

## Knowledge transfer and innovation through university-industry partnership: an integrated theoretical view

Asha Thomas & Justin Paul

To cite this article: Asha Thomas & Justin Paul (2019): Knowledge transfer and innovation through university-industry partnership: an integrated theoretical view, Knowledge Management Research & Practice, DOI: [10.1080/14778238.2018.1552485](https://doi.org/10.1080/14778238.2018.1552485)

To link to this article: <https://doi.org/10.1080/14778238.2018.1552485>



Published online: 08 Jan 2019.



Submit your article to this journal [↗](#)



View Crossmark data [↗](#)



# Knowledge transfer and innovation through university-industry partnership: an integrated theoretical view

Asha Thomas<sup>a</sup> and Justin Paul<sup>b,c</sup>

<sup>a</sup>Jagan Institute of Management Studies, New Delhi, India; <sup>b</sup>Rollins College, Winter Park, USA; <sup>c</sup>University of Puerto Rico, San Juan, USA

## ABSTRACT

Knowledge has vital role in the development of an economy. Universities have switched to interacting with industries like never before to achieve excellence. On the other hand, industries look forward to working and partnering with academics to a greater extent and firms are pushed to innovate by the ever-increasing competitive market forces. Fostering university/industry (U/I) relationships can pave the way for the participating firms and their subsidiaries for building social capital and portrays trust, shared goals, and network ties as the pivotal elements of the social capital theory. In this paper, we develop a theoretical model based on the integrated view that communication is the medium for building trust and strong social ties. This, in turn, can enhance the quality and effectiveness of the knowledge transferred and its utilization for inducing innovation, adapting to sophisticated technology, which in turn foster growth opportunities.

## ARTICLE HISTORY

Received 14 October 2018  
Revised 8 November 2018  
Accepted 16 November 2018

## KEYWORDS

Knowledge transfer; Social Capital Theory (SCT); University-Industry (U/I)

## 1. Introduction

Competition has intensified with the globalization gathering momentum (Paul, 2015). Organizations are aligning themselves with the idea of knowledge management (KM) since the advent of a knowledge-centric economy, even though it continues to be a challenging realm for them and modern techniques have to be constantly adopted in order to keep up and cope with the business challenges. Amalgamation of knowledge has proved to be effective by and large when it is integrated from diverse sources of knowledge like partnerships of a company with government organizations, universities, and other industry players. The collective knowledge acquired from these sources is certainly more valuable than the information generated solely by an organization (Carayannis, Alexander, & Ioannidis, 2000).

Knowledge transfer (KT) between university and industry creates an intangible web of support and ultimately drives an economy towards innovation, growth, and prosperity (Ferreira, Raposo, Rutten, & Varga, 2013; Ankrah & Al-Tabbaa, 2015). Companies need growth strategies focusing on competitiveness in order to survive in this era of globalization (Paul & Benito, 2018; Paul & Sanchez-Morcilio, 2018). KM has molded as an area of specialization in many companies as it helps businesses and their subsidiaries to achieve competitiveness and utilize them in framing invaluable decisions that assist organizations in strategizing and revitalizing during tough times for the attainment of excellence (Grant, 1996; Inkpen & Tsang, 2005; Nicolas, 2004).

The competitive edge that organizations could achieve depends on successful KM and organizational learning. University/Industry (U/I) partnerships continue to propagate and flourish because they are highly useful in helping firms to tap differentiated knowledge and learning, and automation (Santoro & Saparito, 2006). Prior researchers have carried out intense investigation into U/I relationships and as such, there is extensive literature available on these relationships (Ahrweiler et al., 2011; Bruneel, d'Este, & Salter, 2010; Bstieler, Hemmert, & Barczak, 2015; Carayannis et al., 2000; D'Este & Patel, 2007; Eom & Lee, 2010; Eun, Lee, & Wu, 2006; George, Zahra, & Wood, 2002; Leydesdoff & Meyer, 2007; Lööf & Broström, 2008; Rossi & Rosli, 2015; Santoro & Chakrabarti, 2002).

The present paper aims to understand the factors influencing the transfer of knowledge in a university/industry (U/I) partnership and at the same time, also establish how social capital (SC) can facilitate knowledge transfer (KT) (Carayannis et al., 2000) in the actual context of a U/I partnership. Additionally, the paper also seeks to examine how communication can serve as an instrument for mediation between KT and SC. Additionally, the tenets of the Social Capital Theory (SCT) have been intensively investigated in this paper. While several researchers have applied the factors of SCT to explicate the intricacies of knowledge sharing in an organization, the present study highlights the application of some SCT factors in order to explain the potential role and scope of KT in U/I partnerships. This is a significant research gap that has been identified in the literature review

undertaken in this paper. Consequently, several crucial mediators (communication) and predictors were identified and drawn from SCT, which were then used to construct a comprehensive model.

The remainder of this paper is structured as follows: Knowledge management (KM) and KT have been explained in Section 2. Section 3 outlines the research approach followed in the study along with a critical analysis of the review of literature concerning KT in U/I partnerships. An explanation on SCT is offered in Section 5 and the empirical studies on the predictors and outcomes of KT are briefly elucidated in Section 6. Finally, a KT model for U/I transfer is proposed, followed by the concluding remarks in the last section of the paper.

## 2. Knowledge management and knowledge transfer

Knowledge has acquired a vital position in the present era. Defined as a “set of justified beliefs, which can be managed to enhance the organization’s capability for effective action”, it has been perceived to empower individuals and organizations, resulting in the rise of a knowledge economy (Khan & Vorley, 2017; Nonaka, 1994). KT, or in a broader sense KM, has been traditionally considered as “an internal phenomenon, which implies management of knowledge assets through building and reinforcing competencies within the organization to ensure a positive contribution to the firm” (Hermans & Castiaux, 2007).

Knowledge transfer can occur in either explicit or implicit ways (Argote & Ingram, 2000). For instance, when a group converses with another group regarding a strategy, it has discovered for performance improvement, KT would take place explicitly. Explicit knowledge is formal and organized and can be readily codified, documented, and transmitted. In the implicit sense, KT occurs when the receiver is unable to distinctly comprehend the knowledge it has acquired unknowingly. It is the knowledge that resides in the minds of people because of the relative difficulty in formalizing, codifying, and communicating its personal traits (Borges, 2012). The major advantage and distinguishing characteristic of explicit knowledge is that the presence of people is not essential for it to be transferred. Explicit knowledge circulating between the university and industry comprises patents, journals, books, scientific articles, etc. However, implicit knowledge is embedded in people and barely has any possibility of being transferred in their absence. It is featured as the knowledge that cannot (yet) be conveyed in written or diagrammatic form but is acquired by people in the course of performing their job or doing research (Clarysse, Wright, Lockett, Mustar, &

Knockaert, 2007; De Wit-de Vries, Dolfisma, van der Windt, & Gerkema, 2018)

Knowledge transfer is “the process through which one unit (department, group, or division) is affected by the experience of another” (Albino, Garavelli, & Schiuma, 2001). It is common sense that the transfer of knowledge originates from the holder(s) (individual, group, team or organization) to be passed on to the recipient(s) (individual, group, team or organization) (Albino et al., 2001). The process of KT has been defined by Friedman and Silberman (2003) as “the process whereby invention or intellectual property from academic research is licensed or conveyed through use rights to a for-profit entity and eventually commercialized.” Transfer of knowledge eventuates when experience in one subset of an organization directly or indirectly affects the other.

Prior reviews (Cruz, Perez, & Cantero, 2009; Hsu & Wang, 2008) show that knowledge sharing (KS) and KT were synonymously used by many researchers. Though the recent trends in the field of KM have diverted their focus more towards KS, research on KT continue to capture the attention of several experts. Tangaraja, MohdRasdi, Abu Samah, and Ismail (2016) summarized that KT and KS are two varied concepts even though they are interlinked in some ways and KS is a component of KT. Thus, for the present study, relevant literature of both KS and KT has been reviewed.

## 3. Research approach

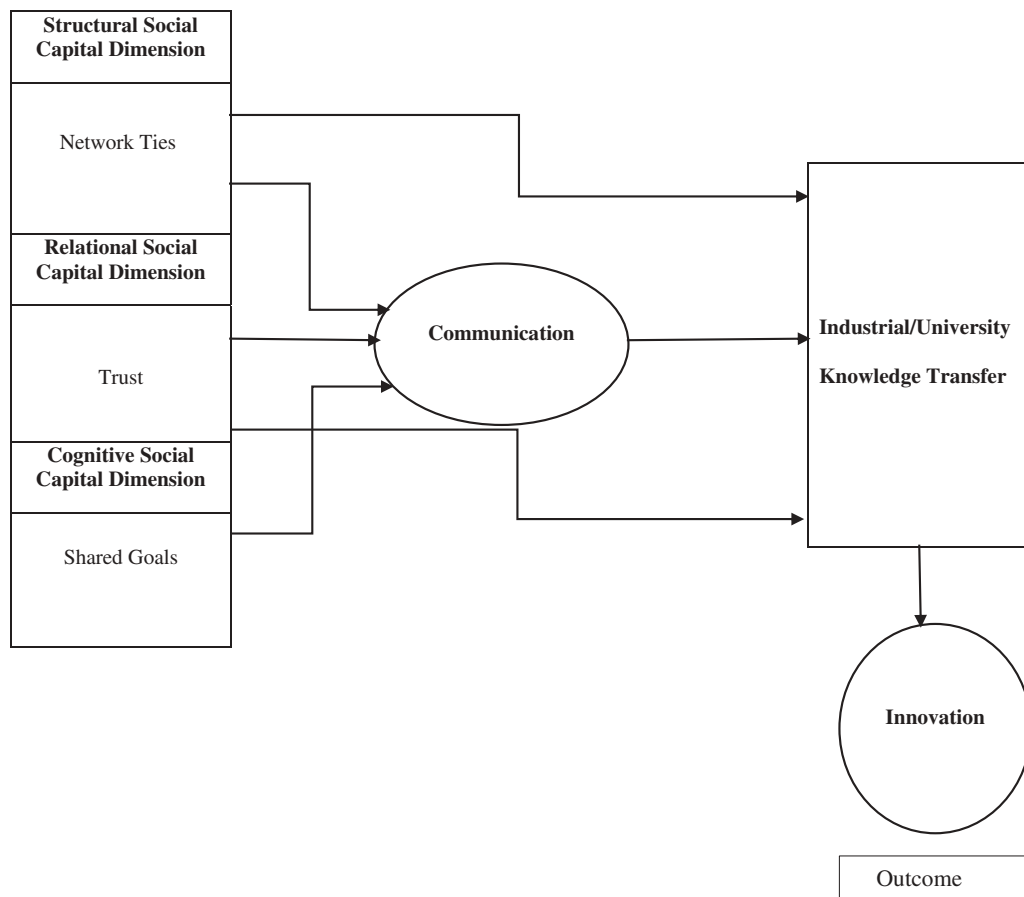
The present paper is based on a vast number of prior studies which are arranged in the manner described briefly in this section. First and foremost, the authors carried out an extensive search on KT in U/I linkages and undertook a critical analysis of what constitutes KT and the outcomes associated with it. Secondly, the gaps in KT in U/I linkages were identified to come up with the solutions that could bridge those conceptual gaps. Next, an attempt has been made to theorize KT between university and industry to derive the important predictors around which KT revolves. Additionally, empirical studies that could be associated with and explain the predictors of KT between university and industry were discussed and laid out. Finally, the key contribution of this study is conveyed through a new KT model with the help of a figure (See Figure 2). This study and the model are based on a detailed analysis of prior literature on KT, spanning diverse countries and industries. The front-end keywords used to make the search were “knowledge transfer,” “university,” “academia,” “business,” “industry,” “firm,” “social capital,” “partnership,” “linkages,” “alliances,” “communication,” “trust,” and “innovation.” A word cloud was created for assembling the major keywords sourced from various publications to present in a pictorial form the topics that were predominantly used in this study, with the length of the

## 4. Literature review

development between the universities and the industries can indeed be a source of widespread innovation (George et al., 2002; Santoro & Chakrabarti, 2002; Carayannis et al., 2000; Motohashi, 2005; Eun et al., 2006; Leydesdoff & Meyer, 2007; D’Este & Patel, 2007; Lööf & Broström, 2008; Segarra-Blasco & Arauzo-Carod, 2008; Arvanitis et al., 2008b; Bruneel



**Figure 1.** Word cloud of keywords used for literature review.



**Figure 2.** A conceptual model for university-industry partnerships.

et al., 2010; Eom & Lee, 2010; Ahrweiler et al., 2011; Bstieler et al., 2015; Rossi & Rosli, 2015).

For the sole aim of accelerating motive-driven agenda like innovation, national growth, and competitiveness, transfer of knowledge from university to the industry are supported and backed by governments (Etzkowitz, 2002; Leydesdorff & Meyer, 2007). Universities have switched to interacting with the industries like never before in several nations including Korea, China, Spain, the UK, Switzerland, the US, Japan, Germany, France, India, Brazil, the Netherlands, and Singapore as they rely significantly on funding from business ventures and conglomerates for financing their research activities and long-term associated programs because of a structural decline or shortage in public funds (Eom & Lee, 2010; Park & Leydesdorff, 2010; Hemmert, Bstieler, & Okamuro, 2014; Eun et al., 2006; Segarra-Blasco & Arauzo-Carod, 2008; Ankrah, Burgess, Grimshaw, & Shaw, 2013; Rossi & Rosli, 2015; D'Este & Fontana, 2007; Kalar & Antoncic, 2015; Arvanitis et al., 2008a; Carayannis et al., 2000; Hemmert et al., 2014; Motohashi, 2005; Dayasindhu, 2002; Azevedo Ferreira & Rezende Ramos, 2015; Brennenraedts, Bekkers, & Verspagen, 2006; Lee & Win, 2004). Putting educational and research-based activities aside, the next important mission of universities is primarily concerned with contributing to the economic development of the nation, a focus that has also received much attention and priority in the past. On that account, industries look forward to working and partnering at a higher level with academics and firms are pushed to innovate by the ever-increasing competitive market forces.

In general, firms are aware that the universities exercise an invaluable role and tend to help them to reap the benefit of the full social returns from investment in research and development (D'Este & Patel, 2007; Fernández-López, Calvo, & Rodeiro-Pazos, 2018; Martin & Scott, 2000; Siegel & Zervos, 2002). From the industry perspective, with increased interaction with the universities, consequentially there is a drop-in disparities and concentration of information that relies on highly complicated, tacit, and fresh knowledge that has the potential for use (Hermans & Castiaux, 2007). The U/I linkages are mainly driven by each group's self-centric goal of fulfilling its own agenda (Ankrah et al., 2013). The reason why universities attempt to partner with the industry cannot be completely narrowed down to the commonly conveyed notion of contributing to economic growth through the generation of ideas for diversification and expansion of product lines and processes alone, but also includes pooling resources to perform their core research that ensures their sustainability and excellence (Ankrah et al., 2013; Bercovitz & Feldman, 2006; George et al., 2002). The industry, on the other hand, as often contemplated, not only wishes to bring diversification by launching brand new products and services which take shape from basic academic research, but also seeks to

establish partnerships with universities to receive and hire inputs for idea generation, new product design, operation, etc., to promptly carry pending projects towards completion. This is because academic scholars are able to solve specific problems alongside transferring and implementing relevant knowledge of both technical and scientific nature (Schartinger, Rammer, & Fröhlich, 2006; Motohashi, 2005; Arvanitis et al., 2008a).

Researchers have committed to an insightful investigation into U/I relationships as depicted in Table 1. The quantifiable approaches benefitting patents and periodic publications as the mainly used spillover indicator and other knowledge-based interactions like informal relationships and R&D projects taken up jointly have highly influenced this research field (Agrawal, 2001; Fontana et al. 2006; Azagra-Caro, Barberá-Tomás, Edwards-Schachter, & Tur, 2017; Hermans & Castiaux, 2007; Schaeffer, Öcalan-Özel, & Pénin, 2018). With the diversity in knowledge and the roots it has spread out to interact with differential economic processes in view, it is not astonishing that knowledge can be sourced and transferred through a wide spectrum of potential channels (D'Este & Patel, 2007; Eun et al., 2006; Wang, Li, Li, & Li, 2015).

## 5. Social capital theory (SCT)

Needless to say, the intercommunication between the knowledge provider and knowledge holder is the key factor, crucial for the occurrence of KT. Social capital has been defined as "the sum total of the assets or resources nested in networks of social relationships shared between individuals, communities, or societies". It can be contemplated as a priceless asset that reforms through interpersonal relationships among individuals and secures advantages for social actors extending from individuals to organizations (Yang & Farn, 2009).

Fostering U/I relationships can pave the way for the participating firms and their subsidiaries for building social capital (Al-Tabbaa & Ankrah, 2016; Carayannis et al., 2000; Wasko & Faraj, 2005) that in turn, will help the economic development. According to the theory of social capital, social actors, with the passage of time, simultaneously gain access to different kinds of resources that, in effect, add up to their immersion in different kinds of external relationships (Gabbay & Leenders, 2001). When we talk about the social capital approach in the U/I relationship, it has a clear bearing on resources that are latent within the frameworks of social exchange as against the different scales of well-being of the enterprise like the degree of success in innovations and other outcomes like profitability, performance, net increase in sales, and so on (Chakrabarti & Santoro, 2004; Huggins, Johnston, & Thompson, 2012). The fruition of U/I collaboration is more or less directly linked to the attainment of knowledge dissemination and creation between the members of



**Table 1.** presents a schematic representation of the review of the available literature on KT.

S. No	Author(s) Name	Journal Name	Year	Title of the Paper	Conclusions	Citation Counts
1	D'Este & Patel	Research policy	2007	"University-industry linkages in the UK: What are the factors underlying the variety of interactions with industry?"	The result asserts that university researchers use an extensive network of channels to connect and interact with the industry and engage in mainstream channels such as consultancy, contract or joint research and training but less frequently in patenting and spin-out activities. The core underlying fact being the strong impact of individual characteristics of a researcher on industry links than the characteristics of the university taken as a whole.	1247
2	Bruneel et al.	Research policy	2010	"Investigating the factors that diminish the barriers to university-industry collaboration."	Trust between partners reduces both transaction-related barriers and orientation-related barriers. that prior experience of collaborative research lower orientation -related barriers.	826
4	Fontana et al.	Research policy	2006	"Factors affecting university-industry R&D projects: The importance of searching, screening and signalling."	Proximate closure of research and development (R&D) project with an academic partner is dependent on the "absolute size" of the industrial partner.	675
5	George et al.	<i>Journal of Business Venturing</i>	2002	"The effects of business-university alliances on innovative output and financial performance: a study of publicly traded biotechnology companies."	U/I linkages do not necessarily produce positive results for an innovation. Rather, decisions can be affected based on the effect of U/I alliances on innovation output and financial performance.	639
6	Santoro &Chakrabarti	Research policy	2002	"Firm size and technology centrality in industry-universityinteractions"	Large firms have a higher intensity knowledge transfer and research support relationship in contrast to small firms that have higher intensity technology transfer and cooperative research relationships. Large firms have the ability to diversify into non-core areas whereas small firms have a very different focus, mainly on survival that provides immediate solutions to critical issues and to gain access to university facilities for advancing core technologies in their U/I relationship.	633
7	Leydesdorff & Meyer	Research policy	2006	"Triple Helix indicators of knowledge-based innovation systems"	Contributed to the Triple Helix issue point in the direction of "rich ecologies"; the construction of a careful balance between differentiation and integration among the three functions.	440
8	Segarra-Blasco & Arauzo-Cardo	Research policy	2008	"Sources of innovation and industry-university interaction: Evidence from Spanish firms"	Consolidated framework to inspect a firm's motivation for lending support in R&D projects and followed by transaction cost theory which claims that there will be a rise in the inclination to cooperate when the costs and risks identified with R&D are feasible and the technological sophistication in the sector is imminent. The size of an organization and its activities associated with innovation are related to the disposition of the firm to secure R&D agreements on its account.	291
9	Eun et al.	Research policy	2006	"Explaining the "University-run enterprises in China: A theoretical framework for university-industry relationship in developing countries and its application to China"	The theoretical framework for U/I relationship in developing countries and its application in China to explain in what condition universities would keep a distance from the industry or become entrepreneurial to take in the industrial functions.	288
10	Arvanitis et al.	Research policy	2008	"University-industry knowledge and technology transfer in Switzerland: what university scientists think about co-operation with private enterprises"	Research and educational activities improve the innovation performance of firms in terms of sales of considerably modified products, research activities, and also in terms of sales of new products.	279
11	Eom& Lee	Research policy	2010	"Determinants of industry-academy linkages and, their impact on firm performance: The case of Korea as a latecomer in knowledge industrialization"	In U/I linkages cost-sharing motives were found to be more important and that firms tend to innovate either to increase market share and/or improve product quality (Demand-pull) or to reduce the cost of material and/ or labor inputs (Cost- push).	254
12	Ahrweiler et al.	Journal of Product Innovation Management, Technology	2011	"A new model for university-industry links in knowledge-based economies"	A model that confirms the role of U/I links in improvising the conditions for diffusing modernization and upgrading collaborative tie-ups in innovation networks.	145
13	Ankrah et al.	Technovation	2013	"Asking both university and industry actors about their engagement in knowledge transfer: what single-group studies of motives omit"	The highest level of beneficial outcomes in U/I actors regarding their involvement in knowledge transfer was institutional, preceded by economic and social factors.	130

(Continued)

**Table 1.** (Continued).

S. No	Author(s) Name	Journal Name	Year	Title of the Paper	Conclusions	Citation Counts
14	Carayannis et al.	Technovation	2000	"Leveraging knowledge, learning, and innovation in forming strategic government–university–industry (GUI) R&D partnerships in the US, Germany, and France"	Partnerships can be considered as a vehicle that gears up organizational learning and coordination of knowledge sharing beyond organizational boundaries, which eases the formation of trust among partners and builds social capital for enhancing cooperation.	126
15	Hemmert et al.	Technovation	2014	"Bridging the cultural divide: Trust formation in university–industry research collaborations in the US, Japan, and South Korea"	Champion behavior is the crucial factor for maintaining and reinforcing trust between firms and universities in collaboration and initial trust formation criteria includes strength of the tie, reputation of the partner and safeguards put forth by contractual terms.	79
16	Azagra-Caro et al.	Research policy	2017	"Dynamic interactions between university–industry knowledge transfer channels: A case study of the most highly cited academic patent"	The succession of formal and informal channels of U/I knowledge transfer and that local economic impact can be achieved only after a complex, temporally unfolding sequence of interaction between formal and informal channels of KI.	19
17.	Schaeffer et al.	The Journal of Technology Transfer	2018	"The complementarities between formal and informal channels of university–industry knowledge transfer: a longitudinal approach"	Strong dynamic interactions between UKT channels contribute to creating a cumulative effect with regard to the commercialization of knowledge. Activities related to the commercialization of knowledge have a collective dimension and are not performed by isolated individuals but by teams led by notable researchers and the best academic entrepreneurs mobilize the different UKT channels in an entrepreneurial way with a clear long-run strategy in mind.	1

**Table 2.** Social capital factors in previous studies.

Literature Study	Year	Structural Social Capital Dimension	Rational Social Capital Dimension	Cognitive Social Capital Dimension	Nature of Research
Akhavan et al.	2015	Social interaction ties	Trust	Shared goals	Knowledge sharing
Al-Tabbaa & Ankrh	2016	Network ties	Relational Trust	Shared codes and narratives, common understanding	Knowledge transfer
Cabrera & Cabrera	2005		Trust, Group Identification	Shared language	Knowledge sharing
Carayannis et al.	2000	Social ties	Trust		Knowledge sharing
Chang & Chuang	2011	Social interaction	Trust, Reciprocity, Identification	Shared language	Knowledge sharing
Santoro & Chakrabarti	2004	Networking	Trust	Problem solving	U-I interaction
Chiu et al.	2006	Social interaction ties	Trust, Norm of Reciprocity, Identification	Shared language, shared vision	Knowledge sharing
Chow & Chan	2008	Social network	Social Trust	Shared goals	Knowledge sharing
Chung et al.	2015	Social network ties	Trust	Shared goals	Knowledge contribution
Hau et al.	2013	Social ties	Social Trust	Shared goals	Knowledge sharing
Inkpen & Tsang	2005	Network configuration, network ties, network stability	Trust	Shared goals, shared culture	Knowledge transfer
Kim	2018	Associability	Trust		Knowledge sharing
Qi & Chau	2018	Social network			Knowledge sharing
De Wit-de Vries et al.	2018		Trust		Knowledge transfer
Wasko & Faraj	2005	Centrality	Commitment, Reciprocity	Self-rated expertise, tenure in the field	Knowledge contribution
SCT Factors considered in our research.		Network ties	Trust	Shared goals	Knowledge transfer

universities and industries. New knowledge generates when knowledge is disseminated through interaction between university and industry (Bekker & Freitas, 2008).

Hitherto, research papers with a past history of KS and KT as the main theme have traditionally adopted the social capital perspective which is grounded in the relationships of people and not confined to the actors alone. In its crude sense, social capital functions just like the commonly perceived form of capital in the context that it is a tool that can be used for generating futuristic benefits and can be utilized for purposes of productivity (Coleman, 1990; Nahapiet & Ghoshal, 2000). But on the other side, it can both facilitate and restrain action. Social capital can neither be traded nor can it be individually or privately owned but it is eligible to be shared profusely, which is dependent on the nature of the interaction between people. This is the difference that sets apart social capital from tangible and intellectual capital (Thune, 2007). The opinion that social capital theory (SCT) can directly influence KT is also backed by the three dimensions of social capital which are the structural, relational, and cognitive aspects (Tsai & Ghoshal, 1998).

The overall pattern of relationships found among social actors describing the impersonal configuration of the correlation between people or units and the extent of connection established from one person to another can be termed as “structural” social capital. The “relational” dimension is inclusive of the assets formed and leveraged through evolving relationships and deals with the behavior of connections between

individuals that influence the attitude of social actors in an organization. This dimension further points out trust, norms, obligations, expectations, and identifications as its key facets. “Cognitive” social capital emerges as the third dimension which is primarily concerned with the range within which people in a social network express a common perception or opinion among social actors by way of shared language, narratives, and paradigm.

This study proposes trust, shared goals, and network ties as the pivotal elements complementary to social capital theory as explained in Table 2.

## 6. Predictors and outcome of knowledge transfer in a university-industry partnership

This section presents the important predictors of knowledge transfer in a university-industry partnership with reference to network ties, trust, shared goals, communication, innovation and knowledge transfer, based on literature review and derives testable propositions.

### 6.1. Network ties

Networks provide the basis through which firms can access information, resources, exchange platforms, and sophisticated technologies. The array of relationships between the members in a network gives rise to the structural dimension of social capital that may be looked at closely from the perspective of network ties dealing with the specific ways the members are



associated (Cross & Cummings, 2004; Inkpen & Tsang, 2005). To this end, Tsai and Ghoshal (1998) show that network ties influence both access to parties for combining and exchanging knowledge and anticipation of value through such exchange.

Research shedding light on the knowledge-based standpoint of a firm have proved that social networks undeniably bring about the creation of new knowledge in a joint social framework in which every unit has some variable in common linking it to other units. Networking, irrespective of its nature and origin, has very high levels of relational strength and is indicative of coordinating KT in the personal or professional context (Cormican & O' Sullivan, 2003).

A network also fosters an encouraging environment to share knowledge and spread channels of information that substantially reduce the time and effort needed to retrieve that information through other means (Tortoriello, Reagans, & McEvily, 2012). Therefore, its primary demand is an ongoing social interaction among members of an organization for the generation, transmission, and multiplication of knowledge (Nonaka, 1994). Psychologically, when good rapport is cultivated, partners tend to feel more secure regarding their affiliate's intention. This leads to the creation of a positive atmosphere which is a basic necessity for the smooth and effortless flow of KS sentiment among them.

Network ties act as a medium through which social interactions between social members are facilitated and are perhaps one of the fastest and most effective ways for the exchange of information and for channelizing it (Al-Tabbaa & Ankrah, 2016; Inkpen & Tsang, 2005; Lin, 2017; Tangaraja, MohdRasdi, Ismail, & Abu Samah, 2015). Dyer & Nebeoka's (2000) research on Toyota has documented the importance of configuring a profoundly strong and interconnected network of ties – a network wherein the members are able to identify the “core firm” undertakings along with clear-cut rules operating for the participation in KS events and activities framed by the network to establish co-operation (KTs) among members in the same or in a related network. And for the very same cause, the need of the hour is strong links between the partners for the stimulation of KT between alliances (Inkpen & Tsang, 2005). Hansen (1999) emphasizes that the formation of both weak and strong inter-dependent ties have their respective pros and cons in easing the search and transfer of potential knowledge across organizational strata and sub-units (Levin & Cross, 2004).

One fact that remains unchanged despite the passage of time and variation in fields is that strong connections are undoubtedly more constructive for the exchange of information and knowledge than weak connections and this has been proved effective (Fritsch & Kauffeld-Monz, 2010). The intensity, frequency, and vastness of the information exchanged

are directly proportional to the duration of interactions undergone by the exchange participants (Akhavan, Hosseini, Abbasi, & Manteghi, 2015; Chung et al., 2015; Qi & Chau, 2018). Hence, proposition 1 (P1):

P1: Strong networks will positively influence KT between U/I partnership

## 6.2. Trust

The word “trust” is clearly the foundation for any relationship, be it personal, social, work, or business (Rosado-Serrano, Paul, & Dikova, 2018). Transmission of information is a process that attaches overarching importance to the trust factor. Past research shows that trust is an underlying asset that stimulates the transfer of knowledge between organizations in a partnership, in addition to being a primary element in inter-organizational relationships developed in parallel (Bstieler et al., 2015; Carayannis et al., 2000; Rosado-Serrano & Paul, 2018; Santoro & Saparito, 2006). It is comparable and can be closely associated with the goodwill of a firm, which is built up only gradually but takes not even a fraction of time to be nullified. Trust acts as a lubricating agent in transactions of economic and financial nature, brings about greater cooperation thereby reducing interfirm transaction costs, and provides stability to social phases and processes (Santoro & Saparito, 2003; Mayer, Davis, & Schoorman, 1995; Akhavan et al., 2015). Also, trust is of the utmost importance especially in smoothening out the links between university and industry (Santoro & Saparito, 2003). For instance, some American universities such as Massachusetts Institute of Technology have developed trusted industry linkages for selling the technology they develop in their labs to the companies.

Knowledge and significant resources are likely to be transferred in relationships when trust is maintained without violation (Rosado-Serrano et al., 2018). Firms may be more probable to invest in resources for learning when the trust quotient is high because of the willingness of their partners to abstain from enacting specific control measures over knowledge spillovers (Inkpen & Tsang, 2005). Bruneel et al. (2010) shows that barriers in collaboration are considerably brought down as trust is developed between partners.

The magnitude of trust between corporate firms and universities demonstrates their objective to work hand-in-hand to solve problems and exhibits the willingness to comprehend and accommodate behaviors to keep up with the expectations of the members (Bruneel et al., 2010; Santoro & Gopalakrishnan, 2000). Increased trust between partners encourages

them to develop informative conversations, which in turn promotes the exchange of rich and valuable knowledge (Ring & Van de Ven, 1992; Cabrera & Cabrera, 2005; Chiu et al., 2006; Chang & Chuang, 2011; Hau et al., 2013; Chumg et al., 2015; Kim, 2018) and innovation performance (Bstieler et al., 2015). Thus, proposition 2 (P2):

P2: Trust will positively and significantly influence KT in a U/I partnership

### 6.3. Shared goals

The extent to which common understanding and methodologies are shared between the network participants for the task accomplishment and the realization of objectives is termed as “shared goals” (Inkpen & Tsang, 2005). This paves the way for better prospects for sharing of resources. When partners visualize the potential benefits that shared goals can reap, sharing of resources becomes much easier and hassle-free (Tsai & Ghoshal, 1998).

Shared goals act as a force that binds people together and allows for the easy sharing of insights and information, thus triggering concord and exchange of ideas (Chow & Chan, 2008). It is, as a matter of fact, a creative and bilateral process of combining the knowledge that is already possessed through sharing, followed by reinforcement of the same in one’s mind, and the knowledge gained over and above it when others follow suit, which simply put, refers to nothing but KT (Example, Stanford University’s corporate and foundation relations centre focuses on engagement opportunities). According to the rule of thumb, members of a network usually have a common goal in sight towards which they strive to work for. While it is often found that partner firms have different goals in mind, negotiation helps them to reach a consensus when they enter a strategic coalition and settle in good terms (Ankrah et al., 2013; Inkpen & Tsang, 2005). Accordingly, proposition 3 (P3):

P3: Shared goals will positively and significantly influence KT between U/I partnership

### 6.4. Communication

Communication can be defined as the formal and informal sharing of meaningful and timely information between organizations. Communication is perceived as a person’s assessment of past communication from other people that have been timely, recurrent, and reliable (Cheng, Yeh, & Tu, 2008; Morgan & Hunt, 1994). If the manner of communication between members reflects positivity, it can be a leading factor in motivating the employees to contribute their knowledge (De Vries et al., 2006).

Since inter-organizational partnerships bear fruit to effective communication, frequent communication intensifies the volume of information that is capable of assessing the eligibilities, intentions, and attitudes of another person within the relationship and provides an array of opportunities for people to develop strong network ties. This, in turn, forms shared goals and enables them to submit their faith in one another’s diligence (Cheng et al., 2008).

Communication lays the foundation for trust. As long as trust is accumulated, the communication graph will only keep sloping upward, accompanied by positive impacts like shared goals and conclusively, KT (Cheng et al., 2008; Morgan & Hunt, 1994). Moreover, psychologists have stated that people are increasingly prone to develop feelings of liking when they are merely exposed to something. Thus, past research substantiates the existence of a link between trust and communication frequency (De Wit-de Vries et al., 2018).

Owing to the institutional differences, industrial partners tend to undergo a feeling of fear whether their academic associate is discreetly deviating from the predetermined agendas and rather are being exploited by the academics as cash cows (Al-Tabbaa & Ankrah, 2016; De Wit-de Vries et al., 2018). It is often an area of fear or concern for industrialists whether too much of relevance and focus is placed on academic substance and publications at the expense of industrial needs as an impact of the wide differences in the common application of interests. An instance of such odds is when publishing requirements hamper sensitive or confidential content of the company that needs to be protected. Communicating with the parties to ascertain goals and exchange views on the type and extent of information that could be published is the most probable and effective way to tackle such differences (Al-Tabbaa & Ankrah, 2016).

Frequent communication with the intended partner can astonishingly reduce or banish fears associated with indifferences, weak ties, and trust. Communication helps to identify and merge common goals, develop strong connections, and boost trust to a significant degree. This bridge the gaps prevailing between the university and industry members, thus easing the process of building strong connections and overcoming differences of opinion through discussion, generation, and exchange of knowledge (Al-Tabbaa & Ankrah, 2016).

Knowledge dissemination is a variable that can be expected to prominently influence the transfer of knowledge between U/I and is, of course, one of the forms of knowledge exchange (Van Den Hooff & De Ridder, 2004). Research has found that communication and KT share a positive relationship and are effective in capturing the essence of the information exchanged. By default, with progress in communication, there follows

greater trust and increased KT, unless the trust of either party has been manipulated. Benefits of inter-organizational partnership can be assured through effective communication among the members, technically implying an effective exchange of knowledge as well. In contrast, failed attempts at KT can be traced back to nothing but inadequate or inappropriate communication techniques (Cheng et al., 2008).

Accordingly, the following propositions are derived:

P4: Communication mediates the relationship between trust and KT in a U/I partnership

P5: Communication mediates the relationship between network ties and KT in a U/I partnership

P6: Communication mediates the relationship between shared goals and KT in a U/I partnership

### 6.5. Innovation and knowledge transfer

In the present era of vigorous competition where industries are on a never-ending quest for knowledge, innovation is the key to survival, growth, and sustenance for any organization.

“Outside the box” thinking emerges only when there is sufficient access to knowledge and experience among partnering members and thus, it is the accelerator for innovative thinking behavior (Akhavan et al., 2015). Several researchers have illustrated that U/I tie-ups improvise the conditions for diffusing modernization and upgrading partnerships in innovation-associated networks and moreover, it also lights a spark for innovation through knowledge sharing and transfer (Segarra-Blasco & Arauzo-Carod, 2008; Arvanitis, Sydow et al., 2008b; Ahrweiler et al., 2011; Guan & Zhao, 2013). Accordingly, the proposition 7 (P7):

P7: KT in U/I partnerships are positively associated with innovation

### 7. Conceptual model

The model illustrated in Figure 2 displays trust, network ties, and shared goals as the three important elements in fostering KT links between universities and industry. The proposed conceptual model expounds the independent variable, the dependent variable, the mediator and the final outcome variable. The framework was developed on the basis of extant literature and theory from the subject domain. While acknowledging the influence of multiple factors in the process of knowledge transfer, three social capital factors have been identified and proposed by the authors as being crucial to knowledge transfer, namely, trust, network ties, and shared goals. It has been further proposed that effective transfer of knowledge in U/I partnerships can be fostered through continuous assessment and investment

towards maintaining trust, by building strong network ties and sharing common goals. The foundation of the proposed conceptual model is entrenched in the mediating factor or better communication. Moreover, authors of a number of past researches in KT and KS have described communication as an exogenous variable (Cheng et al., 2008; Van Den Hooff & De Ridder, 2004). However, in contrast, the present study advocates the promising and mediating role of communication in fostering KT between university and industry. In short, it proposes that communication is the indispensable root of KT that is grounded in the tenets of Social Capital Theory (network ties, trust, and shared goals). More effective communication can in turn influence the aforementioned factors of maintaining trust, building strong network ties, and shared goals, thus providing an impetus for innovation which is considered as an evident outcome of KT in this conceptualized model.

### 8. Conclusion

The present paper augments the KT literature grounded in Social Capital Theory and proposed a conceptual model developed using the elements of the same theory to distinguish and probe the factors that affect the transfer of knowledge. The proposed upgradation in the existing framework substantiates that communication in U/I partnerships has a mediating effect in cultivating the transfer of knowledge. We further propose that U/I relations have to imbibe and adapt to dynamic communication as it indicates communication as a crucial element for increasing and reciprocating trust, developing strong network ties, and building shared goals, which will, in turn, help the partners to transfer knowledge. Since social capital factors (trust, network ties, and shared goals) are also important, we characterize them as pivotal in fostering KT. On validation of the proposed model, this paper could come forth with practical inferences for both universities and businesses on improved and advanced ways of KT. In addition, the relationship among KT determinants, mediators, and innovation as an outcome of social capital will help both industries and universities to devise ways on how to foster and promote KT among network members. It is therefore recommended to ascertain and validate the proposed model in future research using our propositions as testable hypotheses. There will be opportunities to carry out such studied in the context of developed as well as developing countries using different methodologies.

### Disclosure statement

No potential conflict of interest was reported by the authors.



## References

- Agrawal, A. K. (2001). University-to-industry knowledge transfer: Literature review and unanswered questions. *International Journal of Management Reviews*, 3(4), 285–302.
- Ahrweiler, P., Pyka, A., & Gilbert, N. (2011). A new model for university-industry links in knowledge-based economies. *Journal of Product Innovation Management*, 28(2), 218–235.
- Akhavan, P., Hosseini, S. M., Abbasi, M., & Manteghi, M. (2015). Knowledge-sharing determinants, behaviors, and innovative work behaviors: An integrated theoretical view and empirical examination. *Aslib Journal of Information Management*, 67(5), 562–591.
- Albino, V., Garavelli, A. C., & Schiuma, G. (2001). A metric for measuring knowledge codification in organisation learning. *Technovation*, 21(7), 413–422.
- Al-Tabbaa, O., & Ankrah, S. (2016). Social capital to facilitate 'engineered' university-Industry collaboration for technology transfer: A dynamic perspective. *Technological Forecasting and Social Change*, 104, 1–15.
- Ankrah, S., & Al-Tabbaa, O. (2015). Universities-Industry collaboration: A systematic review. *Scandinavian Journal of Management*, 31(3), 387–408.
- Ankrah, S. N., Burgess, T. F., Grimshaw, P., & Shaw, N. E. (2013). Asking both university and industry actors about their engagement in knowledge transfer: What single-group studies of motives omit. *Technovation*, 33(2–3), 50–65.
- Argote, L., & Ingram, P. (2000). Knowledge transfer: A basis for competitive advantage in firms. *Organizational Behavior and Human Decision Processes*, 82(1), 150–169.
- Arvanitis, S., Kubli, U., & Woerter, M. (2008a). University-industry knowledge and technology transfer in Switzerland: What university scientists think about co-operation with private enterprises. *Research Policy*, 37(10), 1865–1883.
- Arvanitis, S., Sydow, N., & Woerter, M. (2008b). Do specific forms of university-industry knowledge transfer have different impacts on the performance of private enterprises? An empirical analysis based on Swiss firm data. *The Journal of Technology Transfer*, 33(5), 504–533.
- Azagra-Caro, J. M., Barberá-Tomás, D., Edwards-Schachter, M., & Tur, E. M. (2017). Dynamic interactions between university-industry knowledge transfer channels: A case study of the most highly cited academic patent. *Research Policy*, 46(2), 463–474.
- Azevedo Ferreira, M. L., & Rezende Ramos, R. (2015). Making university-industry technological partnerships work: A case study in the Brazilian oil innovation system. *Journal of Technology Management & Innovation*, 10(1), 173–187.
- Bekkers, R., & Freitas, I. M. B. (2008). Analysing knowledge transfer channels between universities and industry: To what degree do sectors also matter? *Research Policy*, 37(10), 1837–1853.
- Bercovitz, J., & Feldman, M. (2006). Entrepreneurial universities and technology transfer: A conceptual framework for understanding knowledge-based economic development. *The Journal of Technology Transfer*, 31(1), 175–188.
- Borges, R. (2012). Tacit knowledge sharing between IT workers: The role of organizational culture, personality, and social environment. *Management Research Review*, 36(1), 89–108.
- Brennenraedts, R., Bekkers, R., & Verspagen, B. (2006). The different channels of university-industry knowledge transfer: Empirical evidence from biomedical engineering. Paper presented at DIME workshop on Technology transfer from universities: A critical appraisal of patents, spin-offs and human mobility, Lausanne, Switzerland.
- Bruneel, J., d'Este, P., & Salter, A. (2010). Investigating the factors that diminish the barriers to university-Industry collaboration. *Research Policy*, 39(7), 858–868.
- Bstieler, L., Hemmert, M., & Barczak, G. (2015). Trust formation in university-Industry collaborations in the US biotechnology industry: IP policies, shared governance, and champions. *Journal of Product Innovation Management*, 32(1), 111–121.
- Cabrera, E. F., & Cabrera, A. (2005). Fostering knowledge sharing through people management practices. *The International Journal of Human Resource Management*, 16(5), 720–735.
- Carayannis, E. G., Alexander, J., & Ioannidis, A. (2000). Leveraging knowledge, learning, and innovation in forming strategic government-University-Industry (GUI) R&D partnerships in the US, Germany, and France. *Technovation*, 20(9), 477–488.
- Chakrabarti, A. K., & Santoro, M. D. (2004). Building social capital and learning environment in university-Industry relationships. *International Journal of Learning and Intellectual Capital*, 1(1), 19–36.
- Chang, H. H., & Chuang, S. S. (2011). Social capital and individual motivations on knowledge sharing: Participant involvement as a moderator. *Information & Management*, 48(1), 9–18.
- Cheng, J. H., Yeh, C. H., & Tu, C. W. (2008). Trust and knowledge sharing in green supply chains. *Supply Chain Management: An International Journal*, 13(4), 283–295.
- Chiu, C. M., Hsu, M. H., & Wang, E. T. (2006). Understanding knowledge sharing in virtual communities: An integration of social capital and social cognitive theories. *Decision Support Systems*, 42(3), 1872–1888.
- Chow, W. S., & Chan, L. S. (2008). Social network, social trust and shared goals in organizational knowledge sharing. *Information & Management*, 45(7), 458–465.
- Chung, H. F., Cooke, L., Fry, J., & Hung, I. H. (2015). Factors affecting knowledge sharing in the virtual organisation: Employees' sense of well-being as a mediating effect. *Computers in Human Behavior*, 44, 70–80.
- Clarysse, B., Wright, M., Lockett, A., Mustar, P., & Knockaert, M. (2007). Academic spin-offs, formal technology transfer and capital raising. *Industrial and Corporate Change*, 16(4), 609–640.
- Coleman, J. (1990). *Foundations of Social Theory*. Cambridge: Belknap Press.
- Cormican, K., & O'Sullivan, D. (2003). A collaborative knowledge management tool for product innovation management. *International Journal of Technology Management*, 26(1), 53–67.
- Cross, R., & Cummings, J. N. (2004). Tie and network correlates of individual performance in knowledge-intensive work. *Academy of Management Journal*, 47(6), 928–937.
- Cruz, N. M., Perez, V. M., & Cantero, C. T. (2009). The influence of employee motivation on knowledge transfer. *Journal of Knowledge Management*, 13(6), 478–490.
- D'Este, P., & Fontana, R. (2007). What drives the emergence of entrepreneurial academics? A study on

- collaborative research partnerships in the UK. *Research Evaluation*, 16(4), 257–270.
- D’Este, P., & Patel, P. (2007). University–Industry linkages in the UK: What are the factors underlying the variety of interactions with industry? *Research Policy*, 36(9), 1295–1313.
- Dayasindhu, N. (2002). Embeddedness, knowledge transfer, industry clusters and global competitiveness: A case study of the Indian software industry. *Technovation*, 22(9), 551–560.
- De Vries, R. E., Van Den Hooff, B., & de Ridder, J. A. (2006). Explaining knowledge sharing: The role of team communication styles, job satisfaction, and performance beliefs. *Communication Research*, 33(2), 115–135.
- De Wit-de Vries, E., Dolfisma, W. A., van der Windt, H. J., & Gerkema, M. P. (2018). Knowledge transfer in university–Industry research partnerships: A review. *The Journal of Technology Transfer*, 1–20.
- Dyer, J. H., & Nobeoka, K. (2000). Creating and managing a high-performance knowledge-sharing network: The Toyota case. *Strategic Management Journal*, 21(3), 345–367. <https://doi.org/10.1007/s10961-018-9660-x>
- Eom, B. Y., & Lee, K. (2010). Determinants of industry–Academy linkages and, their impact on firm performance: The case of Korea as a latecomer in knowledge industrialization. *Research Policy*, 39(5), 625–639.
- Etzkowitz, H. (2002). Incubation of incubators: Innovation as a triple helix of university-industry-government networks. *Science and Public Policy*, 29(2), 115–128.
- Eun, J. H., Lee, K., & Wu, G. (2006). Explaining the “University-run enterprises” in China: A theoretical framework for university–Industry relationship in developing countries and its application to China. *Research Policy*, 35(9), 1329–1346.
- Fernández-López, S., Calvo, N., & Rodeiro-Pazos, D. (2018). The funnel model of firms’ R&D cooperation with universities. *Science and Public Policy*.
- Ferreira, J., Raposo, M., Rutten, R., & Varga, A. (2013). Cooperation, clusters, and knowledge transfer – universities and firms towards regional competitiveness, *Advances in Spatial Science*, Springer.
- Fontana, R., Geuna, A., & Matt, M. (2006). Factors affecting university–Industry R&D projects: The importance of searching, screening and signalling. *Research Policy*, 35(2), 309–323.
- Friedman, J., & Silberman, J. (2003). University technology transfer: Do incentives, management, and location matter? *The Journal of Technology Transfer*, 28(1), 17–30.
- Fritsch, M., & Kauffeld-Monz, M. (2010). The impact of network structure on knowledge transfer: An application of social network analysis in the context of regional innovation networks. *The Annals of Regional Science*, 44(1), 21.
- Gabbay, S. M., & Leenders, R. T. A. (2001). Social capital of organizations: From social structure to the management of corporate social capital. In Shaul M. Gabby, Roger Th. A. J. Leenders (ed.). *Social Capital of Organizations* (Research in the Sociology of Organizations, Volume 18) Emerald Group Publishing Limited, pp.1–20.
- George, G., Zahra, S. A., & Wood, D. R. (2002). The effects of business-university alliances on innovative output and financial performance: A study of publicly traded biotechnology companies. *Journal of Business Venturing*, 17, 577–609.
- Grant, R. M. (1996). Toward a knowledge-based theory of the firm. *Strategic Management Journal*, 17(S2), 109–122.
- Guan, J., & Zhao, Q. (2013). The impact of university–Industry collaboration networks on innovation in Nano biopharmaceuticals. *Technological Forecasting and Social Change*, 80(7), 1271–1286.
- Hansen, M. T. (1999). The search-transfer problem: The role of weak ties in sharing knowledge across organization subunits. *Administrative Science Quarterly*, 44(1), 82–111.
- Hau, Y. S., Kim, B., Lee, H., & Kim, Y. G. (2013). The effects of individual motivations and social capital on employees’ tacit and explicit knowledge sharing intentions. *International Journal of Information Management*, 33(2), 356–366.
- Hemmert, M., Bstieler, L., & Okamuro, H. (2014). Bridging the cultural divide: Trust formation in university–Industry research collaborations in the US, Japan, and South Korea. *Technovation*, 34(10), 605–616.
- Hermans, J., & Castiaux, A. (2007). Knowledge creation through university-industry collaborative research projects. *Electronic Journal of Knowledge Management*, 5(1), 43–54.
- Hsu, I. C., & Wang, Y. S. (2008). A model of intra-organizational knowledge sharing. *Journal of Global Information Management*, 16(3), 45–73.
- Huggins, R., Johnston, A., & Thompson, P. (2012). Network capital, social capital and knowledge flow: How the nature of inter-organizational networks impacts on innovation. *Industry and Innovation*, 19(3), 203–232.
- Inkpen, A. C., & Tsang, E. W. (2005). Social capital, networks, and knowledge transfer. *Academy of Management Review*, 30(1), 146–165.
- Kalar, B., & Antoncic, B. (2015). The entrepreneurial university, academic activities and technology and knowledge transfer in four European countries. *Technovation*, 36, 1–11.
- Khan, Z., & Vorley, T. (2017). Big data text analytics: An enabler of knowledge management. *Journal of Knowledge Management*, 21(1), 18–34.
- Kim, S. (2018). Public service motivation, organizational social capital, and knowledge sharing in the Korean public sector. *Public Performance & Management Review*, 41(1), 130–151.
- Lee, J., & Win, H. N. (2004). Technology transfer between university research center and industry in Singapore. *Technovation*, 24(5), 433–442.
- Levin, D. Z., & Cross, R. (2004). The strength of weak ties you can trust: The mediating role of trust in effective knowledge transfer. *Management Science*, 50(11), 1477–1490.
- Leydesdorff, L., & Meyer, M. (2006). Triple Helix indicators of knowledge-based innovation systems: Introduction to the special issue. *Research policy*, 35(10), 1441–1449.
- Leydesdorff, L., & Meyer, M. (2007). The scientometrics of a Triple Helix of university-industry-government relations (Introduction to the topical issue). *Scientometrics*, 70(2), 207–222.
- Lin, N. (2017). Building a network theory of social capital. In *Social capital* (pp. 3–28). Routledge.
- Löf, H., & Broström, A. (2008). Does knowledge diffusion between university and industry increase innovativeness? *The Journal of Technology Transfer*, 33(1), 73–90.



- Martin, S., & Scott, J. T. (2000). The nature of innovation market failure and the design of public support for private innovation. *Research Policy*, 29(4–5), 437–447.
- Mayer, R. C., Davis, J. H., & Schoorman, F. D. (1995). An integrative model of organizational trust. *Academy of Management Review*, 20(3), 709–734.
- Morgan, R. M., & Hunt, S. D. (1994). The commitment-trust theory of relationship marketing. *The Journal of Marketing*, 58, 20–38.
- Motohashi, K. (2005). University–Industry collaborations in Japan: The role of new technology-based firms in transforming the national innovation system. *Research Policy*, 34(5), 583–594.
- Nahapiet, J., & Ghoshal, S. (2000). Social capital, intellectual capital, and the organizational advantage. In *Knowledge and social capital* (pp. 119–157), Butterworth-Heinemann.
- Nicolas, R. (2004). Knowledge management impacts on decision making process. *Journal of Knowledge Management*, 8(1), 20–31.
- Nonaka, I. (1994). A dynamic theory of organizational knowledge creation. *Organization Science*, 5(1), 14–37.
- Park, H. W., & Leydesdorff, L. (2010). Longitudinal trends in networks of university–Industry–Government relations in South Korea: The role of programmatic incentives. *Research Policy*, 39(5), 640–649.
- Paul, J. (2015). Does the WTO Increase Trade and Cause Convergence? *The International Trade Journal*, 29(4), 291–308.
- Paul, J., & Benito, G. R. (2018). A review of research on outward foreign direct investment from emerging countries, including China: What do we know, how do we know and where should we be heading? *Asia Pacific Business Review*, 24(1), 90–115.
- Paul, J., & Sánchez-Morcillo, R. (2018). Toward A new model for firm internationalization: Conservative, predictable, and pacemaker companies and markets. *Canadian Journal of Administrative Sciences*. doi:10.1002/CJAS.1512
- Qi, C., & Chau, P. Y. K. (2018). Will enterprise social networking systems promote knowledge management and organizational learning? An empirical study. *Journal of Organizational Computing and Electronic Commerce*, 28(1), 31–57.
- Ring, P. S., & Van de Ven, A. H. (1992). Structuring cooperative relationships between organizations. *Strategic Management Journal*, 13(7), 483–498.
- Rosado-Serrano, A., & Paul, J. (2018). A new conceptual model for international franchising. *International Journal of Hospitality Management*, 75, 177–188.
- Rosado-Serrano, A., Paul, J., & Dikova, D. (2018). International franchising: A literature review and research agenda. *Journal of Business Research*, 85, 238–257.
- Rossi, F., & Rosli, A. (2015). Indicators of university–Industry knowledge transfer performance and their implications for universities: Evidence from the United Kingdom. *Studies in Higher Education*, 40(10), 1970–1991.
- Santoro, M. D., & Chakrabarti, A. K. (2002). Firm size and technology centrality in industry–University interactions. *Research Policy*, 31(7), 1163–1180.
- Santoro, M. D., & Gopalakrishnan, S. (2000). The institutionalization of knowledge transfer activities within industry–University collaborative ventures. *Journal of Engineering and Technology Management*, 17(3–4), 299–319.
- Santoro, M. D., & Saporito, P. A. (2003). The firm’s trust in its university partner as a key mediator in advancing knowledge and new technologies. *IEEE Transactions on Engineering Management*, 50(3), 362–373.
- Santoro, M. D., & Saporito, P. A. (2006). Self-interest assumption and relational trust in university–industry knowledge transfers. *IEEE Transactions on Engineering Management*, 53(3), 335–347.
- Schaeffer, V., Öcalan-Özel, S., & Pénin, J. (2018). The complementarities between formal and informal channels of university–Industry knowledge transfer: A longitudinal approach. *The Journal of Technology Transfer*, 1–25.
- Schartinger, D., Rammer, C., & Fröhlich, J. (2006). Knowledge interactions between universities and industry in Austria: Sectoral patterns and determinants. In *Innovation, networks, and knowledge spillovers* (pp. 135–166). Berlin, Heidelberg: Springer.
- Segarra-Blasco, A., & Arauzo-Carod, J. M. (2008). Sources of innovation and industry–University interaction: Evidence from Spanish firms. *Research Policy*, 37(8), 1283–1295.
- Siegel, D. S., & Zervos, V. (2002). Strategic research partnerships and economic performance: Empirical issues. *Science and Public Policy*, 29(5), 331–343.
- Tangaraja, G., MohdRasdi, R., Abu Samah, B., & Ismail, M. (2016). Knowledge sharing is knowledge transfer: A misconception in the literature. *Journal of Knowledge Management*, 20(4), 653–670.
- Tangaraja, G., MohdRasdi, R., Ismail, M., & Abu Samah, B. (2015). Fostering knowledge sharing behaviour among public sector managers: A proposed model for the Malaysian public service. *Journal of Knowledge Management*, 19(1), 121–140.
- Thune, T. (2007). University–industry collaboration: The network embeddedness approach. *Science and Public Policy*, 34(3), 158–168.
- Tortoriello, M., Reagans, R., & McEvily, B. (2012). Bridging the knowledge gap: The influence of strong ties, network cohesion, and network range on the transfer of knowledge between organizational units. *Organization Science*, 23(4), 1024–1039.
- Tsai, W., & Ghoshal, S. (1998). Social capital and value creation: The role of intrafirm networks. *Academy of Management Journal*, 41(4), 464–476.
- Van Den Hooff, B., & De Ridder, J. A. (2004). Knowledge sharing in context: The influence of organizational commitment, communication climate and CMC use on knowledge sharing. *Journal of Knowledge Management*, 8(6), 117–130.
- Wang, Y., Li, W., Li, Y., & Li, Q. (2015). Collaboration strategies and effects on university research: Evidence from Chinese universities. *Scientometrics*, 103(2), 725–749.
- Wasko, M. M., & Faraj, S. (2005). Why should I share? Examining social capital and knowledge contribution in electronic networks of practice. *MIS Quarterly*, 29, 35–57.
- Yang, S. C., & Farn, C. K. (2009). Social capital, behavioural control, and tacit knowledge sharing—A multi-informant design. *International Journal of Information Management*, 29(3), 210–218.