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Article

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Exploring tacit knowledge transfer and innovation capabilities within the buyer–supplier collaboration: a literature review

Shem Sikombe*¹ and Maxwell A. Phiri²

Abstract: The study seeks to identify the main facilitators and barriers of tacit knowledge transfer that influence innovation capabilities of the supplier within the buyer–supplier collaboration. The conceptual paper is based on a systematic literature review of 23 peer reviewed journal articles from Elsevier/Science Direct, Emerald, Springer and Scopus. Literature related to buyer–supplier context, tacit and explicit knowledge transfer, knowledge management for innovation purposes was reviewed and synthesised. Findings of the study indicate that organisational contextual factors, relationship strength, internal knowledge brokers, communication and transparency and link duration positively support tacit knowledge transfer and innovation. Complementarity of skills act as a barrier to operational knowledge transfer; however, it supports learning leading to supplier development and innovation in new product development. Conversely, knowledge stickiness is cited as a barrier to tacit knowledge transfer after reaching diminishing returns. The study synthesises the main facilitators of tacit knowledge transfer for managers/practitioners to consider in the buyer–supplier collaboration which can influence supplier innovation on projects such as new product development. The study has further proposed a model that will be tested quantitatively in the subsequent empirical study.

ABOUT THE AUTHOR

Shem Sikombe and Maxwell A. Phiri have been working on a project since 2018 on investigating how Government coordinated initiatives (institutionalised supplier development) have influenced local SME contractor's performance in the construction industry in Zambia. Specifically, the project intends to apply the knowledge-based view and absorptive capacity theories to understand how local SME contractors' ability to utilise knowledge (absorptive capacity) from contracts awarded to them through Government-coordinated initiatives influence their development and operational performance. This article is the first output from the many to come which are envisaged to contribute significantly in an under-researched context of public sector procurement initiatives in the construction industry in Zambia.

PUBLIC INTEREST STATEMENT

As competition between organisations is increasingly hitched on knowledge sharing and innovation among players in the supply chain, knowledge transfer has taken centre stage. Organisations must increase their efforts in exploring, assimilating and utilising the knowledge to outsmart other players in different supply chains. While organisations need to develop internal innovation capabilities, collaborating with other players in the supply chain and creating conditions for effective tacit knowledge transfer are important drivers of innovation outcomes. Suppliers are regarded as initiators of product and process innovation, however, there are limited studies that have explored facilitators and barriers to tacit knowledge to support the innovation capabilities of suppliers. This study highlights the main facilitators and barriers of tacit knowledge transfer within the buyer supplier context and proposes an integrative approach in enhancing the facilitators of knowledge transfer while suppressing barriers.

Subjects: Production, Operations & Information Management; Operations Management; Supply Chain Management; Innovation Management

Keywords: tacit knowledge transfer; buyer–supplier collaboration; tacit knowledge facilitators; tacit knowledge barrier; innovation; supplier capabilities

1. Introduction

Organisations are increasingly becoming knowledge-based and their success and survival depend on creativity, innovation and inventiveness through effective leveraging of knowledge (Martins & Terblanche, 2003). Innovation is a lifeline of an organisation in a competitive business environment; however, innovations are becoming increasingly complex and risky because of the dynamic business environment (Cavusgil, Calantone., & Zhao, 2003). Scholars claim that an organisation is a body of knowledge and the importance of this knowledge if well leveraged through innovation practices can far exceed the physical resources (Cavusgil et al., 2003; Gonzalez & Melo, 2018). In today's business environment, knowledge management entails that successful companies of the future will be those that are able to develop new capabilities by creating organisational knowledge and innovative practices to respond to the changing environment (Giannakis, 2008). This is further attested by several studies which indicate that knowledge is the main organisational resource able to generate a competitive advantage through exploitation of knowledge for commercial value through innovation (Gonzalez & Melo, 2018; Hur & Kim, 2014). However, some strategic resources (such as innovative knowledge) of an organisation may be beyond the organisation boundary. Such resources can only be leveraged through collaboration between buyers and suppliers.

In the recent past, the concepts of knowledge transfer and knowledge management have been extended to the field of supply chain management. Knowledge transfer refers to the exchange of organisation knowledge, skills, ideas and experiences between the buyer and supplier (Zhao, 2013), which in turn is utilised by the parties to improve their performance. Modi and Mabert (2007) argue that the competitiveness of an organisation is a function of both its capabilities and the supplier network providing inputs to the organisation. This has further prompted the need for knowledge transfer in the supply networks. The importance of knowledge transfer is also a recognition that to remain competitive, most organisations are increasingly depending on external networks through buyer–supplier collaborations to maintain capable and high performing suppliers (Squire, Courins, & Brown, 2009). Organisations no longer rely solely on internal idiosyncrasies for competitiveness, but rather through collaborative initiatives within the supply network (Kotabe, Martin, & Domoto, 2003). This argument is also echoed by Monczka, Scannell, Carter, and Carter (2010) who reiterate that innovative organisations that have hitherto relied on internal research and development are increasingly relying on external suppliers for innovation and development activities so that they focus on internal core competences.

Buyer–supplier collaboration through supplier development, for example, involves any deliberate effort of the buying organisation, public or private to improve the performance and/or capabilities of their suppliers with the ultimate objective of improving organisation performance of both parties (Glock, Grosse, & Ries, 2017). Supplier development creates an inter-organisational knowledge transfer context in which a buyer or a third party, acts as a “teacher” organisation which transfers the knowledge, and a supplier as a “student” organisation, the recipient of the knowledge that utilises it to improve the performance of the buyer (Kim et al. 2015). Within this context, the buyer initiates knowledge transfer to the supplier to improve supplier performance and in turn its own through specific investments, training and co-development among others (Chen, 2015). Performance from the supplier can be looked at from two angles, operational (timely delivery, cost management and quality delivery) and/or strategic such as contribution to the long-term goals of the buyer organisation through design skills, experience, new technology and product improvement (Chen, 2015; Zhao, 2013). Note that in this study, supplier development and buyer–supplier collaboration are used interchangeably.

2. Research gap

To improve competitiveness through innovation, many organisations are now engaging in buyer–supplier collaborations to facilitate innovative knowledge exchanges. From knowledge management perspective, knowledge exists in both tangible (explicit) and intangible (tacit) forms, however, it is important for organisations to identify where this knowledge is located so that it can be exploited for organisational success (Chugh, 2017). Abounding studies have paid more attention to explicit knowledge transfer and operational performance outcomes such as quality, delivery, cost and inventory management within the buyer–supplier collaboration (Chen, 2015; Giannakis, 2008; Harvey, Jas, & Walshe, 2015). Despite tacit knowledge being known to be critical to organisational innovation and competitiveness, it has not been fully investigated within the buyer–supplier collaboration context (Pérez-Salazar, Lasserre, Cedillo-Campos, & González, 2017).

Further, previous research on tacit knowledge transfer through research and development (R&D) has predominantly focussed on the corporate sector, disregarding the supply chain context (Chugh, 2017). Others like Noordhoff, Kyriakopoulos, Moorman, Pauwels, and Dellaert (2011) who conducted a related study in the supply chain context only focused on the positive and negative side of embedded ties in business-to-business innovation. Therefore, it is important to assess the facilitators and barriers to tacit knowledge transfer in order to contribute to the discourse on buyer–supplier collaboration. This study, therefore, seeks to identify the main facilitators and barriers of tacit knowledge transfer and its influence on innovation capabilities of the supplier within the buyer–supplier collaboration. The study is guided by the following research questions:

- (1) *What are the key facilitators of tacit knowledge transfer in buyer–supplier collaboration that positively influence supplier innovation capabilities?*
- (2) *What are the key barriers of tacit knowledge transfer in buyer–supplier collaboration that negatively influence supplier innovation capabilities?*

The remainder of the paper is structured as follows. In the next section, a literature review is conducted followed by a review of methods and the adopted method for the study. The third section focuses on the results and discussion and section four draws the conclusion, contribution, implications of the study and avenues for future research.

3. Literature review

3.1. Tacit and explicit knowledge

Chugh (2017) distinguishes two types of knowledge namely explicit and tacit knowledge. Explicit knowledge can be easily codified and communicated through manuals, policies while tacit knowledge is more individualistic and contextual-specific, hence it is expressed through individual experiences such as the know-how and is therefore difficult to communicate. Tacit knowledge is, however, more relevant in buyer–supplier collaboration where innovation is important because it is inimitable and therefore difficult for competitors to access (Modi & Mabert, 2007; Schoenherr, Griffith, & Chandra, 2014). Further, tacit knowledge transfer includes skills, expertise and the experience that a buying organisation shares with the supplier to improve its performance which ultimately results in the improvements of the buyer organisational processes and innovative outcomes. Cavusgil et al. (2003) further argue that explicit knowledge has some attributes of “public good” because it can easily be accessed and imitated, while tacit knowledge is non-verbalised, intuitive, abstract and unarticulated (knowledge turned into habits and highly contextual-specific) hence is unique and valuable for innovation purposes. Md-saad, Ghauri, and Jedins (2016) postulate that these characteristics of tacit knowledge make it a valuable resource to draw upon, however, could also be reasons why most researchers may not be interested in studying tacit knowledge and its implications on organisational performance. The main differences between tacit and explicit knowledge are summarised in Table 1.

3.2. Knowledge transfer

King (2006, p. 542) defines knowledge transfer as “the focused, unidirectional communication of knowledge between individuals, groups or organisations such that the recipient of knowledge (a) has cognitive understanding, (b) has the ability to apply the knowledge or (c) applies the knowledge.” In our context of the study, this knowledge exists at the level of the buying organisation which is transferred to the supplier to improve supplier capabilities and innovative performance. Buyer–supplier collaborations such as supplier development creates an inter-organisational knowledge transfer context in which a buyer with resources, acts as a “teacher” organisation which transfers the knowledge such as design capability, training, supplier evaluation, technology and a supplier as a “student” organisation, the recipient of the knowledge utilises it to improve the performance of the buyer (Kim et al. 2015). Capabilities are regarded as skills and collective learning, exercised through organisational processes that can be used to utilise knowledge for innovation purposes as suggested by Day (1994). Innovation capability is characterised by high innovation performance. Cavusgil et al. (2003) argue that an organisation with high innovation capability employs learning-by-doing effect which has high inimitability because of the nature of tacit knowledge. Therefore, apart from utilising their knowledge, the ability by the buyer to make tacit knowledge available for use by suppliers within the buyer–supplier collaboration is crucial because the success of the buyer is highly dependent on the supplier. For this to be successful, there is a need to ensure that a favourable environment (facilitators) exists for transferring, exploration and exploitation of tacit knowledge while minimising barriers (Chugh, 2017).

3.3. Tacit knowledge and innovation

When tacit knowledge is properly leveraged, it forms an important source of innovation within the buyer–supplier knowledge exchanges. However, most of the extant research on supplier development has focused on explicit knowledge transfer and operational performance outcomes such as to quality, cost, delivery and service (Harvey et al., 2015); while there is limited attention on tacit knowledge and long-term goals with respect to the supplier’s capabilities that may lead to innovation in the buyer supplier collaboration (Wagner & Krause, 2009). The nature of tacit knowledge is that it is embodied in the individual organisation, rooted in practices and experiences of employees, hence, it is very difficult to disseminate (Zhao, 2013). However, tacit knowledge offers a competitive advantage since it is unique, rare and difficult for competitors to replicate according to the resource-based view theory (Chen, 2015), hence valuable for improving supplier innovative capabilities (Nonaka, 1991). Zhao (2013) adds that tacit knowledge begins with individuals such as a member of the buyer organisation (e.g. a design engineer), this knowledge is then transformed through collaboration (e.g. new product development project) into the entire system of the buyer and supplier. Suppliers may then leverage this knowledge to improve their proficiency

Table 1. Differences between tacit and explicit knowledge

	Tacit knowledge	Explicit knowledge
Definition	Know-how, know-why: skills expressed through performance	Know-about: comprise facts, theories and instructions
Quality, speed, cost of transfer	Slow, costly and uncertain (high stickiness)	Fast, may be costly, accurate (low stickiness)
Diffusion	Difficult to convey	Easier to convey
Residence	General information, experiences and memories	Books, documents, databases policy manuals
Complexity	Relative complex	Relatively simple
Teachability	Not teachable	Teachable
Observability	Not observable	Observable
Codifiability	Difficult	Easy

Adapted from Giannakis (2008, p. 65) and Cavusgil et al. (2003, p. 9).

and innovative capabilities (e.g. design accuracy, robustness and unique features) within the buyer–supplier collaboration.

3.4. Innovation in buyer–supplier collaboration

Hur and Kim (2014) suggest two types of supplier collaboration, one focusing on managerial knowledge transfer which ultimately leads to supplier capabilities such as innovation and operational knowledge that results in operational performance outcomes such as quality, cost and timely delivery as indicated in Figure 1.

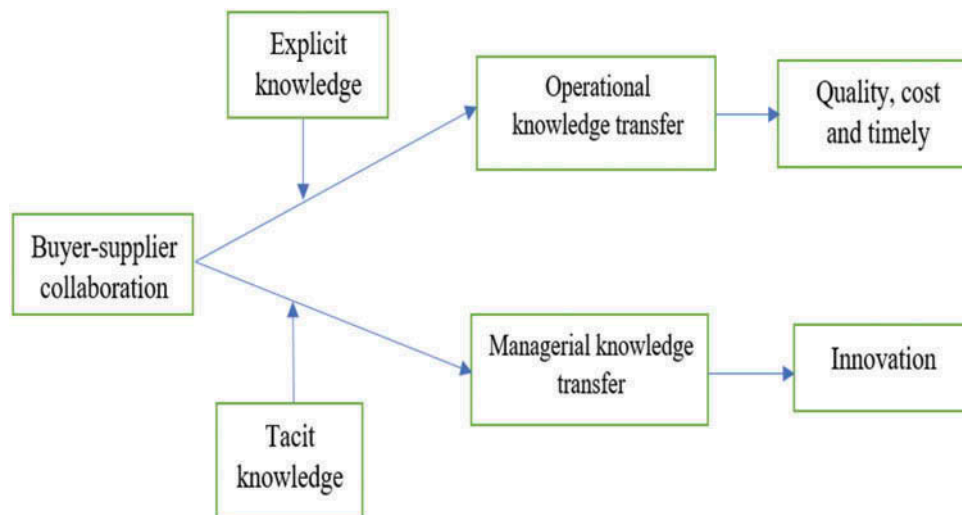
Relatedly, Kotabe et al. (2003) also distinguish between simple technical exchanges related to operational performance and higher-level technology transfer related to long-term goals such as innovation. In order to leverage supplier innovation within the buyer–supplier collaboration, Monczka et al. (2010) suggest that organisations should adopt an open innovation model as opposed to the closed model. The open innovation model can leverage supplier knowledge, assets and resources who may view the organisation from a different perspective as opposed to the status quo. The closed model, however, is characterised by internal controls and “not made here” mindset which can hamper supplier innovation capabilities.

Further, in their investigation of embedded ties in business-to-business innovation, Noordhoff et al. (2011, p. 35) define supplier innovation as “the ability by the supplier to use new or improved product, service, or process activities relative to the supplier’s current activities.” The definition gives a holistic view of innovation whereby a supplier can innovate in any functional area of the buyer organisation from operations, marketing, human resource, procurement, and so forth. Supplier innovation entails improvement in the product and processes that result in efficiencies and responsive delivery as a results of tacit knowledge application by the supplier (Winter & Lasch, 2016).

Innovation practices differ widely from one organisation to another, for example, in new product development supplier input from product conceptualisation, design and manufacturing in order to increase speed to market constitute innovation. Supplier innovation may also be exhibited by supplier proactive market orientation where a supplier anticipates and meets customer needs ahead of other players in the market (Noordhoff et al., 2011). Typically, four types of innovations can be distinguished, such as process, product or service, organisational structure and people innovation. Process innovation, for example, focuses on making processes efficient in the logistics services, while product innovation may involve making products easy to use, safer, secure and well integrated with other processes.

Figure 1. Operational and managerial knowledge transfer.

Adapted from Hur and Kim (2014).



Further, organisational structure and people innovation may take a form of developing flat structures which support responsive communication and tacit knowledge transfer (Winter & Lasch, 2016).

4. Review of methods

4.1. Methods

There are different approaches to conducting literature review studies albeit highly contested. For example, Tranfield, Denyer, and Smart (2003) propose a three-stage approach in conducting a systematic literature review study from medical sciences comprising of the following steps: (1) planning literature, (2) conducting a review and (3) reporting and dissemination. However, Tranfield et al. (2003) acknowledge that while this approach has produced evidence-based findings for both academics and practitioners in medical sciences, the approach is difficult to apply in management studies because the field lacks methodological consensus. Further, Tsafnet et al. (2014) propose a 15-step approach methodology of systematic literature review adapted from Cochrane study reviews as follows: (1) formulate research question, (2) find previous systematic review, (3) write the protocol, (4) devise the search strategy, (5) search, (6) de-duplicate, (7) screen abstracts, (8) obtain full text, (9) screen full text, (10) snowball, (11) extract data, (12) synthesis data, (13) recheck literature, (14) meta analyse (optional), (15) write up. This approach can be adapted with variations depending on the study. Similarly, Ham-Bolayi and Jordan (2016) propose a five-step approach which is the culmination of various studies encompassing notable literature study approaches such as Cochrane collaboration systematic reviews and Tranfield et al. (2003). This approach starts with review questions which in turn guide the research protocol. Literature search is followed by critical appraisal, data extraction and finally synthesis.

4.2. Method adopted

This study followed a literature review process suggested by Ham-Bolayi and Jordan (2016) as detailed below.

Step 1: Review questions

Ham-Bolayi and Jordan (2016) suggest that review questions should contain the following variables: population of interest (P), intervention (I), comparative intervention (C) and the outcomes of interest (O) commonly known as the PICO format. However, where a study has a specific focus on a particular context, an extended version of PICO that includes a context is usually applied, the PICOC. Since the study involves the buyer-supplier context, the PICOC which includes assessing the context was adopted. The research questions for the study are:

- (1) What are the key facilitators of tacit knowledge transfer in buyer-supplier collaboration that positively influence supplier innovation capabilities?
- (2) What are the key barriers of tacit knowledge transfer in buyer-supplier collaboration that negatively influence supplier innovation capabilities?

These guiding questions conform to the PICOC approach as follows: the population include all buyer-supplier collaboration related studies that include innovative practices and tacit knowledge transfer; the intervention is supplier buyer-supplier collaboration; the comparative intervention is the effect of tacit knowledge transfer within the buyer-supplier context and its implication on supplier innovation capabilities; the outcome of interest is supplier innovation practices.

Step 2: Searching the literature

The inclusion criteria were all the studies involving buyer-supplier collaboration specifically focusing on supplier development, innovation and knowledge transfer within the buyer-supplier collaboration context. We believe that the study period given (2003–2019) is sufficient for collecting diverse articles within the subject areas stated above to answer the research

questions on buyer–supplier collaboration and supplier innovation capabilities. The exclusion criteria were studies outside the buyer–supplier collaboration context and earlier than 2003 as summarised in Table 2. A number of combinations were used when searching for literature as suggested by Burn and Burns (2008) which include using key words with OR combination such as “knowledge” OR “transfer”; “tacit transfer” OR “supplier development”; “supplier development” OR “innovation” which produced over 500 results. These results were reduced by the use of the “AND”, such as knowledge transfer’ AND “supplier development”; “supplier development” AND “innovation” in topic (title, abstract, key words) resulting in a sample of 60. The study only considered peer reviewed journal articles from recognised databases such as Elsevier/Science Direct, Emerald, Springer and Scopus. After reviewing the journal titles and abstracts, only 23 were considered for analysis in this study. The main focus on the considered journal articles were the findings on tacit knowledge transfer within the buyer–supplier context and supplier innovation practices. Other relevant journal articles were used as part of literature review.

Steps 3–4: Critical appraisal and data extraction

Data extraction is the process of documenting salient details about the articles considered for review. These include details about the authors, journal, population characteristics and evaluation of methodological quality among others to ensure that the studies included meeting the inclusion and exclusion criteria (Tranfield et al., 2003). Data extraction also helps in lining concepts from different studies and the emerging themes for synthesis. In our study, all the 23 documents were researches specifically conducted on knowledge transfer within the buyer–supplier context and supplier innovation practices; hence, they specifically helped in answering the research questions.

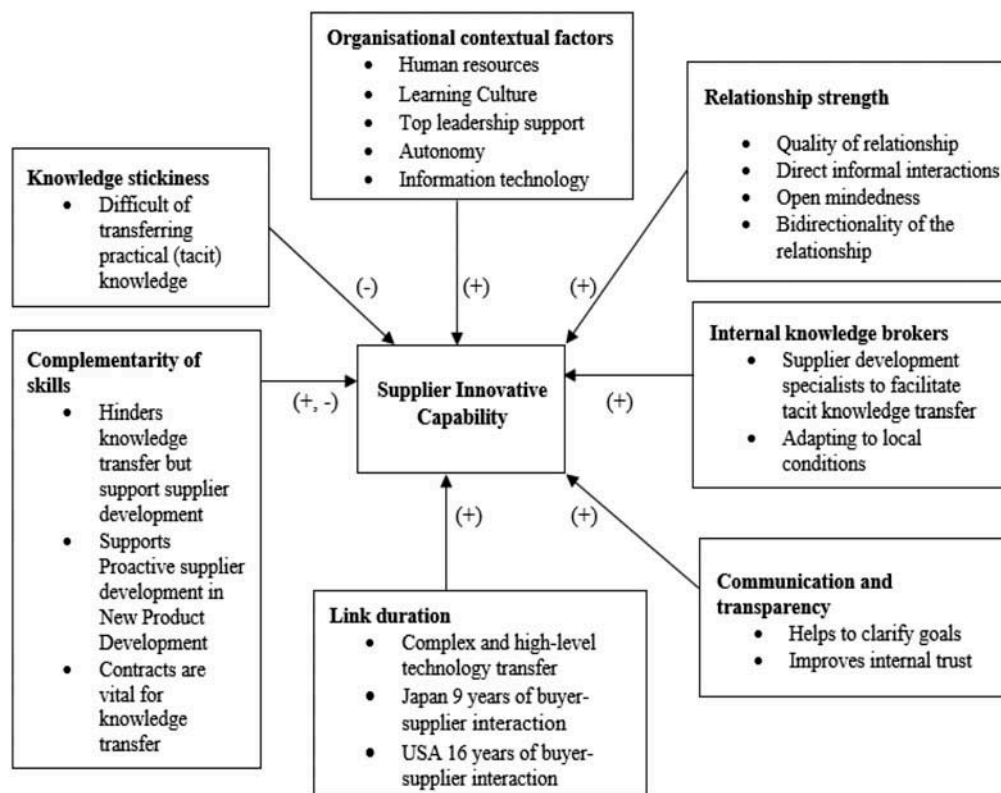
Step 5: Synthesis

Synthesis involves summarising and integrating the findings and the discussion of findings. The main findings for the research questions “What are the key facilitators and barriers of tacit knowledge transfer in buyer–supplier collaboration that influence supplier innovation capabilities?” are summarised in Figure 2. The findings indicate that organisational contextual factors, relationship strength, internal knowledge brokers, communication and transparency and link duration positively support tacit knowledge transfer. Complementarity of skills may act as a barrier to operational knowledge transfer; however, it supports learning leading to supplier development and innovation in new product development. Conversely, knowledge stickiness acts as barrier to tacit knowledge transfer when diminishing returns are reached. There is also a general consensus that when facilitators are not holistically leveraged, they turn into barriers of tacit knowledge.

Table 2. Inclusion and exclusion criteria for the literature study

Inclusion criteria	Exclusion criteria
Peer-reviewed journals	Articles focusing on innovation in general
Articles emphasising knowledge transfer within the buyer–supplier collaboration	Articles focusing on supplier development without knowledge transfer/management
Articles addressing innovation within the buyer–supplier collaboration	Articles not peer-reviewed
Articles emphasising knowledge management within the buyer–supplier collaboration.	General articles in purchasing and supply
Articles focusing on supplier development in new product development	No emphasis on creativity or innovation
Studies in the subject area from 2003 to 2019	Studies in the subject area earlier than 2003

Figure 2. Summary of facilitators of tacit knowledge transfer.



5. Results

Appendices I and II include two tables, which depict information on the articles reviewed and synthesised. Appendix I shows the articles reviewed on the main facilitators of tacit knowledge transfer and Appendix II highlights the articles reviewed on the main barriers to tacit knowledge transfer within the buyer-supplier collaboration.

5.1. Facilitators of tacit knowledge transfer

The study reveals that organisational contextual factors such as human resource management, top leadership, organisational culture, employee autonomy and information technology influence supplier innovation through knowledge exploration and exploitation. For example, information technology facilitates interactive applications such as discussion boards which in turn facilitate tacit knowledge exchanges. Further, it is noted from the results that relationship strength facilitates tacit knowledge transfer through close inter-organisation relationships characterised by frequent interactions, extended history and mutual confiding. Close relationships also rely on mutual trust, commitment and frequent communications. These attributes are important in enhancing tacit knowledge transfer and supplier innovation. An organisation with high innovation capabilities employs learning by doing approach which is associated with tacit knowledge transfer within buyer-supplier collaboration. A close relationship also allow members of the organisation to interact freely, share feelings, emotions, collaborative experiences and shared meaning. These are important antecedents for high degree of tacit knowledge transfer and innovation.

The results further indicate that organisations with long-established relationships (link duration) are better able to share knowledge in the form of technology. Long-term partners are able to overcome the hazards of opportunism in the relationship and hence, create an environment for tacit knowledge transfer. While such relationship may be susceptible to complacency, close supplier monitoring and continuous improvement may overcome complacency.

Similarly, the study indicates that communication and transparency are important facilitators of tacit knowledge transfer as they allow partners to clarify goals and to be open-minded. Internal trust is important for managing knowledge between buyers and suppliers. Trust (in form of credibility, benevolent and competence) positively supports tacit knowledge transfer between the parties by weakening formal mechanisms of tacit knowledge transfer. The study further suggests the use of internal knowledge brokers such as supplier development specialists to facilitate tacit knowledge transfer. Knowledge brokers can be used to assess and transfer good innovative practices within the buyer–supplier collaboration.

5.2. Barriers of tacit knowledge transfer

Conversely, results indicate that knowledge stickiness (difficult of transferring practical knowledge) acts as a barrier to tacit knowledge transfer because by nature tacit knowledge transfer is influenced by social embeddedness, which is characterised by close ties, trust and culture. Hence, as the cost associated with encoding tacit knowledge increases, stickiness also increases and consequently impedes tacit knowledge transfer.

Furthermore, complementarity of skills (for example, cross-functional teams) between the buyer and supplier hinders tacit knowledge transfer because tacit knowledge is socially embedded. However, complementarity of skills supports supplier development. When a supplier is given more responsibility, for example, in new product development project, the supplier may enhance its creativity and technical skills albeit challenges of exploring tacit knowledge from the buyer in the short term. The study findings further reveal that fragmentation (disintegration) in the supply chain, traditional organisation structures and working processes hinder tacit knowledge transfer within the buyer–supplier collaboration.

Figure 2 summarises the findings.

Figure 2 summarises the facilitators and barriers of tacit knowledge transfer. The sign on the arrow depicts the nature of the influence where (+) denotes a positive influence (facilitator), while (–) denotes a negative influence (barrier) and (+,–) indicate both. From the diagram, organisational contextual factors, relationship strength, internal knowledge brokers, communication and transparency and link duration facilitate tacit knowledge transfer. While knowledge stickiness, lack of integration and complementarity of skills act as barriers to tacit knowledge transfer. Paradoxically, complementary of skills (for example, cross-functional teams) while hinders knowledge transfer in the short term, it supports supplier development in the long term.

6. Discussion

The study has endeavoured to answer the research question *what are the key facilitators of tacit knowledge transfer in buyer–supplier collaboration that positively influence supplier innovation capabilities* by identifying specific facilitators. The literature review suggests that accelerating supplier innovative capabilities through tacit knowledge transfer requires a number of facilitators or enablers to be in place. As can be seen from Figure 2 and Appendix I, organisation contextual factors, such as integrated knowledge management processes, innovative human resource skills and expertise, innovative organisational culture and information technology are key in supporting tacit knowledge transfer and supplier innovation within the buyer–supplier collaboration (Chang, 2017; Gonzalez & Melo, 2018). For example, Pérez-Salazar et al. (2017) argue that information technology supports supply chain integration which in turn facilitates tacit knowledge transfer within the buyer–supplier collaboration. This finding has been echoed by Gonzalez and Melo (2018).

Other cited facilitators include organisational structure that supports collaborative leadership, autonomy and leveraging social capital between the parties in a collaborative relationship (Rottman, 2008); as well as integration of strategy and vision with the organisational structure (Cavusgil et al., 2003). Some studies have examined the influence of these contextual factors in relation to knowledge management and innovation in isolation, however, Gonzalez and Melo

(2018) propose an integrated view in order to holistically appreciate the influence of supplier organisational context on innovation capabilities of suppliers.

Further, other studies argue that the integration of strategy and vision is an important antecedent to effective exchange of tacit knowledge between the buyer and supplier (Lawson, Krause, & Potter, 2015; Monczka et al., 2010) in order to achieve sustained competitive advantage. This argument has also been echoed by Monczka et al. (2010) who argue that organisations should align their strategy and vision in such a way as to support an open innovation model within the buyer–supplier collaboration to enhance supplier innovation capabilities.

Similarly, Giannakis (2008) suggests top management support, communication and interaction processes with cross-functional teams as key facilitators of tacit knowledge transfer within the buyer–supplier collaboration. Research further suggests that in the context of tacit knowledge transfer, informal interactions premised on trust (credibility, benevolent and competence) play a key role in transferring hard to encode knowledge because it reduces the power distance among the parties. When a supplier believes in a buyer's trustworthiness in relation to its competence, integrity and reliability, they expect the buyer to behave in the supplier's interest and transfer accurate and relevant information (Balboni, Marchi, & Vignola, 2017; Giannakis, 2008). Trust further reduces the power distance between the buyer and supplier and hence enhances tacit knowledge transfer and innovation within the buyer–supplier collaboration. Buyer–supplier interactions also enhance communication between the parties (Lawson et al., 2015), which also influences tacit knowledge transfer and innovation. Since tacit knowledge is inherently difficult to codify, informal interactions create an effective avenue by the supplier to leverage the know-how, the experiences and the internalised knowledge from the buyer for innovation purposes (Cavusgil et al., 2003).

In the same context, Giannakis (2008) further contends that top management support from both the buyer and supplier is a key in developing effective communication channels and cross-functional teams necessary to enhance tacit knowledge transfer and innovation. Top management support from both the buyer and supplier enhances cooperation between individual organisations through socialisation. Individual socialisation reduces cognitive distance and aligns individual knowledge bases to the common objective of the buyer and supplier (Squire et al., 2009). Seidler-de et al. (2004) recapitulate that tacit knowledge transfer in innovation management requires personal and informal interaction, open culture and flatter structures.

In addition, it is noted from literature that the amount of experience that the buyer and supplier have in dealing with each other, commonly known as link duration is a key antecedent in tacit knowledge transfer and supplier innovation (Kotabe et al., 2003). Link duration conditions the effectiveness of tacit knowledge transfer as it enhances trust and reduces power distance between the parties. However, paradoxically, Squire et al. (2009) argue that relationship duration has a negative effect on knowledge transfer, because organisations tend to share more knowledge in the early stages of the relationship compared to matured long-term relationship (link duration). Further, Zhao (2013) suggests relationship strength between the parties as an important antecedent of tacit knowledge and innovation within the buyer–supplier collaboration as opposed to duration only. Relationship strength is the measure of relationship quality between the buyer and supplier and relates to the frequency of interactions and information transfer, bidirectionality of the relationship, confidence in one another and desire to maintain the relationship as opposed to its duration only. Squire et al. (2009) underscore the importance of interaction as a facilitating mechanism for knowledge transfer because knowledge resides in individuals and its effective transfer should be grounded in individual interactions between the buyer and supplier employees. However, the performance outcome of such interactions and knowledge transfer should diffuse in the entire organisation for it to be exploited for innovation purposes.

The study has also endeavoured to answer the other research question on *what are the key barriers of tacit knowledge transfer in buyer–supplier collaboration that negatively influence supplier innovation capabilities by identifying specific barriers*. Knowledge stickiness has been

cited as one of the main barriers to tacit knowledge transfer within the buyer–supplier collaboration. Stickiness in knowledge transfer is a metaphor coined by von Hippel (1994) as the difficulties encountered in transferring knowledge because of the cost associated with accessing and transfer information for technical innovation since knowledge is socially embedded within the organisation and its practice. Tacit knowledge by nature is difficult to encode (Nonaka, 1991), therefore, as the cost of encoding this knowledge increases, stickiness also increases. Knowledge stickiness can be caused by both organisational and personal factors. Organisational factors may relate to knowledge integration challenges among others, while personal factors may include lack of motivation to learn, often because of poor buyer–supplier relationship among others (Schuller, 2014). Further, Saini, Arif, and Kulonda (2019) reveal from the study of the construction sector supply chain that the fragmented nature of the supply chain, traditional organisation structures and working processes within the construction sector are some of the barriers of tacit knowledge transfer and supplier innovation capabilities.

However, Li (2012) conceptualises a curvilinear relationship between knowledge stickiness and supplier performance. He argues that high levels of knowledge stickiness only enhance supplier capability up to a certain point, thereafter, it decreases performance due to diminishing returns. The argument being advanced is that difficult but achievable goals may motivate suppliers to overcome stickiness challenges and solve the problem thereby acquiring the needed knowledge. However, if this difficultness because insurmountable, it becomes a barrier to tacit knowledge transfer and learning.

In addition, complementarity of skills between the buyer and supplier is also cited as another notable barrier to knowledge transfer even though it supports supplier development (Lawson et al., 2015). While differences in the types of skills possessed by the buyer and supplier may hinder the smooth transfer of knowledge, it creates a fertile ground for learning from one another more often from the buyer to the supplier. This is consistent with Noordhoff et al. (2011) argument that buyer–supplier embeddedness facilitates tacit knowledge transfer supported by commitment and trust of the players in the collaboration which lower the levels of opportunism.

These findings are summarised in Appendices I and II.

7. Conclusion and contributions of the study

7.1. Conclusion

The study has presented key facilitators of tacit knowledge transfer in buyer–supplier collaboration that should lead to supplier innovation capabilities from literature. The influence of facilitators (integration of KM processes, supplier integration, human resources, organisational culture, organisational structure, information systems and innovation, link duration, quality of relationship, trust, power relations, informal interactions, communication, relationship strength) in relation to tacit knowledge transfer and innovation must be examined holistically to comprehend their combined effect on supplier innovation capabilities.

Further, it has been noted from the literature that knowledge stickiness is one of the main barriers of tacit knowledge transfer depending on the level of application. Complementarity of skills between the buyer and supplier is also cited as another notable barrier to knowledge transfer even though it supports supplier development. It is important to stress that the opposite of facilitators often turns out to be barriers such as fragmented knowledge management processes, inadequate communication, supplier disintegration, lack of resources, lack of top leadership support and incompatible organisation culture among others.

It is further noted from literature that attention must be given to all the facilitators of tacit knowledge to support knowledge management process and supplier innovation. If little attention is given to the facilitators they may turn into barriers and can stifle tacit knowledge transfer and indeed innovation.

7.2. Contributions

The study contributes to literature by providing a holistic approach of the facilitators of tacit knowledge transfer which is required to enhance tacit knowledge transfer within the buyer-supplier collaboration to support supplier innovation capabilities. Overall companywide integration of knowledge management processes, supplier integration, effective communication and a learning culture among others, create an environment most supportive of innovation success. Buying and supplying organisations should endeavour to address the suggested facilitators while suppressing barriers of tacit knowledge transfer prior to engagement to support innovation.

The study further contributes to practice by synthesises the main facilitators of tacit knowledge transfer for managers/practitioners to consider in the buyer-supplier collaboration which can influence supplier innovation on projects such as new product development. The study has further proposed a model that will be tested quantitatively in the subsequent empirical study.

7.3. Limitations of the study

Although the study presents satisfactory results from the literature review, it has some limitations that need to be brought to the fore to give direction for future research. First, the study relied on literature based on the inclusion and exclusion criteria in Table 2. Future studies can consider testing the facilitators of tacit knowledge transfer empirically to see if indeed they support supplier innovative capabilities through the proposed model from extant literature in Figure 2. Second, the sample size used (documents used in the analysis) is relatively small (23), future studies can consider revising the inclusion criteria and increasing the sample size to see if different results can be realised.

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Other references

Appendix I

Facilitators of knowledge transfer and innovation within buyer–supplier collaboration			
Author	Methodology applied	Key issues highlighted	Contribution to the question
Gonzalez and Melo (2018)	The research surveyed 250 Brazilian automobile industry companies. The data were analysed using Structural Equation Modelling Technique using Partial Least Squares (PLS) which is suitable for small samples	The findings indicate that human resource management (HRM), leadership, culture, autonomy and ICT systems have influence over the processes of innovation from the knowledge exploration or exploitation. In addition to the above factors, interactive applications such as discussion boards are cited as important facilitators of tacit knowledge exchanges	Five organisational contextual factors supporting KT are identified: HRM, collaborative leadership practices, learning culture (characterised by mutual trust), ICT systems and autonomy influence the innovation practices of the organisation (suppliers) through knowledge exploration and exploitation. These factors facilitate the transfer and exploration of tacit and explicitly knowledge
Cavusgil et al. (2003)	An empirical study tested the tacit knowledge construct through survey of 182 manufacturing and service organisations in the USA. The study also considered the moderating role of relationship experience and organisational size	Close inter-organisation relationships are characterised by frequent interactions, extended history and mutual confiding. Close relationships also rely on mutual trust, commitment and frequent communications. These attributes are very important in enhancing tacit knowledge transfer and organisational innovation. An organisation with high innovation capabilities employs learning by doing approach which is associated with tacit knowledge transfer. Close relationship also allows members of the organisation to interact freely, to share feelings, emotions, collaborative experiences and shared meaning. These are necessary for high degree of tacit knowledge transfer and innovation	Tacit knowledge can be transferred from a partner through close and frequent interactions. Tacit knowledge makes a significant contribution to an organisation's innovation capability. Further, organisation collaborative experience contributes to tacit knowledge transfer via shared meaning. Direct interactions with partner organisation allow gradual experiential learning essential for tacit knowledge transfer. Further, open-mindedness between partner organisation employees is key to tacit knowledge transfer

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Facilitators of knowledge transfer and innovation within buyer–supplier collaboration			
Author	Methodology applied	Key issues highlighted	Contribution to the question
Giannakis (2008)	The study followed a qualitative method employing multiple case studies of supplier development programmes in four large organisations in the UK	The focus of supplier development should not be on rehabilitating poorly performing suppliers; but to proactively develop new skills and capability of suppliers. This should take a strategic approach requiring support from top management and proactive procurement management. Codification of knowledge via e-channels, development of formal channels of interactions and training are useful for effective knowledge transfer	The study suggests appointment of internal knowledge brokers such as supplier development specialists to facilitate tacit knowledge transfer. Knowledge brokers can be used to assess and transfer good practices. The study also proposes the development of organisation routines and networks for transfer knowledge across operations. Development of hybrid skills by supplier development managers that can encompass technical, managerial and social behavioural areas is important for tacit knowledge transfer
Kotabe et al. (2003)	The study surveyed US and Japanese automotive suppliers. 104 questionnaires were received from the USA and 123 from Japan for analysis. Data were quantitatively analysed using a regression model	Organisations with long-established relationships are better able to share their technology. Long-term partners are able to overcome the hazards of opportunism in the relationship and hence, create an environment for tacit knowledge transfer. While such relationship may be susceptible to complacency, close supplier monitoring and continuous improvement may overcome complacency. Small scale technical exchanges also promote supplier performance improvement especially in USA compared to Japan	The effect of technology transfer in the buyer–supplier relationship increases with the duration of the relationship (link duration). Link duration, for example, in Japan is 9 years while in the USA is 16 years for technology to make an impact on supplier performance. Further, prior link duration is necessary for more effective complex and high-level technology transfer. And high-level technology transfer works better in long established buyer–supplier collaboration
Rottman (2008)	Interviews were conducted with US manufacturers and their Indian partners over two years. The study used an interpretative qualitative study approach	Utilising multiple suppliers and social capital increase the organisational ability to create and manage tacit knowledge transfer. Knowledge retention is also important, this can be achieved by having shadows for key suppliers. Relational trust among partners further creates an enabling environment for tacit knowledge transfer	Cultural understanding is key to tacit knowledge transfer between diverse partners. Communication and transparency have also been cited as facilitators of tacit knowledge transfer as they allow partners to clarify goals and to be open minded. Internal trust is important for managing knowledge between buyers-suppliers

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Facilitators of knowledge transfer and innovation within buyer–supplier collaboration

Author	Methodology applied	Key issues highlighted	Contribution to the question
Balboni et al. (2017).	A survey of an Italian manufacturer consisting of 105 relationships was conducted. Data were analysed using a hierarchical multiple regression analysis	The study indicates that both formal and informal mechanisms are important in supporting knowledge transfer between customers and suppliers. Trust (credibility, benevolent and competence) positively support knowledge transfer between the parties. And formal mechanisms of knowledge transfer are weakened with high trustworthiness	The study distinguishes between formal (databases and reports) with informal interactions mechanisms of knowledge transfer. Informal mechanisms based on social interactions and open communication favour tacit knowledge transfer through transfer of experiences. Trust has been cited as an important moderating variable in tacit knowledge transfer
Md-saad et al. (2016)	A conceptual study focusing on strategic alliances in the form of international outsourcing demonstrates the importance of prior knowledge, business relatedness and interactive involvement tacit knowledge transfer	Findings indicate that absorptive capacity is a critical requirement to tacit knowledge acquisition which is facilitated through prior knowledge, business relatedness and interactive involvement between the supplier and the buyers	Tacit knowledge transfer within buyer–supplier strategic alliance will require the absorptive capacity of the supplier and its employees. Further, prior knowledge, business relatedness and interactive involvement mediates tacit knowledge transfer between the buyer and supplier
Liu, Li, Shi, and Liu (2017)	A matched dyadic survey of 255 buyer–supplier pairs of home appliance manufacturers in China was conducted. Data were analysed quantitatively using hierarchical regression, descriptive statistics and Pearson correlations	Focus on how governance mechanisms such as transactional (contracts and transactional specific-investments) and relational (trust and personal relationship) facilitate transfer of credible knowledge within vertical relationships	Contracts may increase knowledge quantity than transactional specific investments within the transactional mechanism. While trust improves the quantity and credibility of knowledge transferred within the buyer–supplier relationship. Credibility is an important antecedent to knowledge transfer and supplier performance. Contracts are vital forms of formal knowledge transfer through formal channels of communication and interaction, thereby supporting knowledge credibility

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Facilitators of knowledge transfer and innovation within buyer–supplier collaboration			
Author	Methodology applied	Key issues highlighted	Contribution to the question
Lin and Wei (2018).	The study uses simulation to understand the impact of innovation intermediary on the knowledge transfer and growth with network systems	The findings indicate that innovation intermediary provide an enabling environment for knowledge transfer. And selecting partners based on innovative ability greatly improves their performance as opposed to random selection or absorptive capacity	Innovative intermediary improves the efficiency of knowledge transfer in a network. Collaboration with innovation intermediary minimises market inefficiencies in terms of knowledge transfer
Seidler-de Alwis, Hartmann & Gemünden (2004)	A literature review study was conducted. And an integrated model developed focusing on the impact of tacit knowledge on innovation	Tacit knowledge is an important driver of innovation success in an organisation. The study supports adaptation of innovation to specific company requirements	The study proposes a model which enables organisations to adapt tacit knowledge management to contextual innovation requirements, and therefore, optimise their innovation success
Chang (2017).	The study was conducted in the manufacturing industry in China. A sample of 277 questionnaires was considered for the study and data were quantitatively analysed using multiple hierarchical linear regression analysis	The study focused on channel integration mechanisms (supplier involvement and joint planning) on knowledge acquisition and product innovation. The study also distinguishes the importance of product knowledge and customer product knowledge of product innovation and argues that the latter is important even though it has received less attention in supply chain literature	The findings reveal that supplier involvement in knowledge acquisition and innovation has a greater influence than supplier joint planning. Secondly, economic incentives within buyer–supplier collaborations positively moderate the relationship between supplier joint planning and knowledge acquisition
Zhao, 2013)	The study focused on suppliers working with manufacturers in new product development (NPD) in China	The finding from the study indicates that relationship strength facilitates tacit knowledge transfer to suppliers and that tacit knowledge transfer to suppliers positively influences suppliers' new product performance. The study also supports that trust and knowledge transfer supports knowledge transfer	Relationship strength and frequent interactions are important antecedents of tacit knowledge transfer in buyer–supplier collaboration. Tacit knowledge influences supplier performance in terms of shortening new product development and improving product quality

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Facilitators of knowledge transfer and innovation within buyer–supplier collaboration			
Author	Methodology applied	Key issues highlighted	Contribution to the question
Chen (2015).	The study conducted a literature review focusing on collect 30 supplier development activities. The data were then consolidated and synthesised. This was followed by co-occurrence coefficient analysis	Buyer–supplier involvement in knowledge transfer such as knowledge acquisition, knowledge emission and joint knowledge transfer has been recognised in buyer–supplier collaboration. Supplier development may involve knowledge acquisition, selection, generation, assimilation and emission (first-order activities) as well as knowledge measurement, leadership, coordination and control (second-order activities)	Managers must detect potential activities (pre-requisites) before engaging in supplier development (buyer–supplier collaboration) Knowledge transfer is also a precursor to knowledge transfer within the buyer–supplier collaboration. Supplier development may involve first-order knowledge management activities (i.e., knowledge acquisition, selection, generation, assimilation and emission) as well as second-order knowledge management activities (i.e., knowledge measurement, leadership, coordination and control)
Hur and Kim (2014):	A survey of 136 SME suppliers of major Korean firms was conducted and quantitatively analysed hierarchical regression analyses to test the hypotheses of the study	Supplier development must proactively focus on either managerial objectives such as creativity and innovation practices or routine practices such as cost, quality and delivery times. For the purposes of supplier innovation capabilities, managerial objectives must be the focus in supplier development	The study distinguishes between managerial knowledge transfer and operational knowledge transfer. Managerial knowledge transfer results in significant improvement such as innovation while operational knowledge transfer focuses on routine activities such as cost, quality and delivery
Marina Du Plessis (2007).	A literature review and synthesises, with personal experiences in knowledge management was conducted in South Africa	Knowledge management ensures accessibility of the knowledge generated through innovation. The study proposes knowledge integration that can results in innovation. The study further argues that there should be a linkage between knowledge integration and adaptability of the knowledge. The study also suggests effective communication, absorptive capacity and knowledge exchanges as facilitators of knowledge transfer for innovation	Knowledge management facilitates the creation of tools, platforms and processes for tacit knowledge. Tacit knowledge, in turn, plays an important role in innovation process Knowledge management provides an enabling environment for transfer tacit knowledge. Further, knowledge management facilitate the transformation of tacit knowledge into explicit knowledge through transfer of meaning in communities of practice centred on innovation Knowledge management facilitates collaboration in the innovation process

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Facilitators of knowledge transfer and innovation within buyer–supplier collaboration			
Author	Methodology applied	Key issues highlighted	Contribution to the question
Mollahosseini and Barkhordar (2010).	The study utilised secondary data of key literature on knowledge management and supplier development and applied the Modi and Mabert (2007) model	Good supplier relationship is important to respond to dynamic and uncertain environments. Knowledge management facilitates supplier development which in turn may lead to competitive advantage through superior performance	Developing good supplier relationship is an important facilitator of knowledge transfer. Knowledge management is a facilitator of supplier development
Modi and Mabert (2007).	A survey was conducted of 215 manufacturing organisations in the USA. The study focused on testing buying organisation's perceptions of supplier development efforts. Data were quantitatively analysed using latent variable structural equation modelling	The study emphasises the role of collaborative communication in supplier development. The study further introduces the concept of operational knowledge transfer activities and value creation within the supplier development context	Operational knowledge transfer activities help an organisation to improve supplier capabilities in form of improved organisation performance. Operational knowledge transfer activities also facilitate collaborative communication between partners and knowledge transfer The study further proposes the development of special functional groups within organisations to support supplier development programmes. The study recommends evaluation and certification efforts as a minimum requirement before supplier development can be carried out
Schoenherr et al. (2014).	A sample of 195 SME importers working in the manufacturing industry was used. Structural equation modelling using partial least squares was used to test the hypotheses	The supply chain knowledge management provides an enabling environment for the transfer of tacit and explicit knowledge. Supply chain knowledge management capability positively influences prior knowledge present within the supply chain	Tacit knowledge has a greater impact on supply chain performance compared to explicit knowledge. Greater collaboration and interactions among supply chain partners facilitates the transfer of tacit knowledge

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Facilitators of knowledge transfer and innovation within buyer–supplier collaboration			
Author	Methodology applied	Key issues highlighted	Contribution to the question
Squire et al. (2009).	The study surveyed 104 UK manufacturing companies and data were quantitatively analysed using multiple hierarchical regression analysis	The findings reveal that cooperation supports knowledge transfer; however, this is positively moderated by trust and supplier performance. Relationship duration negatively support knowledge transfer, organisation share more knowledge in the early stages of the relationship compared to mature relationship	Inter-organisation trust and supplier performance facilitate knowledge transfer in the buyer–supplier collaboration. While relationship duration has a negatively effect on knowledge transfer. This is because companies tend to share more knowledge in the early stages of the relationship compared to mature relationship
Wagner and Krause (2009)	A survey of 61 European research institutions was conducted. Data were quantitatively analysed using descriptive statistics, correlation analysis and hierarchical regression analysis	The study summaries supplier development activities into two categories: indirect or externalised (evaluation of the supplier and provision of explicit information among others) and direct or internalised (provision of in-depth technical knowledge and interactive transfer of tacit knowledge). The study also reveals that buyers invest in communication systems at varying degrees depending on the goals they need to achieve within buyer–supplier collaborations	Organisations distinguish between two supplier development goals: product delivery performance and supplier capability improvement Buyer's supplier development goals are not influenced by the buyer's feedback and evaluation of the supplier Knowledge transfer is facilitated by supplier development goals and employee exchanges between partners Buyer's focus on supplier capability improvement through knowledge transfer also entails more reliance on supplier human resources and interactions

Appendix II

Barriers of knowledge transfer and innovation within buyer–supplier collaboration			
Author	Methodology applied	Key issues highlighted	Contribution to the question
Li (2012)	A survey of 110 Executives in Taiwanese original equipment manufacturers (OEM) was conducted. Data were analysed quantitatively using multiple regression analysis was used to test hypotheses	Knowledge stickiness (difficult of transferring practical knowledge) has been proposed to provide both positives and negatives. On the one hand, it acts as a barrier to supplier capability development while on the other side it supports problem-solving activities. Further, it can be argued that difficult but achievable goals motivate suppliers to overcome the stickiness of knowledge	The study proposes a curvilinear relationship between knowledge stickiness and supplier capability. High levels of knowledge stickiness only lead to high supplier capability up to a certain point thereafter, it decreases performance due to diminishing returns Knowledge transferred from the buyer to the supplier can enhance supplier capabilities which in turn can contribute to product innovation Supplier capabilities facilitate supplier commitment which in turn supports supplier performance Knowledge transfer is also influenced by social embeddedness, which is characterised by close ties, trust and culture
Lawson et al. (2015)	A survey of 153 medium-to large-sized and 10 semi-structured interviews were conducted in the UK. Data were quantitatively analysed using structural equation modelling	The findings of the study indicate that supplier's greater responsibility contributes significantly to new product development through creativity and innovation. However, similarity of technical skills between the buyer and supplier only facilitate knowledge transfer and limit the need for supplier development. Further, there is a negative relationship between single sourcing and supplier development and finally, supplier development in new product development improves supplier performance in terms of creativity and technical capabilities	Complementarity of skills (cross-functional) between the buyer and supplier supports supplier development but may hinder knowledge transfer. When a supplier is given more responsibility in new product development project, the supplier may enhance its creativity and technical skills Investment in relationship-specific may enhance tacit knowledge transfer between the buyer and supplier, and hence contribute to supplier innovative capabilities which can be manifested through relationship rents (superior performance) The study emphasises on proactive supplier development in new product development

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Barriers of knowledge transfer and innovation within buyer–supplier collaboration

Author	Methodology applied	Key issues highlighted	Contribution to the question
Saini et al. (2019)	The study is a mixed study conducted within the construction sector which identifies six challenges of tacit knowledge transfer from literature which are quantitatively validated	The study findings indicate that that fragmented (lack of integration) nature of the supply chain, traditional organisation structures and working processes within the construction sector some of the challenges hindering tacit knowledge transfer	Construction sector supply chain fragmentation, traditional organisation structures and working processes are the main barriers to tacit knowledge transfer



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