that both the forms of trust associated and significantly affect the sharing of tacit knowledge. Chowdhury (2005) in a similar vein observed that both, the affect-based trust and cognitive-based trust independently influence the tacit knowledge sharing. Levin and Cross (2004) argue the special importance of cognitive-based trust in tacit knowledge sharing. Holste and Fields (2010) observed that both the types of trust significantly contribute to the willingness to share and use of tacit knowledge. Their study shows that the affect-based trust has a greater influence on the willingness of tacit knowledge sharing than cognitive-based trust while cognitive-based trust greater has greater influence in using the tacit knowledge than affect-based trust. Personal relationship embedded with interpersonal trust strongly influence tacit knowledge sharing (Epstein, 2000; Foos *et al.*, 2006). Dhanaraj *et al.* (2004) also found that relational embeddedness between the parties strongly impacts tacit knowledge sharing. The extant literature, thereby, posits that a trusted relationship, which is the core component of relational social capital is strongly related to tacit knowledge sharing. Accordingly, we develop the following hypothesis.

H3b. Relational social capital positively influences tacit knowledge sharing.

2.3.1 Cognitive social capital and tacit knowledge. Individuals to recognize understand and then exchange unique knowledge with other actor(s) in a social network need to have a shared cognitive frame of reference (Nonaka, 1994; Kang *et al.*, 2007). Shared goals, language and understanding influence in determining what knowledge to be collected and evaluated (Kogut and Zander, 1996). Inkpen and Tsang (2005) argue that shared vision and goals act as a bonding mechanism that facilitates different actors in an intra-corporate network to share and integrate newly acquired knowledge. They further argue that shared culture encompassing shared values, beliefs and norms and they influence the process of

knowledge sharing and integration. Wasko and Faraj (2005) argue that cognitive social capital significantly contributes to knowledge sharing, especially complex knowledge. Nonaka (1994) argue that individuals exchange tacit knowledge through the exchange mechanism that involves socialization requiring shared experience and understanding. He further points out that the mode of knowledge conversion involves shared experience and each other's' thinking processes. Such socialization process of conversion of tacit knowledge to tacit knowledge demands members' shared context, experiences and understanding involving shared cognitive schemas and shared purposes (Nonaka and Toyama, 2003). We, thus, develop the hypothesis.

H3c. Cognitive social capital positively influences tacit knowledge sharing.

2.4 Role of knowledge reciprocity in knowledge sharing

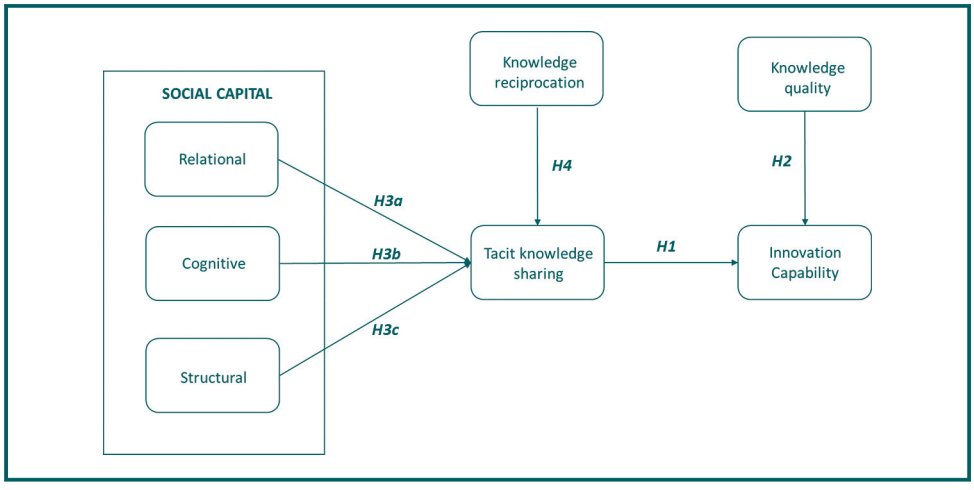
Ben-Ari and Enosh (2013, p. 426) defined reciprocity as a "process whereby each research party believes that he or she contributes not necessarily to the other party, but to a matter of common interest, an issue of concern, a social phenomenon, or a personal matter". It is the exchange of information and knowledge, which is mutual and fair and justifies the time and attempts spent on knowledge sharing (Tamjidyamcholo *et al.*, 2013) and can be direct or indirect in nature (Molm *et al.*, 2007). Therefore, reciprocity is associated with relationships that are perceived to have a greater value as compared to relationships with only unidirectional communication (Linton, 2000). According to Davenport and Prusak (1998), reciprocity serves as a major driver of knowledge sharing. Reciprocity, which is greatly influenced by the intention to deploy knowledge, and by goal attainment, creating and maintaining reciprocity of knowledge flows can be considered as a managerial competence (vanWijk *et al.*, 2005). Therefore, a lack of knowledge reciprocity can end up draining the emotional resource of an individual and is significantly associated with depersonalization and lack of personal accomplishment (Thomas and Rose, 2010), thereby leading to a loss in social capital. Thus, when individuals trust that their knowledge contribution efforts will be rewarded through reciprocations and ensuring ongoing contribution (Wasko and Faraj, 2005), they are motivated to share tacit knowledge (Hau *et al.*, 2013). Smedlund (2008) suggests that participants of a network are facilitated to share knowledge by norms of reciprocity which assures knowledge sharing agents that they will be compensated in the future. Additionally, reciprocity is a type of social capital that is embedded within personal relations, triply defined in the factual, social and temporal dimensions by co-presence, reciprocity and memory, respectively (Torche and Valenzuela, 2011), which makes it more apt to consider in the current study. Finally, reciprocity in knowledge sharing can create a perception of involvement, as well as aiding the actors to understand what information is needed (Linton, 2000), all of which serves as vital components of growing and sustaining innovation capability.

Prior studies on knowledge management and sharing have indicated the importance of knowledge reciprocity in the success of the knowledge sharing process (Caimo and Lomi, 2015; Richards, 2001; Tamjidyamcholo *et al.*, 2013). Linton (2000) observed that relationship with a reciprocal component has been observed as more fruitful than its unidirectional counterpart and can improve knowledge/information sharing through creating a perception of involvement. Additionally, reciprocity can also lead to an increase in the social capital as well as develop network ties, which in turn leads to a greater innovation capability and performance (Wu and Leung, 2005), as well as diffusion of innovation (Andersen, 2011). Thus, based on the discussion above, the authors propose the following hypotheses:

H4. Knowledge reciprocity is positively associated with effective sharing of tacit knowledge.

Figure 1 provides the readers with the basic research model:

Figure 1 Conceptual research model



3. Research methodology

3.1 Sample and data collection

The current study began with an in-depth survey of the theoretical foundations of the concepts, based on which the relevant set of hypotheses was developed. The developed hypotheses were subsequently validated through a primary survey in the form of a questionnaire. The design of the questionnaire followed the requirements of Churchill (1979) and once the questionnaire was developed it was sent out to a selected group of industry experts for a pilot study. The questionnaire was subsequently revised and optimized according to their feedback. The data for the variables used in this study were collected through two separate survey questionnaires. Following the key informant method (Bagozzi *et al.*, 1991; Mitchell, 1994), the survey questionnaires were sent out to the managerial staffs of a few organizations from Automotive, FMCG, IT and Media industry.

There is always a likelihood of industry effects on innovation capability (Damanpour *et al.*, 2009; Jiménez-Jiménez and Sanz-Valle, 2011; Weerawardena *et al.*, 2006). Al-ali (2003), however, argues that an organization's intangible assets like intellectual capital including tacit knowledge primarily drives innovation in the organization. He further argues that irrespective of the industry character, in the current era, business performances of the organizations are transformed by knowledge economy and best performing organizations in terms of innovation, irrespective of the industry they belong to, are having disproportionately majority of asset portfolios as an intellectual asset. Studying innovation capability and tacit knowledge relationship (according to Al-ali, tacit knowledge is a major component of intellectual capital), thus for practical implication, it would be interesting to include both traditional as well as knowledge-driven service industry. The authors, therefore, chose four diverse industrial sectors (two traditional sectors, i.e. FMCG and Automotive and two knowledge-driven service sector, i.e. IT and Media) with a view to enhancing the generalizability of the study. The authors choose two organizations from each of these industries. Additionally, as organizational culture/climate has its implications on innovation capability (Hofstede, 1991; Hofstede, 1998; Hogan and Coote, 2014; Schein, 1990), the authors' chose four industries where the organization culture/climate was diverse in nature – thereby attempting the control the organizational culture/climate factor.

That's somehow restricted to the number of respondents. To avoid the problem of common method bias associated with primary surveys, the authors' obtained data of the focal dependent variable (innovation capability) and focal independent variable (tacit knowledge

sharing) from different sources within the same organization as recommended by Podsakoff *et al*. (2003). The survey consisted of two separate online links – one link containing the variables *innovation capability* and *quality of shared knowledge* and the other links containing the variables *tacit knowledge sharing, social capital (relational, cognitive and structure) and knowledge reciprocity*. To avoid the priming effect or question context and item embeddedness biases, counterbalancing of items of the constructs were done in each set of the questionnaire (Podsakoff *et al*., 2003). The two survey links were sent out electronically to separate groups of managerial staffs of the same organizations (total of 460 emails were sent 65 of each set to Automotive secretor, 65 of each set to FMCG, 50 and 50 of each set to IT and Media sector respectively) secretor and a total of 187 responses (response rate 41 per cent) were received, including 92 responses for the one set of variables – Tacit knowledge sharing, Social capital (relational, cognitive and structure) and knowledge reciprocity and 95 responses for the other set variables - Innovation capability and Quality of shared knowledge. However, on matching the responses of both the set of variables for each company with the industry, the net number of responses further reduced to 87 (87 responses for each set of variables). Table I presents the basic characteristics of the survey respondents.

3.2 Selection of variables and scales

The variables and the scales used in this research were selected on the basis of reviewing the extant literature. The measures of the identified variables used in this study were chosen based on the developed hypotheses and are subsequently discussed in the remainder of this section.

The independent variables used in the current study comprised social capital (relational, cognitive and structural), knowledge quality and knowledge reciprocation. The variables were identified based on the set of hypotheses to be developed and an in-depth review of the extant literature. On the other hand, tacit knowledge sharing and innovation capabilities form the two focal dependent variables in the study. The measures of the variables consisted of existing scales obtained from the open literature. All items in the survey questionnaire were measured using a five-point Likert scale where 1 signified strongly disagree and 5 signified a strong agreement. Table II provides the readers with the variables, their scales and their reliability score (Cornbach's α).

To increase the robustness of the study, the relationship of each dimension of social capital, i.e. social capital-relational, social capital-cognitive and social capital-structure with tacit knowledge was investigated separately.

Control variable: The industry structure was considered to be the control variable for the current study. As previous research has indicated that innovation capability seeming to have a relationship with industry structure (Weerawardena *et al*., 2006), industry was used as a control variable.

It should be worthwhile to reiterate in this context that to avoid common method bias, the data was collected from two different sources of the organization. As previous discussions on addressing common method bias has suggested the use of multiple sources for data

Table I Characterization of the survey respondents

Industry type (%)	Industry size by employees (%)	Management level (%)	Experience in years (%)
IT (36.35%)	<1000 (26.1%)	Director (6.8%)	>15 (48.7%)
FMCG (34.53%)	1000-4999 (44.4%)	Senior level management (70.54%)	10-15 (33.2%)
Automotive (21.78%)	5000-9999 (19.7%)	Mid-level management (16.6%)	5-10 (16.7%)
Media (7.34%)	>10,000 (9.8%)	Others (6.06%)	<5 (1.4%)

Table II The measurement scales and their reliability

Measurement scale	*Scale items*	*Reliability (Chronbach's α)*
Innovation Capability (Adopted and modified from Lin, 2007*)*	In the last three years, my organization's rate of introduction of new product/service has increased	0.890
	In the last three years, my organization has commercialized new product/service ideas	
	In the last three years, my organization has been creative in its methods of operation?	
	In the last three years, my organization has developed new techniques/processes for product/service development	
	In the last three years, my company has often been the first to the market with new products and services	
	In the last three years, my organization has often been the first to market with new products and services	
Tacit knowledge sharing (adapted and modified from Lin, 2007*;* Wang and Wang, 2012*;* Lee, 2001*)*	In my company during any group discussions, each one of us tries to find out each other's opinions, thoughts, and information	0.904
	It is an established practice in my organization that to understand others' thought better, repeat what one has said and ask them "is this what they mean?"	
	In my organization, it is an established practice for each employees present in a meeting to write a summary note of what was discussed in the meeting	
	In discussion, all participating members are encouraged in my organization to actively share their experience formally or informally	
	My organization urges every employee to discuss with each other what they think to make sure his/her understanding is same as others	
	In my work team, my teammates and I will share life or work experience with each other through informal gatherings	
	Before starting any project, my company makes every one of the project team to know each other well through formal and informal gatherings	
Social capital- relational (Adapted from Leana and Pil, 2006*)*	Overall, the members in our team are trustworthy	0.900
	There is high "team spirit" among our team members	
	Our team members show a great deal of integrity	
	Our team members have confidence in one another	
	Our team members are usually considerate of one another's feelings	
	We can rely on our co-workers and superiors, with whom we work within this team?	
Social capital- cognitive (adapted from Leana and Pil, 2006*)*	Our team members share the same ambitions and vision for the team	0.903
	Our team members view themselves as partners in charting the team direction.	
	Our team members are committed to the goals of the team	
	Our team members enthusiastically pursue collective goals and mission	
	There is a commonality of purpose among the employees in our team	
Social capital- structure (Adopted from Collins and Clark, 2003 *and* Peng and Luo, 2000*)*	On an average how close is your relationship with the other members of your team?	0.739
	To what extent do you have contact with other members within the team that you work with?	
	To what extent you have contact with members of other teams within your own department/ division?	
	On an average how close is your relationship with members of other teams within your own department/division?	
	To what extent you have contact with members of other department/division?	
	On an average how close is your relationship with members of other department/division?	
Knowledge reciprocation (Adapted from Tamjidyamcholo *et al.*, 2013*)*	I will be willingly contributing to sharing new ideas only if I sees other members of team reciprocating	0.818
	When I share my knowledge, I expect somebody to respond when I'm in need	
	When I share my knowledge, I believe that my queries for knowledge will be answered in future	
	I find that sharing knowledge can be mutually helpful	
Quality of knowledge shared (Adapted from Chiu *et al.*, 2006*)*	The knowledge shared the employees of my company is complete and clear	0.914
	The knowledge shared among the employees of my company is mostly accurate	
	The knowledge shared among the employees of my company is timely	
	The knowledge shared by employees of my company is easy to understand	
	The knowledge shared by the employees of my company is relevant to the topics pertaining to the business operations of my organization	
	The knowledge shared among the employees in my organization is reliable	

collection as one of the possible methods to eliminate common method bias (Craighead *et al.*, 2011; Malhotra *et al.*, 2006; Malhotra *et al.*, 2017; Podsakoff *et al.*, 2003), the authors thought it is appropriate to follow the suggested procedure. Further, the author followed other procedural remedies as suggested by Podsakoff *et al.* (2003) to have psychological and proximal separation in terms of questionnaire design, counterbalanced the order of items used in measuring each construct and kept the responses unanimous. Furthermore, the authors followed two separate statistical remedies to ensure that data do not suffer from any common method bias. As PLS-SEM approach has been used in this study for data analysis, following the recommendation of Kock (2015), the authors carried out the full collinearity assessment by checking the vertical and lateral collinearity of the full model of our study. None of the VIF (Variance Inflation Factor) score of each variable, when connected to remaining all other variables, has been found to be above the threshold score of 3.3 (Knock, 2015). These results reasonably indicate the absence of common method bias in our study. Table III shows the collinearity statistics (VIF).

As a second statistical remedy, the authors carried out the widely used statistical analysis of "controlling the effects of single method factor" (Conger *et al*, 2000; Podsakoff *et al.*, 2003) to determine the presence of measurement error, if any. We first conducted CFA with the respective indicators of our latent constructs, i.e. innovation capability, tacit knowledge sharing, knowledge quality, knowledge reciprocity, relational social capital, structural social capital and cognitive social capital. The result (Chi-Square/df= 649.15/617 = 1.052; RMSEA = 0.027; CFI = 0.96; RMR = 0.67) confirms distinctiveness of the hypothesized seven-factor model. We subsequently did the single factor CFA loading all 37 items on a single factor. The result (Chi-square/df = 2102/627 = 3.352; RMSEA = 0.178; RMR = 0.11; CFI = 0.77) significantly different than the 7 factor hypothesized model and it did not support single factor model fit. This result helped the authors to conclude that the hypothesized seven factors are significantly distinct. The authors' also conducted CFA for each of the constructs separately and the results confirm the single factor for each of the constructs used in the study. The construct of social capital, however, shows a good fit as three factors (relational, cognitive, and structure) model. Since the influence of each of these factors was hypothesized and tested separately on tacit knowledge sharing, CFA of these factors have been tested separately and the results confirm good model fit each of them as a single factor. Table IV shows the CFA results for each construct.

3.3 The scale validity and reliability

In latent variable analysis is it critical to establish the convergent and discriminant validity (Bagozzi *et al.*, 1991; Farrell, 2010). Table V contains the descriptive statistics and correlations of the variables in the hypotheses while table VI contains the data of Cronbach's alpha, composite reliability and average variance extracted (AVE).

Table III Colinearity statistics (VIF)

	INCP	*TCK*	*KQ*	*KR*	*SCR*	*SCC*	*SCS*
INCP		1.997	2.026	2.251	3.114	2.686	2.495
TCK	2.065		2.324	2.382	2.659	2.499	2.684
KQ	1.166	1.472		1.276	1.863	1.353	1.448
KR	1.275	1.320	1.209		1.556	1.500	1.305
SCR	1.414	1.374	1.110	1.390		1.422	1.370
SCC	1.894	1.653	1.589	1.679	2.029		1.750
SCS	1.507	1.554	1.314	1.315	1.523	1.432	

Notes: INCP: Innovation Capability; KQ: Knowledge Quality; TCK: Tacit Knowledge sharing; KR: Knowledge reciprocation; SCR: Social Capital-Relational, SCC: Social Capital -Cognitive; SCS: Social Capital – Structure

Table IV Confirmatory factor analysis results

Variable	No. of factors	Fit indices
Innovation capability	One	Chi-Square/df = 1.41; RMSEA= 0.64; CFI = 0.99; GFI = 0.96
Tacit knowledge sharing	One	Chi-Square/df = 1.64; RMSEA= 0.013; CFI = 0.99; GFI = 0.96
Quality of shared knowledge	One	Chi-Square/df = 0.981; RMSEA= 0.000; CFI = 1.00; GFI = 0.99
Reciprocation	One	Chi-Square/df = 1.325; RMSEA= 0.010; CFI = 0.99; GFI = 0.97
Social capital	Three (Relational, Cognitive, and Stricture)	Chi-Square/df = 1.616; RMSEA= 0.047; CFI = 0.97; GFI = 0.90
Social capital-relational	One	Chi-Square/ df = 1.37; RMSEA= 0.061; CFI = 0.99; GFI = 0.95
Social capital- cognitive	One	Chi-Square/ df= 0.51; RMSEA= 0.000; CFI = 1; GFI = 0.99
Social capital- structure	One	Chi-Square/df = 0.00; RMSEA= 0.000; CFI = 1; GFI = 0.1

Table V Descriptive statistics and correlation scores of the variables

Variables	*Mean*	*SD*	*INCP*	*KQ*	*TKS*	*KR*	*SCR*	*SCC*	*SCS*
INCP	3.8844	0.7139	1						
KQ	4.1022	0.7508	0.344**	1					
TKS	4.0019	0.6417	0.636**	0.094	1				
KR	4.0600	0.6924	0.349**	−0.062	0.343**	1			
SCR	4.0667	0.6443	0.208*	−0.045	0.432**	0.099	1		
SCC	3.9973	0.6901	0.421**	0.307**	0.520**	0.064	0.366**	1	
SCS	3.5578	0.6842	0.387**	0.121	0.396**	0.207	0.342**	0.426**	1

Notes: $N = 87$; $^{**}p < 0.001$; $^{*}p < 0.05$; INCP: Innovation Capability; KQ: Knowledge Quality; TKS: Tacit Knowledge sharing; KR: Knowledge reciprocation; SCR: Social Capital-Relational, SCC: Social Capital -Cognitive; SCS: Social Capital – Structure

Table VI Composite reliability and validity scores of the variables

	Cronbach's α	Composite reliability	AVE
INCP	0.917	0.936	0.709
KQ	0.924	0.940	0.723
KRCP	0.881	0.917	0.734
SCC	0.903	0.928	0.720
SCR	0.900	0.923	0.666
SCS	0.828	0.827	0.745
TKS	0.910	0.929	0.651

Notes: INCP: Innovation Capability; KQ: Knowledge Quality; TCK: Tacit Knowledge sharing; KR: Knowledge reciprocation; SCR: Social Capital-Relational, SCC: Social Capital -Cognitive; SCS: Social Capital – Structure

Table V and Table VI provide the reader with the basic findings of the study. Looking at the values of the mean and standard deviation from Table V, it was observed that the standard deviation of each of the variables resulted in a value that was lesser than one, which signified that the respondents were fairly in agreement with each other in spite of being surveyed separately, which translated into an increase in the reliability of the study. Additionally, it can also be observed by looking at the correlation values from Table V, while innovation capability had a significant, positive correlation with all the other variables considered as a part of the study, quality of knowledge only had a significant correlation only with innovation capability and tacit knowledge sharing. This supported the subsequent findings of the research. On the other hand, tacit knowledge sharing had a significant and positive correlation with social capital and the three types of social capital considered as a part of the study were positively and significantly correlated with one other.

Table VI contains the data of Cronbach's alpha, composite reliability and average variance extracted (AVE). AVE of all the constructs was more than 0.50 indicating good convergent validity. The composite reliability and Cronbach's Alpha value of all higher than 0.70 indicating good reliability in terms of internal consistency of each construct (Nunnally,1978). Furthermore, as seen in figure 2 (exhibited in the following section), the outer loading of all indicators each of construct is found to be higher than 0.70. These data indicate good indicators of reliability for each of the constructs (Hulland, 1999). Furthermore, the square root of AVE of each variable (Innovation capability: 0.842, Tacit knowledge: 0.807; Knowledge quality: 0.850, Knowledge reciprocation:0.857, Social Capital-Cognitive: 0.849; Social Capital-Relational: 0.816, Social Capital-Cognitive: 0.863) is greater than the correlation coefficient with each of the other variables. These results confirm the discriminant validity of all the variables (Fornell and Larcker, 1981)

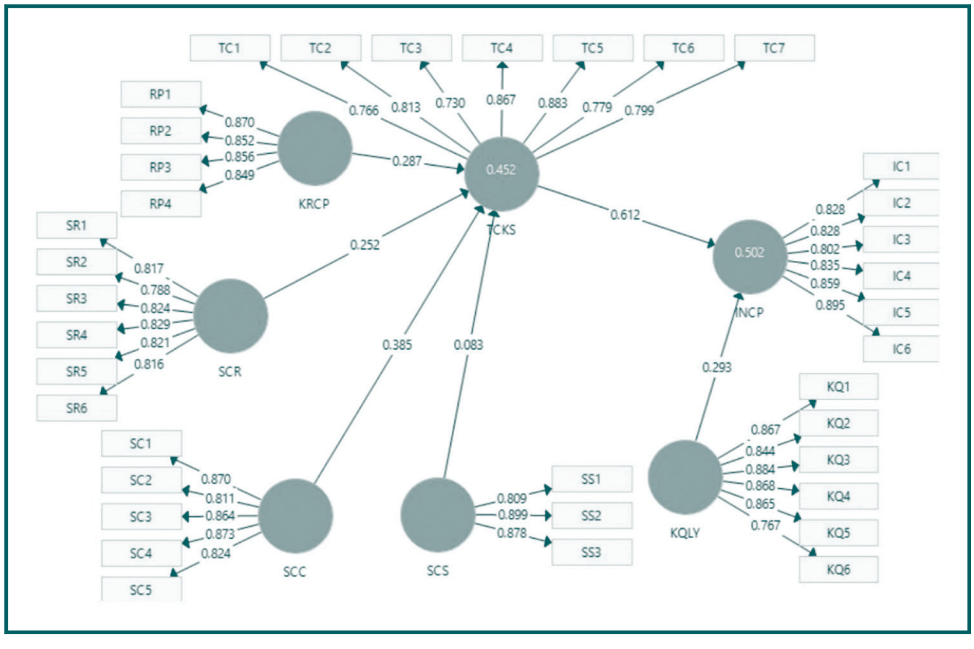
4. Data analysis and findings

4.1 Data analysis strategy

The set of hypotheses developed as a part of the current study was tested using the statistical technique of structural equation modeling *(SEM)*. SEM allows path analysis with latent variables and further, allows statistically testing relationships between multiple dependent and independent variables simultaneously (Chin, 1998). Thus, SEM best suits to test the hypothesized model in this study.

Due to the sample size not being very large, partial least square – SEM (PLS-SEM) analysis was conducted using the SmartPLS 3.0 software. The rationale behind using PLS-SEM was that although not being sample size sensitive, it was still capable of analysing complex models (Haenlein and Kaplan, 2004; Wong, 2013). Although there are two main approaches for SEM – covariance-based (CB-SEM) and the variance-based approach – PLS follows the variance-based approach (Chin, 1998). Furthermore, the variance-based approach, as compared to its covariance based counterpart, has been observed to be more robust with a fewer identification issues, in addition to successfully working with a much smaller as well as

Figure 2 Full model with findings



much larger samples, in the process readily incorporating formative as well as reflective constructs (Hair, *et al.*, 2011). Additionally, the sample size of 87 in this study is more than ten times of the number of structure directions of structural model (there are six structural directions in the structural model in this study) met the requirement of PLS-SEM analysis (Hair *et al.*, 2011).

4.2 Hypothesis testing through structural equation modeling

As a part of testing the hypotheses through structural equation modeling, the authors' assessed the path coefficients, R^2 value and f^2 values through PLS algorithm and the path coefficient significance (t- statistics and corresponding *p*-values) through bootstrapping. The results are exhibited in Table VII, while Figure 2 shows the structural path diagram. This figure contains the path coefficient (β value), outer loadings of indicators of each construct and R^2 values.f^2 value denotes the effect size, which implies the magnitude of association or effect between two or more variables (Ferguson, 2009). As indicated in the open literature, the value of f^2 depicting the effect size values of 0.02, 0.15 and 0.35 suggest small, medium and large effects, respectively (Coleman, 1988, Henseler *et al.*, 2009), while a two tailed *t*-value 1.96 and 2.57 indicates the 95 and 99 per cent significance level, respectively, of the path coefficient (Hair *et al.*, 2011). Therefore, as could be observed from Tables VII and Figure 2, the path coefficient (0.612), f^2 value (0.743) and t-statistics (7.793) with corresponding *p*-values (0.000) indicate that *H1* is supported. This result highlights that the influence of tacit knowledge on innovation capability is highly significant and has a very high magnitude of association with innovation capability.

Furthermore, *H2* of relationship between quality of knowledge shared and Innovation capability is also supported (path coefficient= 0.293; f^2 value = 0.169; t-statistics = 3.364; *p*-value = 0.001). Quality of knowledge shared is positively related to innovation capability of an organization and the association between them is highly significant, though, have a moderate effect.

H3b pertaining to the relationship between cognitive social capital and tacit knowledge (path coefficient = 0.365; f^2 value = 0.210; t-statistics = 3.984; *p*-value = 0.000) are also supported The results, thus, signify that cognitive social capital is positively related to tacit knowledge sharing and association between them is highly significant with a moderate level of magnitude of association.

The results (Table VII) also support the *H3a* suggesting highly significant relationship between social capital relational and tacit knowledge (the path coefficient = 0.252, and *t* –statistics = 3.151 with corresponding *p*-values of 0.002), though effect size found to be small (f^2 value = 0.097). Similarly, the results (table VII) also support the *H4* suggesting a significant positive effect of knowledge reciprocation on tacit knowledge sharing (path coefficient = 0.287, and *t* –statistics =2.991with corresponding *p*-values of 0.003) with moderate effect size (f^2 value of 0.143).

Table VII PLS-SEM results

Independent variable	*Path coefficient (β)*	R^2	f^2	*T-statistics*	p-*value*
Dependent variable: Innovation capability (INCP)					
Tacit knowledge sharing	0.612	0.502	0.743	7.793	0.000
Knowledge quality	0.293		0.169	3.364	0.001
Dependent variable: Tacit knowledge sharing (TKS)					
Knowledge reciprocation	0.287	0.452	0.143	2.991	0.003
SC – Relational*	0.252		0.097	3.151	0.002
SC – Cognitive*	0.365		0.210	3.984	0.000
SC – Structural*	0.083		0.009	0.910	0.364

Note: *SC = Social capital

However, the results do not support *H3c*. The relationship between social capital- structure and tacit knowledge creation has not been found to be significant (path coefficient = 0.083, and t –statistics = 0.910 with corresponding p-values of 0.364) as indicated by t-statistics and corresponding p-value. Thus, the results suggest the following:

- Tacit knowledge sharing and Quality of knowledge shared are positively related to Innovation capability with an R^2 value of 0.502. The R^2 value suggests that more than 50% variance in the innovation capability is associated with tacit knowledge sharing and quality of knowledge shared. This indicates a significant impact of tacit knowledge sharing and quality of knowledge shared together on innovation capability.
- The results further suggest that knowledge reciprocation, as well as the relational and cognitive dimension of social capital, are positively related to tacit knowledge sharing and they together explain more than 45% ((R^2 = 0.452) variance in tacit knowledge sharing. This implies that knowledge reciprocation and two dimensions of social capital (cognitive and relational) together have a significant effect on tacit knowledge sharing
- The relationship between the structural dimension of social capital and tacit knowledge is found not statistically significant. This finding seems to be unusual.

Figure 2 explains the hypothesized model and summarized the above findings. It shows the outer loading of each indicator of each of the constructs and the path coefficients (β-value) along with the R^2 value of the corresponding dependent variable. Outer loading of all the indicators of each construct is above 0.70 confirming a good indicator of the reliability of each construct. It shows that both tacit knowledge (β = 0.612) and quality of knowledge (β = 0.293) are significantly related to innovation capability, while knowledge reciprocation (β = 0.287) as well as cognitive (β = 0.385) and relational (β = 0.252) dimensions of social capital significantly related to tacit knowledge sharing. Further, it shows a weak path coefficient (β = 0.083) between structural social capital and tacit knowledge sharing.

5. Discussing the results

One of the primary contributions of this study is that it offers a detailed picture of the links between tacit knowledge, knowledge quality and innovation capability as well as the role of different facets of social capital and knowledge reciprocity on tacit knowledge transfer in an organizational setting. Prior researches in knowledge management had indicated that organizations with a strong knowledge management capability are more adept in pursuing successful innovation (Soto-Acosta *et al.*, 2018), and the findings of the current study adhere to the same. As shown in Figure 2, *H1* is supported which means that tacit knowledge sharing enhances innovation capability. This finding reiterates the importance of tacit knowledge on innovation capability lending support to the finding of Leonard and Sensiper (1998) and Cavusgil *et al.* (2003). It is also consistent to Saenz *et al.* (2012) who find that exchange of tacit knowledge is key to foster innovation in Spanish and Columbian high tech firms. Other studies (Kucharska and Dabrowski, 2016; Kruse and Geibler, 2012; Popa *et al.*, 2017) also find a positive association between the sharing of tacit knowledge and innovation in a varying setting. Additionally, the results throw light on how tacit knowledge sharing interacts with different facets of social capital and knowledge reciprocity. This furthers the argument of that mere availability of knowledge is insufficient to create knowledge (Basadur and Gelade, 2006; Soto-Acosta and Cegarra-Navarro, 2016) and initiates a serious debate of realizing knowledge sharing within the realm of social and cultural context.

The relation between knowledge quality and innovation capability is less discussed in the literature barring few exceptions such as Lee *et al.* (2006) who verified empirically that organizational climate had a positive effect on knowledge quality. However, the results of the current study (*H2*) extend this finding to posit that knowledge quality has a moderate

effect directly on the innovation capability of a firm. It reveals the latent link between knowledge quality which has been used in the premise of knowledge management performance indicator (Yu *et al*, 2004) and firm innovation capability. This is also consistent with the empirical finding (deZubielqui *et al*, 2018) although in a different setting of supplier and customer knowledge transfer in Australian MNEs. We also recommend Yoo (2014) which has a detailed discussion on different knowledge management processes on innovation. Furthermore, although there has been fair attention to knowledge and innovation quality (Wang and Wang, 2012; Darroch, 2005) the role of knowledge quality on innovation has barely received any attention. Thus, this study makes a meaningful contribution to the literature on knowledge management and innovation.

Knowledge reciprocation has been found to be significantly related to tacit knowledge sharing which is in correspondence with earlier findings of Hau *et al* (2013) and Cabrera and Cabrera (2005), in her study, identified "the perception of exchange" to be a driving factor of knowledge sharing. Therefore, the authors argue that in the case of tacit knowledge – which is hard to be codified, personalized and is rooted in ideas, values and emotions (Nonaka and Takeuchi, 1995) – the realization of perception would be more amplified in the process of knowledge sharing. Since, no contract and specification exist in the tacit knowledge sharing process (Kachra, 2002), reciprocity naturally assumes an important motivation for knowledge sharing, which is evident in the high value of the path coefficient. Not surprisingly, tacit knowledge, which is represented through non articulated knowledge (Rudiger and Vanini, 1998), has a high social capital path coefficient in the context of the current study, which further the augment of the importance of arm's length distance (Spring, 2003) and body language and demonstration of skills (Leonard and Sensiper, 1998) in the context of tacit knowledge sharing. The result supports the finding of Liou *et al*. (2016) and Serenko and Bontis (2016) who claims reciprocal exchanges define the attitude towards knowledge sharing which is the basis of social exchange theory.

The findings of the positive effect of relational and cognitive dimensions of social capital on tacit knowledge sharing reinforce its theoretical foundation. The root of tacit knowledge in organizations, to a great extent, lies in the social interactions, shared ideals and values (Nonaka and Von Krogh, 2009), thereby, positively associated with social and collective identity (Spender, 1996). The tacit knowledge in organizations, in other words, is strongly related to the cognitive and relational dimensions of social capital (Nahapiet and Ghoshal, 1998). Trust is one of the core characteristics of relational dimension of social capital (Coleman, 1988; Nahapiet and Ghoshal, 1998) and mutual trust is one of the critical underlying factors that influence tacit knowledge sharing in organizations (Nonaka and Toyama, 2003). This view is also strongly supported by Collins and Hitt (2006) and Martinez-Conesa *et al* (2017), who assert that relational facet of social capital and interconnectedness between the collaborating partners facilitates tacit knowledge sharing. Shared values, vision and common goals are some of the key components of the cognitive dimension of social capital (Nahapiet and Ghoshal, 1998). While mutual trust between the knowledge sharing partners is an important requirement of effective transfer of tacit knowledge (Nonaka and Takeuchi, 1995; Nonaka andVon krogh, 2009), several scholars argue that lack of shared values, vision and common goal may lead to conflict and trust erosion (Inkpen and Tsang, 2005; Schnake and Cochran, 1985) and act as barriers of transfer of tacit knowledge. Thus, while the relational dimension of social capital plays an important role in the effective transfer of tacit knowledge, the cognitive dimension also plays an equally important role in tacit knowledge transfer (Chow and Chan, 2008; Wasko and Faraj, 2005).

In this context, it would be worthwhile to discuss and draw attention to the fact that the study indicated no significant relationship between the structural component of social capital and tacit knowledge sharing. This is contrary to the finding of Wasko and Faraj, (2005) who find centrality to be a determining factor in electronic knowledge networks. However, there is

evidence of conflicting observations. Hansen (1999) posits that strong ties in social network structure positively influence tacit knowledge transfer, however, Reagans and McEvily (2003) reported weak evidence of such a positive relationship. Further, this study focuses on the closure network structure. Granovetter (1983) emphasizes the "strength of weak ties" in creation and transfer of valuable knowledge and in the similar vein Nooteboom (1999a) underpins the importance of optimal cognitive distance in knowledge exchange as a means of developing innovation capability. Thus, the finding of an insignificant relation of closure network structure in tacit knowledge transfer may not be fully out of place from the theoretical perspective. Adler and Kwon (2002) also explain social structure to be rooted in the market, hierarchical and social relations. Since both hierarchical and social relations would depend on the firm structure and the cultural nuances, the enabling or coercive actions of hierarchy could be an objective factor, leading to a micro-level analysis, which is considered to be beyond the scope of the paper.

5.1 Managerial implication

Knowledge management has in its right carved its own space in the industry and there are numerous knowledge management programmes and initiatives which are championed by different firms. This research highlights that managers of highly innovative companies have to be wary of knowledge sharing as an important tool to achieve innovative results. Although tacit knowledge appears to be "out of reach" to managers, they must be aware of its implications and know that tacit knowledge sharing is strongly related to the innovation capabilities of a firm. Tacit knowledge sharing could be encouraged by improving cognition and understanding relational factors in the firm and the team. Al-Ali (2003) provides a powerful model of comprehensive intellectual capital management wherein he emphasizes the critically of social interactions (he calls is social tools) in developing any knowledge management programme. He argues that the management of intellectual capital comprising human capital, customer capital and structural capital is the fountainhead of innovation. It begins with the knowledge resources that reside in the human brain. Whatever the best process, design and practices of information management system any organization may have, it would be insufficient to create valuable knowledge resources, which is most tacit in nature. It entails the social processes of knowledge exchange involving knowledge network structure, cognitive and relational social capital (Nooteboom, 1999a). In the similar vein Abram *et al.* (2003) emphasize that use of advanced technology while supports creation of effective knowledge management system in an organization, it cannot replace the process of social interactions amongst its employees as the primary means of knowledge creation and transfer. They argue that interpersonal trust, in particular, embedded in the social network of employees is essential for knowledge transfer. Thus, the study has significant managerial implications towards the development of organizational intellectual capital. Further, as knowledge quality has a significant effect on innovation capabilities, managers could think of deploying better knowledge management platforms or knowledge quality management programs to ensure the availability of high-quality knowledge. As the rate of innovation has hastened, tacit knowledge sharing is an important weapon for a firm to outpace other competitors.

5.2 Academic implications

Given the growing importance of knowledge-based thinking in the academic front, these results will have several implications. First, the findings on the constructs of social capital, tacit knowledge sharing, and innovation capability are fairly novel. Second, this research also responds to one of the "underexplored factors" highlighted (Del Giudice *et al*, 2018) at an individual level related to innovation. This paper adds to the existing research by underlining the critical role of tacit knowledge in innovation capability and ties the idea of social capital to it. Our study considerably expands the design adopted by Hu and Randel

(2014) and investigates the mediating role of knowledge sharing in the relationship between social capital and innovation. We have also tried to move beyond the case based investigation popularly undertaken in knowledge sharing studies and used four different industries as our sample, which considerably widens the unit of analysis and also the generalizability of our result. Furthermore, this study complements how knowledge sharing occurs in communities of practice (Del Giudice *et al.*, 2015; Li *et al*, 2018). In addition, we investigate the constructs of knowledge quality and reciprocation, which are largely overlooked in the existing discussion. We hope this study encourages further examination of these constructs in the field of knowledge management.

6. Limitations of the current research

Like most other research studies, the current study was not devoid of limitations. The first and foremost limitation of this study is the limited number of respondents that were surveyed to arrive at the conclusion. The number of professionals surveyed as a part of this study was limited in number and therefore needs to be validated with a larger number of samples to increase its generalizability. Two other limitations that can be attributed to this study involve the geographical location and the nature of industries. The present study was conducted across a set of organizations in India and is therefore restricted to a particular geographical location. Since the respondents in this study were from a particular geographical location, their responses might have been influenced by the cultural, organizational and professional environment of that location as compared to other parts of the globe, which might prove to be a limitation of the current study. Furthermore, not considering the stickiness of tacit knowledge can also be considered as a limitation of the current study. Although stickiness of tacit knowledge (Szulanski, 1996; vonHippel, 1994) is observed as an important factor that might affect its effective transfer, the authors' did not consider it for their current study, but rather kept it under consideration for future research activities. This was done to avoid sacrificing adequate depth of the study for too much (or over-reaching) width.

7. Conclusions and directions for future research

The current day business scenario marked by intense competition and uncertainty has compelled organizations to continuously strive for fostering an innovative environment. One of the key avenues that an organization can follow to achieve innovativeness is effective knowledge management and sharing. According to Riege (2005), commercial success and competitive advantages of organizations seem to have its roots in the application of knowledge sharing practices that optimize its business objectives. The current study focused on the role of tacit knowledge sharing, knowledge reciprocity, social capital and knowledge quality on innovation capability of an organization. The importance of tacit knowledge in the knowledge resources of an organization can be considered significant and has been pointed out in relation to decision-making, time-management, quality and competitiveness (Haldin-Herrgard, 2000), all of which can be considered as important ingredients in the recipe for successful innovation. Furthermore, the paper also discussed the role that social capital might play in tacit knowledge sharing and determined that structural and cognitive social capital had a significant role to play in the successful sharing of tacit knowledge. This study also revealed that knowledge reciprocity and quality also plays an important role in fostering the innovation capability of an organization. Finally, the findings of the current investigation can be used to create strategies to develop and sustain knowledge sharing among employees within and across an organization, which will lead to an increase in efficiency, creativity and innovations through more streamlined decision-making (TitiAmayah, 2013).

Future research activities might be directed towards validating the findings through surveying larger data samples spanning across a larger portfolio of industries as well as a wider geographical region, thereby increasing its generalizability. Additionally, future

research could also focus on developing strategic guidelines based on the findings of the current research to aid organizations to determine avenues to nurture tacit knowledge sharing, which will result in improving innovation capability of an organization, in turn enhancing business performances and leading to a significant competitive advantage in the market. Finally, incorporating the stickiness of tacit knowledge transfer into the model would be another interesting avenue for future research activity.

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