

Inter-Firm Knowledge Transfer between Strategic Alliance Partners: A Way Forward

Running head: Mapping the Upstream Research Decisions

Qile He^{*1}

College of Business, Law and Social Sciences, University of Derby, Kedleston Road, Derby, DE22 1GB, UK

q.he@derby.ac.uk

+44 (0)1332 591 208

Abby Ghobadian^{*1}

Henley Business School, University of Reading, Greenlands, Henley-on-Thames, Oxon, RG9 3AU, UK

abby.ghobadian@henley.ac.uk

+44 (0)1491 571 454

David Gallear

Brunel Business School, Brunel University London, Kingston Lane, Uxbridge, UB8 3PH, UK

David.Gallear@brunel.ac.uk

+44 (0)1895 267 077

¹ *Corresponding Author: **Qile He**, College of Business, Law and Social Sciences, University of Derby, Kedleston Road, Derby, DE22 1GB, UK. Email: q.he@derby.ac.uk, Tel: +44 (0)1332 591 208.

Abby Ghobadian, Henley Business School, University of Reading, Greenlands, Henley-on-Thames, Oxon, RG9 3AU, UK. Email: abby.ghobadian@henley.ac.uk, Tel: +44 (0)1491 571 454.

Inter-Firm Knowledge Transfer between Strategic Alliance

Partners: A Way Forward

ABSTRACT

Strategic alliance (SA) is pursued by a diverse array of firms motivated by a range of factors. Among the SA themes, knowledge transfer (KT) has gained significant popularity over the past fifteen years. The developing literature is ontologically, epistemologically, and methodologically diverse. In spite of helpful reviews, the intellectual structure (up-stream decisions) of SA–KT research remains unclear, arguably resulting in the accidental rather than deliberate diversity potentially slowing the advancement of knowledge, its efficacy, its interpretation, and utility. By systematically analysing the intellectual structure of the empirical SA–KT studies published in peer-reviewed journals between 1990 and 2017 we address these shortcomings. The aim is to identify the preponderance of particular methods, and/or analytical procedures, developing the essence of the established research conventions. By reviewing the up-stream rather than the more conventional down-stream decisions, we offer an alternative approach to conducting systematic management literature reviews helpful to future researchers.

Keywords: knowledge transfer, strategic alliance, inter-firm relationship, methodology, systematic review.

INTRODUCTION

The decision to enter a strategic alliance (SA) is among the most frequently exercised organizational decisions (Inkpen and Tsang, 2016), fuelling considerable growth in research output (Gomes et al., 2016). Motives for entering SAs are numerous and among them is access to and transfer of knowledge, a theme attracting increasing attention over the past fifteen years (Gomes et al., 2016). Despite increasing interest, a fine-grained, systematic literature review revealing the intellectual structure (ontology, epistemology, methodology, method and data sources) of strategic alliance–knowledge transfer (SA–KT) research is missing, arguably hindering the development of the field. We address this gap, advancing our nascent knowledge and contributing to the development of better focused and more effective future research. The importance of revealing the intellectual structure of SA–KT is discussed in the following paragraphs. A comparison between this systematic review and the previous reviews is presented in the next section, revealing minimal overlap.

The building blocks of intellectual structure (up-stream decisions) – ontology, epistemology, methodology, method, and data source – have a profound impact on the research outcome (the down-stream product of the research) and its interpretation (Bryman, 2012; Grix, 2002; Podsakoff and Dalton, 1987). The up-stream decisions shape the questions asked, how questions are posed, how answers are sought, and how they are interpreted and used (Bryman, 2012; Grix, 2002; Podsakoff and Dalton, 1987). Developing a clear understanding of intellectual structure enables the field of study to advance knowledge effectively. Unusually for the management field, three of the previous literature reviews have made attempts to highlight elements of intellectual structure of SA research up to a point (see next section). In our review we delve deeper, focusing on SA–KT themes not addressed by previous reviews.

A review of the intellectual structure of the SA–KT field is particularly important, not least because scholars suggest that the SA literature has evolved using diverse approaches (Culpan, 2008; López-Duarte *et al.*, 2016; Meier, 2011) in a disjointed, accidental manner, which has impeded its collective advancement (Shi *et al.*, 2011). This broad observation raises an important question: Is this insight applicable to the SA–KT field? We contend that the answer largely depends on whether the diversity of intellectual structure is deliberate or accidental. Deliberate diversity is likely to advance the field of study incrementally or radically. Planned systematic diversity facilitates incremental broadening of knowledge by, for example, varying context. Deliberate departure from the tried and tested ontology and/or epistemology may bring a radical change to the existing wisdom. On the other hand, accidental/disjointed diversity is likely to impede development by creating unrelated knowledge. Poor understanding of intellectual structure also makes interpretation of outcomes more imprecise; hence, in fields such as medicine, particular attention is paid to up-stream decisions and the interpretation of outcomes is linked to these decisions. Systematically chronicling the intellectual structure of SA–KT research addresses this question, allowing future researchers to make better informed choices and facilitating a more effective knowledge accumulation. Therefore, we pose and answer the question: What is the intellectual structure of the SA–KT field? More specifically we examine what methodologies and methods are employed in the study of SA–KT. This question, despite the significance of KT as a key motive (pre-agreement phase of SA) and outcome (post-agreement phase of SA), has received little academic attention.

In this paper, we systematically review up-stream decisions (methodology, method, and data sets) deployed in the study of SA–KT, revealing the intellectual structure of the field.

Working backwards from the method and methodology, we shed light on the ontological and epistemological choices underpinning these studies. Such a review is of value since revealing the intellectual structure of the field enables future researchers to better: position their research effort; identify gaps; make informed up-stream decisions; assess strengths and shortcomings of the research; and to further the theoretical and empirical development of the research field (Bryman, 2012; Gray, 2013; Grix, 2002; Podsakoff and Dalton, 1987). Moreover, revealing the intellectual structure of the field improves the organization and the exploitation of research outcomes.

The rest of the paper is organised as follows. Next we provide a brief review of the literature followed by a description of the systematic review methodology deployed. We then present our detailed analysis, discussion, and the implications for future research.

LITERATURE REVIEW

The extant literature points to the significance of KT to both pre- and post-SA formation phases and as a key focus of past research (Becerra *et al.*, 2008; Inkpen and Tsang, 2016; Oxley and Wada, 2009). Gomes *et al.*'s (2016) extensive literature review points to an increasing interest in examining SA–KT relationship. This is unsurprising as knowledge, in the post-industrial economy, underpins competitive advantage (e.g., Grant and Baden-Fuller, 2004; Kale *et al.*, 2001; Muthusamy and White, 2005). Hence, understanding the SA–KT relationship is of paramount importance to both academics and practitioners.

SA's increasing popularity, thematic diversity, and complexity has resulted in a number of helpful reviews (Burgess *et al.*, 2006; Christoffersen, 2013; Gomes *et al.*, 2016; López-Duarte *et al.*, 2016; Meier, 2011; Reid *et al.*, 2001, among others). A succinct analysis of

these six key reviews under nine headings – aims, review methodology, review time frame, focus of review (up- and/or down-stream), underpinning theory, form and phase of inter-organizational collaboration covered, industry scope, key findings, and level of overlap with the current review – is presented in Table 1. Three previous reviews recognized the importance and contribution of the intellectual structure (up-stream decisions) of the field to its development (Burgess *et al.*, 2006; Gomers *et al.*, 2016; López-Duarte *et al.*, 2016). However, there is little overlap with the current review due to major differences in aim, form and phase of inter-organizational collaboration, thematic focus, and comprehensiveness of constructs representing intellectual structure extraction criteria (see Table 1). Our analysis of intellectual structure is deeper, drawing on the work of Podsakoff and Dalton (1987) to identify critical up-stream decisions. There is thematic overlap with Meier (2011), but that is the extent of the intersection as the focus of the two studies is entirely different (see Table 1). The definition of SA used in this study is similar to that used by Christoffersen (2013), López-Duarte *et al.* (2016), and Meier (2011), thus enhancing its face validity. Like all other studies, with the exception of Reid (2001), we focus on the post agreement phase of SAs. In summary, these observations established the need for our reviewable research question, highlighting that there is little overlap between our reviewable research question and that posed by the other six literature reviews examined.

Insert Table 1 about here

The SA–KT literature is characterised by methodological diversity (Culpan, 2008; López-Duarte *et al.*, 2016; Meier, 2011) exhibiting ontological and epistemological

heterogeneity. Furthermore, SA-related research has developed in a disjointed/accidental manner impeding its collective advancement (Shi *et al.*, 2011). As noted above, the paucity of systematic reviews of the intellectual structure of the SA–KT field is hampering the successful and systematic development of the field of study, decreasing the likelihood of replication and extension, key requirements for developing robust concepts and theories.

Accordingly, the aim of this paper is to reveal the intellectual structure of the field by mapping out the methodology and method of the empirical research dedicated to examining SA–KT. We attempt to highlight the conventions of the research methodology used to produce down-stream research output. Moreover, we identify the dynamics that may account for a preponderance of particular methods and/or analytical procedures and identify potential gaps in the current intellectual structure. This in turn allows us to offer suggestions for future research from a methodological perspective. This paper also provides future researchers in business and management with an alternative approach to conducting systematic literature reviews.

METHODOLOGY

Systematic review provides an effective pathway to producing a new perspective on a carefully demarcated piece of knowledge resulting in advancement of a field of study (Wolfswinkel *et al.*, 2013). Taking our lead from key scholars – e.g., Denyer *et al.* (2008), Rousseau *et al.* (2008), Wolfswinkel *et al.* (2013) and Adams *et al.* (2016) – we followed a five-stage process, each comprising a number of steps.

Stage one comprised of two steps. First, we established the need, scope, and aim of the review (as discussed above). Second, we developed the following reviewable questions related to the study of SA–KT:

- a) What methodology and methods are used?
- b) What are the boundaries for these studies?
- c) What are the independent and dependent variables and analytical methods?

Ontological and epistemological assumptions underpin methodology and method (Blaikie, 2000; Blaxter *et al.*, 1997). By addressing the above questions, we shed light on the ontological and epistemological assumptions underpinning SA–KT research. The need, scope, aim, and reviewable questions guided the succeeding stages.

At stage two, we developed definitions for the key selection elements – SA, KT, and empirical research. For SA, we adopted Teece’s (1992: 9) definition: ‘voluntary agreements characterized by commitment of two or more firms to reach a common goal entailing some pooling of their resources or activities’. We selected this definition because it overlaps with a number of other widely used SA definitions (e.g., Culpan, 2009; Gulati, 2000; Inkpen and Dinur, 1998) and because of its similarity with the definition used in prior reviews (Christoffersen, 2013; López-Duarte *et al.*, 2016; Meier, 2011). We excluded papers examining public–public and public–private organizational alliances. Our reason was twofold. First, reference to ‘firms’ in our chosen definition points to for-profit organizations excluding public organizations. Second, differences between public and private goods means that pre- and post-SA agreement hurdles are different and that there are significant differences between absorptive capacity of public and private organizations (Ghobadian *et al.*, 2004). Hence, we

excluded these types of alliances to maintain unit of observation homogeneity. Moreover, SAs assume different governance structures intended to pursue different ends (Culpan, 2008). The governance form spans from informal ‘relational contract’ (e.g., supplier–buyer partnership) to contractual agreements (e.g., franchising) to ownership links (e.g., joint venture and cross equity holdings). Teece’s (1992) definition encompasses the full range of all governance forms. Hence, all were included in our review. Furthermore, this definition incorporates all SAs irrespective of intention, and hence we included all SAs irrespective of intention, selecting papers addressing the post-agreement phase. For KT we used Wiig’s (1997) conceptualization – bringing together, through a multi-stage process, knowledge from various sources to a point where its value is realized. This conceptualization points to KT occurring through multiple stages. As our starting point, we used the stages proposed by Zahra and George (2002) – acquisition, assimilation, transformation, and exploitation – as they are interrelated steps of effective KT. Finally, we used the accepted definition of *empirical research* – that is to say, research utilizing systematic information gained by means of observation, experimentation, or elicitation of third-party experience (Scudder and Hill, 1998).

The third stage consisted of three steps. First, we developed a procedure for locating the review material. We restricted our search to papers published in general management, strategy, organizational development/science, marketing, knowledge management, operations management, supply chain management, and HR journals with an SSCI index between 1990 and 2017. We chose this period because many of the key conceptual papers covering SA–KT date back to the mid-1980s, while the empirical work started to emerge in the 1990s (see Figure 1). Second, we developed search terms and strings by identifying seminal papers and analysing author-supplied keywords coupled with extensive discussion with three experts in

the field of study. Third, we systematically combined our first search terms with the second search terms to form search strings, for example: ‘Alliance, Strategic Alliance, Joint Venture, Partnership, AND Inter-firm Knowledge Transfer, Knowledge Acquisition, Knowledge Sharing’. These strings were deployed to generate a coarse list of publications by searching three major electronic databases – EBSCO, Emerald, and Science Direct – along with our inclusion criteria. In addition, we examined the title pages of our selected journals to test the robustness of our search strings and ensure that we had not missed any relevant publications. This process yielded 339 publications.

At the fourth stage, we examined the coarse list of publications in detail with the aim of generating a refined list for detailed analysis. A pre-agreed two-step process was used to decide which of the 339 articles to keep. As a first step, one researcher examined all the articles in our coarse list, while the other two researchers each examined half of the articles. We deployed this process because it is robust and resource efficient. One researcher reviewed all the papers developing a detailed overall view while the other two researchers examined half of the publications each reducing potential cognitive bias if the review was carried out by only two of the researchers. This process proved efficient because reviewing all the papers by three researchers would have otherwise created unnecessary workload. Accordingly, each publication was independently judged by two researchers. We only kept articles that explicitly focused on inter-firm KT or inter-organizational learning. We also examined the conceptualization of constructs to determine their relevance, concluding in the exclusion of a number of articles despite ‘KT’ appearing in their titles (e.g., Dushnitsky and Shaver, 2009; Lichtenthaler and Lichtenthaler, 2009). In the case of studies containing multiple stages or phases, we concentrated on the empirical stage of the study for the purpose of this review. In the second step we compared the inclusion/exclusion decisions made independently by the

researcher who had reviewed all the papers and the other two researchers who each had reviewed half of the papers. In the case of disagreement, where one had decided on inclusion and the other on exclusion – only two papers in total – the paper was discussed by the three researchers in detail with reference back to the inclusion/exclusion criteria. In each case, a unanimous inclusion/exclusion decision was reached. As a result, 156 papers were selected from 53 journals. Figure 1 supports our decision to use 1990 as our starting point and reflects the increasing research interest in the field.

Insert Figure 1

Data extraction was the focus of the fifth and the final stage. The extant literature argues that a priori design is essential to maintaining objectivity, validity, and reliability (Tranfield *et al.*, 2003). Objectives are the key determinants of abstracting variables/dimensions (Neuendorf, 2002: 11). Our starting point, given the objectives of this study, was the 12 dimensions/variables proposed by Podsakoff and Dalton (1987) for mapping up-stream research decisions. These were augmented with additional dimensions/variables (such as range of analysis, type of inter-firm relationship, type of inter-firm KT, and KT process) to more fully address our objectives of mapping the up-stream research decisions as well as capturing SA–KT specific dimensions (see Table 2 for coding dimensions). This stage entailed two steps. First, based on the rationale presented previously, all of the publications were codified independently by two researchers. One researcher codified all the publications while the other researchers each codified a proportion of the publications. The initial inter-rater reliability was 0.84, which is an acceptable figure (Miller and Friesen, 1984). In the

second step, the researchers discussed the disputed cases – where coding differences were present – and agreement was reached in all cases.

Insert Table 2 about here

RESULTS

The following sections present our analysis based on cross-tabulations between categories of concepts.

Data collection strategy and setting

Organizational studies' primary data collection approaches comprise survey, experimentation, archival, field, or a mix of these methods (Podsakoff and Dalton, 1987).

Insert Table 3 about here

Table 3 shows the overall incidence of use of each data collection strategy. The majority of studies reviewed deployed surveys (56.4%), followed by archival (24.4%), field (19.2%), and experimentation (0%). Field-based studies, if conducted systematically, offer reliable description. However, in reviewing the field-based studies, we detected paucity in embedded case studies (e.g., Berard and Perez, 2014; Dyer and Nobeoka, 2000; Sornn-Friese and

Sorensen, 2005), an excellent approach for producing rich data critical in the development of a robust descriptive theory.

The data collection method suggests a preponderance of an ontological position that asserts that the SA–KT phenomenon and context is independent of social actors (Bryman, 2012). Hence, objectivism provides the starting position of much of the research. The dominant epistemological position is positivism (e.g., Hult *et al.*, 2004; Musarra *et al.*, 2016; Sornn-Friese and Sorensen, 2005). It is more difficult to offer a conclusive view when it comes to the field studies without a deeper examination of actual methods. Our analysis suggests that a very small number adopted a constructivism ontology and interpretivist epistemology (e.g., Holt *et al.*, 2000; Lam, 1997). The field appears to be dominated by foundationalist ontology leading to positivist epistemology.

Sample characteristics

The characteristics of the samples – an important contextual dimension – were examined focusing on three key variables: industrial composition, position of respondents, and the geographic location. A high proportion of the studies used a cross-sectoral sample (35.9%), followed by manufacturing (12.2%), and high-technology (10.9%). Studies drawing on the manufacturing and high-technology firms used a cross-section of firms. Therefore, in total 59% of studies drew on cross-sectoral samples where the contingency factors may have influenced the outcomes of the studies.

The choice of respondents is important to reliability. The majority of the studies reviewed (60.8%) drew their respondents from among appropriate senior managers. Appropriateness of respondents is among the strengths of the prior studies. However, nearly

half of the studies (49.4%) relied upon a single key informant, giving rise to potential common method variance (CMV).

Insert Table 4 and 5 about here

In terms of geography (see Table 4), the majority of studies drew their sample from among firms operating in the US (26.9%) and European countries (26.3%). Among emerging economies, Chinese firms provided the context for a significant proportion of studies (nearly 8%) but others like India, Russia, and Brazil were underrepresented, leaving an important gap in our study, given the growing significance of these latter countries and the importance of knowledge in their future development. A significant proportion of studies (circa 26%) were transnational, affected by the confounding impact of contingency factors. Lack of control variables in some of these studies raised reliability related issues (e.g., Lew *et al.*, 2013; Nielsen and Gudergan, 2012).

Data collection methods and sample characteristics

We examined sample size, frequency of single and mixed data collection methods, number of respondents, and the time span of studies (see Table 5). The average sample size for surveys was reasonably high (165.6 respondents), but the standard deviation was also high and the range broad. The average sample size was much bigger in studies using archival data sources, as a good number of those studies relied on panel data (e.g., patent citation data) extracted from large business databases (e.g., Caner and Tyler, 2015).

The majority of studies used a single data collection method. Mixed methods, when deployed, were mainly used in field-based studies (e.g., Blumenberg *et al.*, 2009), another pointer to the preponderance of foundationalist ontology and positivist epistemology. We contend that there is a need for more studies using mixed methods combining potentially opposite ontologies and epistemologies leading to the formulation of complementary questions and analysis. As expected, most of the survey-based studies relied on pre-coded constructs. A minority of these studies augmented questionnaire data with archival or interview data, in pursuit of triangulation (e.g., Heimeriks, 2010; Heimeriks *et al.*, 2015; Lane and Lubatkin, 1998). Interviews provided the dominant data collection method for the field-based studies, but more than half of them augmented interviews with observation or archival data, thus generating richer and more balanced information (e.g., Dyer and Nobeoka, 2000; Santos and Baptista, 2016). Moreover, the great majority of field studies relied on multi-informants, enhancing triangulation and creating greater confidence in findings (e.g., Blumenberg *et al.*, 2009).

The majority of surveys relied on single respondent cross-sectional approaches that are susceptible to CMV (Podsakoff *et al.*, 2003). Although limited in number, an increasing number of studies sought to take steps to reduce the likely impact of CMV or report on tests to assess its potential influence (e.g., Musarra *et al.*, 2016; Yoo *et al.*, 2016).

We examined the time span covered by the studies reviewed. Three predefined categories were used: cross-sectional – when the study offered a snapshot taken at one particular time; cross-sectional time-series – where the study used standard repeated measures, collected at predefined time intervals; and longitudinal – where the study used data collected at two or more time periods, but not all measures were repeated. The majority of studies were cross-sectional (72.4%), particularly studies that used surveys for data collection (97.7%). Cross-

sectional studies lack sufficient reliability in differentiating cause and effect from simple association and could therefore be subject to criticism. Our findings highlight the need for more longitudinal or time-series based studies. A significant number of archival studies used cross-sectional time-series data (63.3%), which are better geared to detecting causal relationships. A significant number of field-based studies (36.7%) used longitudinal design, which is less likely to be biased by random time-invariant factors and are therefore better for developing robust descriptive theory.

Strategic alliance format

Strategic alliances between private firms assume different purposes and configurations; this, in turn, is likely to influence the attitude to and shape of KT (Koka and Prescott, 2002). Therefore, to develop a robust mid-range theory, it is essential that a broad range of SAs provide the backdrop for the study of KT. However, we found that KT is studied in a narrow range of SAs (see Table 6). The majority of studies (41%) used the terms SA – a coarse rather than a fine-grained description of purpose and configuration (e.g., Cambra-Fierro *et al.*, 2011; Jiang *et al.*, 2016; Santos and Baptista, 2016). Hence, our finding points to the need for future studies to articulate more clearly the purpose and configuration of SA.

Insert Table 6 about here

Types of inter-firm knowledge transfer

Four types of learning – ‘learning from’, ‘learning together’, ‘learning to manage’, and ‘learning about’ – take place within an SA, thereby shaping outcomes (Inkpen and Tsang,

2005). ‘Learning from’ occurs when one partner gains access to another partner’s knowledge (e.g., Musarra *et al.*, 2016). ‘Learning together’ ensues when SA partners jointly develop new knowledge (e.g., Wu and Cavusgil, 2006). ‘Learning to manage’ occurs when knowledge gained from one alliance is applied to the management of other alliances (e.g., Heimeriks, 2010). The final form of learning is concerned with acquisition of knowledge *about* an alliance partner in support of effective operation of the SA (e.g., Heimeriks *et al.*, 2015). Applying these definitions, we categorised the studies by type of learning.

The dominant form of learning covered by the prior literature was ‘learning from’ (66.7%), followed by ‘learning together’ (23.1%) (see Table 7). Only a small proportion of studies covered ‘learning to manage’ (9.6%) or ‘learning about’ (0.6%), thus representing a significant gap. Extant literature points to knowledge regarding alliance partners and its management as an important determinant of success/failure (Das and Teng, 2000; Zineldin and Dodourova, 2005). Hence, the paucity of studies examining ‘learning to manage’ and ‘learning about’ are hampering our nascent understanding of the role and contribution of these two types of learning to the longevity of SAs.

Insert Table 7 about here

These findings also have important implications for the development of the field. Implicitly, studies examining ‘learning from’ draw on the knowledge-based view (KBV) (Grant, 1996; Kogut and Zander, 1992). Drawing on two different theoretical lenses – transaction cost economics (TCE) (Williamson, 1981) and resource-based view (RBV) (Barney, 1996) –

would suggest that firms as organizational forms exist to economise on the exchange of knowledge (TCE) or that knowledge is critical to securing superior rent (RBV). The majority of studies we reviewed veered towards the RBV at the expense of the TCE view of knowledge. We contend that the dominance of this starting theoretical position drives the foundationalist ontology, resulting in the dominant positivist epistemology discussed previously. Despite this, the overreliance on the KBV is restricting progress, given its shortcomings (Heiman and Nickerson, 2002; Mahoney, 2001; Nickerson and Zenger, 2004). This is particularly the case because there are alternative suitable theoretical lenses that have been ignored (Nickerson and Zenger, 2004); this represents a gap left in the research effort.

Strategic alliance involves two or more firms. As such it is, at a minimum, a dyadic relationship – hence, the importance of ‘learning together’ (Grant and Baden-Fuller, 2004). Despite the attention paid to ‘learning together’, the dominance of quantitative methodologies has made it difficult to examine the KT from multiple perspectives. Furthermore, many of these studies have failed to fully discuss the theoretical and practical implications of their findings pertaining to dyads (e.g., Berard and Perez, 2014; Jiang *et al.*, 2016), a point discussed further in the section entitled ‘Unit of analysis and scope of study’.

Knowledge transfer value chain

Taking our lead from the extant literature, the capability model proposed by Zahra and George (2002) was used to delineate KT’s value chain. We found that a great majority of studies (133) treated KT as a ‘black box’, not identifying and examining elements of its value chain (see Table 7). This is a significant gap in the literature and, arguably, a priority research direction because of the capability differences required at each stage. Acquisition of knowledge does not automatically result in assimilation and utilization. KT is only complete

when it results in utilization. Compared to other methods, a relatively higher proportion of field-based studies (33.3%) disaggregated KT's value chain elements (e.g., Blumenberg *et al.*, 2009; Wood *et al.*, 2016). This suggests that field methods are better suited to the complexity of breaking down the KT value chain into its constituent elements.

Unit of analysis and scope of study

Unit of analysis (UoA) is the domain that findings address (Neuendorf, 2002). Not surprisingly, in line with most organizational studies, the primary UoA was 'plant' (see Table 8). Interestingly, a reasonable proportion of studies (37.8%) adopted a system view using 'alliances' as the UoA. A small proportion of studies used corporation, department, and project as the UoA (e.g., Heras and Henar, 2014; Lin and Wu, 2010; Wu and Cavusgil, 2006). Examining SA–KT at the corporate level is valuable because the capabilities required to ensure effective KT are likely to differ with that of plant level. Individual level is also interesting as individuals are at the centre of learning and change. Therefore, we contend that there is need for more research using either corporation or individual as the UoA.

Invariably, an SA will involve two or more parties. To fully comprehend and explore SA–KT, it is necessary to gain insight into the behavior of all parties involved (Heide and Miner, 1992). Therefore, scope of study – the number of firms included in SA–KT – is an important methodological issue. To map the scope of study, we categorized studies into unilateral, dyadic, and network. Studies were deemed 'unilateral' if, regardless of intention, data was collected from a single entity (e.g., Berard and Perez, 2014). Studies that collected data from two parties involved in SA–KT were categorized as 'dyadic' (e.g., Muthusamy and White, 2005; Schildt *et al.*, 2012). Finally, studies involving more than two firms were categorized as 'network' (e.g., He *et al.*, 2013; Hult *et al.*, 2004).

A significant majority of studies (76.2%) fell into the ‘unilateral’ category (see Table 8). Dyadic and network categories were much less frequent (14.1% and 9.6%, respectively). This is an important weakness, possibly reflecting the limitation of survey design and/or implementation (Dyer and Hatch, 2006; Heide and Miner, 1992; Hult *et al.*, 2004; Muthusamy and White, 2005). The greater prevalence of dyadic or network categories when using field methods (50%) offers further support in this regard (e.g., Gassmann *et al.*, 2010). Despite which, there is paucity of dyadic and network type studies, which potentially limits the advancement of the field.

Insert Table 8 and 9 about here

We also examined the relationship between scope, type of SA, and type of learning. The majority of studies with a network scope focused on buyer–supplier partnerships. This seems reasonable since buyer–supplier partnership typically involves a chain of firms. Many unilateral studies (46.2%) didn’t specify the type of SA (e.g., Berard and Perez, 2014; Lin and Wu, 2010). Thus, as was pointed out earlier, it would be interesting to examine the influence of type of SA on outcome.

As shown in Table 9, the majority of the studies focused on ‘learn from’ (a point discussed earlier). Interestingly, we found that network studies failed to examine ‘learn to manage’ or ‘learn about’ types of KT. Moreover, dyadic studies failed to examine ‘learn about’. This represents an important knowledge gap. Evidently, when row percentages are compared, ‘learn together’ was the dominant theme in network studies. The popularity of

'learn together' in 'network' studies is indicative, arguably, of recognition of the importance of multidirectional knowledge flows.

Type, number and measure of dependent variables

Selection of dependent variable (DV), particularly in qualitative studies, is critical to theory development, testing, and future research. Hence, we identified the DVs deployed. This was not always straightforward, particularly in field-based studies. In these cases, we established the implied causal relationship and extrapolated from there to identify the implied DV (e.g., Bogers, 2011; Gassmann *et al.*, 2010).

Table 10 displays the type and number of DVs used. Analysis uncovered four primary types of DV: learning performance, organizational performance, alliance performance, and relationship performance. Learning performance assessed the extent, effectiveness, or efficiency of KT between SA partners (e.g., Ramasamy *et al.*, 2006; Satta *et al.*, 2016; Squire *et al.*, 2009). Organizational performance assessed process or financial improvements attributable to the KT (e.g., Hult *et al.*, 2004; Kotabe *et al.*, 2003). Alliance performance measures focused on assessing the overall ecosystem performance (e.g., Musarra *et al.*, 2016). Relationship performance measures focused on assessing the extent of building or improving the inter-firm relationship (e.g., Dussauge *et al.*, 2000).

The majority of studies deployed a single performance measure, while a few deployed multiple measures (e.g., He *et al.*, 2013; Wood *et al.*, 2016). Learning performance was the most used DV, a testimony to the significance of inter-firm learning (e.g., Santos and Baptista, 2016).

Insert Table 10 about here

We also examined whether DVs were assessed subjectively or objectively. Subjective assessments rely on the observer or respondent's opinion, while objective measures are independent of the observer or respondent. Two-thirds of studies used subjective measures. Unsurprisingly, objective measures were more prevalent when archival-based methods were used. This analysis offers two interesting points. The first regards the relationship between the ontological position and selection of performance measures. Somewhat unexpectedly, those drawing on an objectivist ontology deployed subjective measures (e.g., Heimeriks, 2010; Yang *et al.*, 2016), while those with constructivist ontology tended to deploy objective measures (e.g., Darr *et al.*, 1995). The contradiction between ontology and DV potentially contributes to inconsistent results and an inaccurate interpretation of the outcomes. Secondly, the paucity of objective measures in survey- and field-based studies is notable. However, we are unable to determine whether this is a methodological preference issue or if it is a consequence of firms not collecting appropriate objective measures on a regular basis.

An important theoretical and practical consideration is the fit between DV and the type of KT studied. Learning performance measures were, appropriately, more prevalent in studies where the focus was on 'learn from' and 'learn together', while organizational performance (26.7%) or relationship performance (26.7%) were prevalent where 'learn to manage alliance' was the focus. Surprisingly, a few 'learn from' studies focused on alliance or relationship performance (e.g., Contractor *et al.* 2011; Musarra *et al.*, 2016). Another contradiction revolved around the paucity of learning performance, where the focus was 'learn to manage

alliance' (e.g., Howard *et al.*, 2016), while few 'learn together' studies used alliance performance as the DV (Gudergan *et al.*, 2012). We contend that the selection of DV did not always fit with the type of KT being studied, thus leaving room for improvement as well as gaps – for example, around how inter-firm relationships evolve when a firm learns from a partner.

Type and number of independent variables

Selecting the appropriate independent variables (IV) is critical. Identifying IVs proved complex because of the diversity of terminology used to describe similar variables. This unnecessary proliferation is detrimental to the effective development of the field. A careful examination of the intrinsic meanings of the IVs yielded the following six broad measures (See Table 11):

- learning capacity – the ability to learn, broadly in-line with the absorptive capacity concept (Cohen and Levinthal, 1990);
- institutional factors – circumstances rooted in the institutional and economic environment of firms with a bearing on KT (Hemmert, 2004);
- KT activity/mechanisms – measures with focus on process or activities of KT (e.g., Cousins *et al.*, 2008);
- knowledge characteristics – the type or nature of knowledge resources involved in the KT (e.g., Williams, 2007);
- relationship structure – measures concerned with the inter-organizational characteristics of the inter-firm alliance, such as trust, commitment, and dependence (e.g., Wu and Cavusgil, 2006); and
- contingency factors – measures such as firm size, firm age, and industrial sectors.

Insert Table 11 about here

The IV most frequently used was of relationship structure (53.2%), followed by KT mechanisms (42.9%), and learning capacity (38.5%). Relatively few studies used contingency factors as the IV (e.g., Contractor *et al.* 2011; Santos and Baptista, 2016). However, a good proportion used contingencies as control variables.

Analytical methods

Table 12 depicts the analytical methods deployed. Overall, multiple regression was used most frequently (20.5%), followed by structural equation modeling (SEM) (17.4%). Panel regression was most common in archival-based studies. A point of note was greater use of partial least square-structural equation modeling (PLS-SEM) in more recent studies. PLS-SEM is better suited to small sample sizes and non-normally distributed data. Overall, studies were technically sound using appropriate analytical methods.

Insert Table 12 about here

Validation and result verification

Central to the scientific approach is a degree of scepticism of findings and their meaning (Robson, 1993: 67). The value of the research outcome largely depends on the validity and reliability of constructs. A significant number of studies (40.2%) failed to describe their

validation procedures (see Table 13). This calls into question the dependability of a large number of studies. Multiple validations were more often used in survey-based studies, while field-based and archival-based studies relied mainly on the criterion validity or interrater reliability.

Insert Table 13 and 14 about here

Result verification is critical to the dependability and generalizability of outcomes (Podsakoff and Dalton, 1987). Close to 40% of studies attempted to systematically verify their results (see Table 14). Of concern is the 60.3% of studies that failed to carry out result verification. Survey- and archival-based studies more frequently employed multiple verification techniques, compared to field-based studies. The tendency by field-based studies (86.7%) to not use verification methods cannot solely be explained by the dominance of qualitative approaches. It also reflects on design. The most commonly used verification methods used were quantitative robustness analysis and testing of alternative models. It appears that the field is building some conventions in verifying quantitative results.

DISCUSSION AND CONCLUSION

In this section we highlight the key issues, including conceptualisation of theories, links between research methods and theories, and generalisability of research methods. Salient gaps in the SA–KT studies are identified, leading to the delineation of implications for future researchers.

Conceptualisation of SA–KT

- (1) Learning is dependent on the characteristics of SA – purpose, structure, and governance – as has been pointed out. However, a good number of studies failed to clearly specify the characteristics of the SAs being studied, leading to a need for more fine-grained empirical studies of different types of SA.
- (2) Industry structure influences firm behavior including KT. The cross-sectoral samples used by many studies is both a strength and a weakness. Cross-sectoral studies can lay claim to generalisation. If a theory works for firms drawn from among different standard industrial classifications (SIC) then it should hold true for the population as a whole. The difficulty with many of these studies was that the sample did not fully reflect the population and, in practice, it is extremely difficult to develop a representative sample. A careful analysis indicated that cross-sectoral samples did not represent the population and the generalisability was overstated. Studies drawing their sample from a single industry have the advantage of controlling for sectoral contingencies and hence offer a better, step-by-step route to the development of robust theory. In conclusion, we contend that there is a need for more studies focusing on a single sector/industry.
- (3) The majority of studies reviewed treated the learning process as a ‘black box’. We contend that this is due to the starting ontology and epistemology. Judging by the methodology and method, objectivism and positivism were the dominant ontology and epistemology, respectively. The starting ontology and epistemology drive the theoretical lens and the research questions. The dominant positivist stance made it difficult to account for the complexity of KT’s value chain. This represents an important weakness, and to counter this weakness we suggest there is an urgent need for more constructivism and interpretivist-based research.

- (4) The extant literature points to four types of KT (Inkpen and Tsang, 2005). While ‘learning from’ and ‘learning together’ received significant attention, little attention was paid to ‘learning to manage’ and ‘learning about’, which in turn is detrimental to the development of theory and practice. Hence, the need for greater research focus on ‘learning to manage’ and ‘learning about’.
- (5) We examined the relationship between SA and four primary performance measures (as defined earlier). A significant number of studies reviewed focused on issues related to improving learning performance and organisational performance. Our review points to the need for more studies examining alliance performance as well as relationship performance.

Research design

- (1) Strategic alliance entails a relationship between two (dyadic) or more firms (network). To capture this relationship fully and develop a comprehensive picture of KT between partners, it is helpful to design studies embracing more than one SA firm. The dominance of objectivism and positivism in framing the research questions and research design made it difficult to include more than one firm in the great majority of studies, resulting in a partial picture. Hence, the extant literature by-and-large fails to provide a balanced assessment of SA–KT.
- (2) We uncovered a broad span of UoAs ranging from project to alliance. However, the majority of studies used ‘plant’ or ‘alliance’ as the UoA. The expectation for studies using alliance as the UoA was to capture information from more than one participating firm. Many of these studies, however, used joint patenting as the representation of dyadic relationship. Joint patenting represents the outcome of SA but does not shed light on its working and KT practice. Moreover, these studies drew their information from a single

firm, hence, calling into question accuracy of the UoA. Overall, there was a lack of studies drawing on more than one firm, hence, the need for more dyadic or network-based studies. There is also a lack of studies with ‘corporation’ as the UoA. Many alliances involve corporations or divisions of corporations rather than a single plant. Hence, the need for more studies with corporate or ‘division’ as the UoA.

- (3) There were a small number of studies based on constructivist ontology deploying field-based methods. Such ontology enables researchers to pose more complex research questions – e.g., the relationship between KT and elements of the KT value chain – as well as collecting data from multiple SA partners and a broader range of respondents. We suggest that the field will benefit from more interpretivist approaches.
- (4) We detected a paucity of longitudinal studies. Extant literature suggests that organisational learning is a dynamic process and takes time to be realised (Cohen and Levinthal, 1990; Grant, 1996). Cross-sectional studies – normally retrospective and one-off – are arguably less suited to providing an accurate picture of the actual learning activities of firms. Panel, archival, and to a lesser extent field-based studies offer a better route to longitudinal design.
- (5) The studies reviewed were skewed towards large organizations at the expense of small to medium-sized enterprises (SMEs). There are significant differences between large firms and SMEs and one cannot assume that what holds true for large firms also holds true for SMEs (Ghobadian and Gallear, 1997). Hence, there is need for more research examining SA–KT among SMEs.
- (6) There was a distinct geographic concentration among the studies reviewed. The samples of respondents/firms were drawn mainly from the developed economies, notably the US and Western Europe, and from China among developing economies. As was pointed out, context, for example in form of culture, is likely to affect SA–KT. Hence, the need for

greater geographic dispersion, in particular drawing on firms operating in BRIC (save China) or MINT countries.

Links between research methods and theory

The foundational theory was more often implicit than explicit, which represents a weakness of these studies. The most frequently used theory was KBV followed by RBV. This in turn has resulted in method-led research relying on a survey approach. Hence, we contend that future research of SA–KT will benefit from better balance between ontological and epistemological approaches, as well as theoretical perspectives, thus helping the field to develop beyond its current confines.

We uncovered a dissociation between learning types and study scope pointing to a need for further research – e.g., ‘learn about’ in a dyadic or network context, and ‘learn to manage’ in a network context. We also detected an association between types of KT and DVs pointing to pre-specified conceptualisations at the expense of other possibilities. We contend that there is the need to move beyond prevailing conventions and develop studies linking, for example, ‘learn together’ or ‘learn from’ with alliance performance.

Data analysis and result verification

Key validity and generalisability issues are as follows:

- (1) The field-based studies, notwithstanding the lack of standard processes for assuring their reliability and validity, more often than not failed to describe the process deployed. This is a weakness that needs addressing in order to enhance the value of the field-based studies.
- (2) A significant number of archival-based studies did not describe their data validation

processes – another weakness. Most recent studies have adopted multiple approaches of post hoc robustness analysis to verify results, suggesting a more vigorous approach.

- (3) We detected a high degree of reliance on subjective measures of DVs without considering potential drawbacks – this too is a weakness. Many survey-based studies failed to describe the steps taken to reduce the impact of CMV – again, a weakness. On the other hand, more and more survey-based studies deployed systematic approaches to construct validation.
- (4) While a good proportion of studies have adopted various result verification procedures, the majority of survey or field-based studies did not report any such procedures. This is also a weakness.

Implications for future researchers

The systematic review presented here, by revealing the intellectual structure of SA–KT research, identifies the strengths and weaknesses of the extant literature and the pertinent gaps, thereby developing a research agenda for the future. The key weaknesses of the extant literature reviewed are: lack of clarity of foundational theory; dominance of two theoretical perspectives (KBV and RBV) at the expense of other potential lenses; lack of studies with dyad or network UoA; overreliance on cross-sectional survey methods; lack of longitudinal studies; focus on large firms at the expense of SMEs; geographic concentration at the expense of geographic diversity; and lack of vigorous validation in field-based studies.

In terms of future research, we suggest the following (also presented as a guiding framework in Figure 2). First, there is a need to avoid treating KT as a ‘black box’; rather researchers should develop an understanding of the effect of individual components of KT’s value chain on learning in the context of different SAs. Second, because different types of

inter-firm relationship are linked with different mechanisms and processes of KT (Koka and Prescott, 2002), future researchers should clearly define the SA type within which KT is taking place, to develop a more fine-grained knowledge and understanding. Third, given the wide spectrum of SA types, future research should pay greater attention to understudied alliance types such as cross-licensing, franchise, business networks, consortia, public-private partnerships, and concentric partnerships. Fourth, we contend that there is need for greater efforts to examine understudied KT learning, such as ‘learning to manage’ and ‘learning about’. Fifth, future researchers could develop research to more fully examine the effect of different types of KT activities on the subsequent performance improvement. Moreover, greater attention should be paid to areas not examined extensively by the literature. For example, how KT activities will affect alliance performance and relationship performance between alliance partners.

Insert Figure 2 about here

Overall, the highly differentiated aims and content of the studies and the varied logics and theoretical underpinnings followed by the studies reviewed has limited the extent to which this paper can provide a completely comprehensive account of up-stream decisions. However, the paper provides a thorough analysis of the principal up-stream research choices and decisions. By identifying and mapping out the research conventions, this paper provides fellow researchers with a clear picture of what has gone before, thus revealing limitations of that extant research and its gaps, and hence providing guidance both in terms of the

knowledge required and the methodological choices available for those wishing to improve the empirical base and the development of SA–KT theory in the future.

Finally, business and management reviews typically focus on down-stream issues, largely ignoring the intellectual structure of the research field. We hope that this research encourages more business and management scholars to systematically review up-stream decisions. This will help both mature and evolving fields – such as ‘behavioral strategy’, ‘open innovation’, ‘innovation system’, ‘leadership’, ‘corporate responsibility’, and ‘sustainability’ – to develop quicker, thus creating add-on knowledge rather than squandering effort or creating disjointed knowledge.

REFERENCES

- Adams, R., S. Jeanrenaud, J. Bessant, D. Denyer, D. and P. Overy, 2016, "Sustainability-oriented innovation: a systematic review". *International Journal of Management Reviews*, 18: 180–205
- Barney, J. B., 1996, "The resource-based theory of the firm". *Organization Science*, 7: 469
- Becerra, M., R. Lunnan and L. Huemer, 2008, "Trustworthiness, risk, and the transfer of tacit and explicit knowledge between alliance partners". *Journal of Management Studies*, 45: 691–713
- Berard, C and M. Perez, 2014, "Alliance dynamics through real options: The case of an alliance between competing pharmaceutical companies". *European Management Journal*, 32: 337–349
- Blaikie, N., 2000, *Designing social research*. Cambridge: Polity.
- Blaxter, L., C. Hughes and M. Tight, 1997, *How to research*. Buckingham: Open University Press.
- Blumenberg, S., H-T. Wagner and D. Beimborn, 2009, "Knowledge transfer processes in IT outsourcing relationships and their impact on shared knowledge and outsourcing performance". *International Journal of Information Management*, 29(5): 342–352
- Bogers, M., 2011, "The open innovation paradox: knowledge sharing and protection in R&D collaborations". *European Journal of Innovation Management*, 14(1): 93–117
- Bryman, A., 2012, *Social research methods*, 4th ed. Oxford: Oxford University Press.
- Burgess, K., P. J. Singh and R. Koroglu, 2006, "Supply chain management: A structured literature review and implications for future research". *International Journal of Operations & Production Management*, 26: 703–729

- Cambra-Fierro, J., J. Florin, L. Perez and J. Whitelock, 2011, "Inter-firm market orientation as antecedent of knowledge transfer, innovation and value creation in networks". *Management Decision*, 49(3): 444–467
- Caner, T., and B. B. Tyler, 2015, "The effects of knowledge depth and scope on the relationship between R&D alliances and new product development". *Journal of Product Innovation Management*, 32: 808–824
- Christoffersen, J., 2013, "A review of antecedents of international strategic alliance performance: Synthesized evidence and new directions for core constructs". *International Journal of Management Reviews*, 15: 66–85
- Cohen, W. M., and D. A. Levinthal, 1990, "Absorptive capacity: A new perspective on learning and innovation". *Administrative Science Quarterly*, 35: 128–152
- Contractor, F. J., J. A. Woodley and A., Piepenbrink, 2011, "How tight an embrace? Choosing the optimal degree of partner interaction in alliances based on risk, technology characteristics, and agreement provisions". *Global Strategy Journal*, 1(1-2): 67–85
- Cousins, P. D., B. Lawson and B. Squire, 2008, "Performance measurement in strategic buyer-supplier relationships: The mediating role of socialization mechanisms". *International Journal of Operations & Production Management*, 28: 238–258
- Culpan, R., 2008, "The role of strategic alliances in gaining sustainable competitive advantages for firms." *Management Revue, The International Review of Management Studies*, 19: 94–105
- Culpan, R., 2009, "A fresh look at strategic alliances: research issues and future directions". *International Journal of Strategic Business Alliances*, 1: 4–23

- Darr, E. D., L. Argote and D. Epple, 1995, "The acquisition, transfer, and depreciation of knowledge in service organizations: Productivity in franchises". *Management Science*, 41(11): 1750–1762
- Das, T. K. and B. S. Teng, 2000, "Instabilities of strategic alliances: An internal tensions perspective". *Organization Science*, 11: 77
- Denyer, D., D. Tranfield and J. E. Van Aken, 2008, "Developing design propositions through research synthesis". *Organization Studies*, 29: 393–413
- Dushnitsky, G. and J. M. Shaver, 2009, "Limitations to interorganizational knowledge acquisition: The paradox of corporate venture capital". *Strategic Management Journal*, 30: 1045–1064
- Dussauge, P., B. Garrette and W. Mitchell, 2000, "Learning from competing partners: Outcomes and durations of scale and link alliances in Europe, North America and Asia". *Strategic Management Journal*, 21: 99–126
- Dyer, J. H. and N. W. Hatch, 2006, "Relation-specific capabilities and barriers to knowledge transfers: Creating advantage through network relationships". *Strategic Management Journal*, 27: 701–719
- Dyer, J. H. and K. Nobeoka, 2000, "Creating and managing a high-performance knowledge-sharing network: The Toyota case". *Strategic Management Journal*, 21(3): 345–367
- Gassmann, O., M. Zeschky, T. Wolff and M. Stahl, 2010, "Crossing the industry-line: breakthrough innovation through cross-industry alliances with 'non-suppliers'". *Long Range Planning*, 43: 639–654
- Ghobadian, A. and D. Gallear, 1997, "TQM and organization size". *International Journal of Operations & Production Management*, 17: 121–163
- Ghobadian, A., N. O'Regan, D. Gallear and H. Viney, 2004, *Public-private partnership: policy and experience*, Palgrave Macmillan.

- Gomes, E., B. R. Barnes and T. Mahmood, 2016, "A 22 year review of strategic alliance research in the leading management journals". *International Business Review*, 25: 15–27
- Grant, R. M., 1996, "Toward a knowledge-based theory of the firm". *Strategic Management Journal*, 17: 109–122
- Grant, R. M. and C. Baden-Fuller, 2004, "A knowledge accessing theory of strategic alliances". *Journal of Management Studies*, 41: 61–84
- Gray, D. E., 2013, *Doing research in the real world*. London: Sage.
- Grix, J., 2002, "Introducing students to the generic terminology of social research". *Politics*, 22: 175–186
- Gudergan, S. P., T. Devinney, N. F. Richter and R. S. Ellis, 2012, "Strategic Implications for (Non-Equity) Alliance Performance". *Long Range Planning*, 45: 451–476
- Gulati, R., N. Nohria and A. Zaheer, 2000, "Strategic Networks". *Strategic Management Journal*, 21: 203-215
- He, Q., A. Ghobadian and D. Gallear, 2013, "Knowledge acquisition in supply chain partnerships: The role of power". *International Journal of Production Economics*, 141(2): 605–618
- Heide, J. B. and A. S. Miner, 1992, "The shadow of the future: Effects of anticipated interaction and frequency of contact on buyer-seller cooperation". *Academy of Management Journal*, 35: 265–291
- Heiman, B. and J. A. Nickerson, 2002, "Towards reconciling transaction cost economics and the knowledge-based view of the firm: The context of interfirm collaborations". *International Journal of the Economics of Business*, 9: 97–116
- Heimeriks, K. H., 2010, "Confident or Competent? How to Avoid Superstitious Learning in Alliance Portfolios". *Long Range Planning*, 43: 57–84

- Heimeriks, K. H., C. B. Bingham and T. Laamanen, 2015, "Unveiling the temporally contingent role of codification in alliance success". *Strategic Management Journal*, 36(3): 462–473
- Hemmer, M., 2004, "The influence of institutional factors on the technology acquisition performance of high-tech firms: Survey results from Germany and Japan". *Research Policy*, 33: 1019–1039
- Heras, A. and M. D. Henar, 2014, "Building product diversification through contractual R&D agreements". *R&D Management*, 44(4): 384–397
- Howard, M., H. K. Steensma, M. Lyles, and C., Dhanaraj, 2016, "Learning to collaborate through collaboration: How allying with expert firms influences collaborative innovation within novice firms". *Strategic Management Journal*, 37(10): 2092–2103
- Hult, G. T. M., D. J. Ketchen and S. F. Slater, 2004, "Information processing, knowledge development, and strategic supply chain performance". *Academy of Management Journal*, 47: 241–253
- Inkpen, A.C. and A. Dinur, 1998, "Knowledge management processes and international joint ventures". *Organization Science*, 9: 454–468
- Inkpen, A. C. and E. W. K. Tsang, 2005, "Social capital, networks, and knowledge transfer". *Academy of Management Review*, 30: 146–165
- Inkpen, A. C. and E. W. K. Tsang, 2016, "Reflections on the 2015 Decade Award – social capital, networks, and knowledge transfer: An emergent stream of research". *Academy of Management Review*, 41: 578–588
- Jiang, X., Y. Bao, Y. Xie and S. Gao, 2016, "Partner trustworthiness, knowledge flow in strategic alliances, and firm competitiveness: A contingency perspective". *Journal of Business Research*, 69(2), 804–814

- Kale, P., J. Dyer and H. Singh, 2001, "Value creation and success in strategic alliances: Alliance skills and the role of alliance structure and systems". *European Management Journal*, 19: 463–471
- Kogut, B. and U. Zander, 1992, "Knowledge of the firm, combinative capabilities, and the replication of technology". *Organization Science*, 3: 383–397
- Koka, B. R. and J. E. Prescott, 2002, "Strategic alliances as social capital: A multidimensional view". *Strategic Management Journal*, 23: 795–816
- Kotabe, M., X. Martin and H. Domoto, 2003, "Gaining from vertical partnerships: Knowledge transfer, relationship duration, and supplier performance improvement in the US and Japanese automotive industries". *Strategic Management Journal*, 24: 293–316
- Lam, A., 1997, "Embedded firms, embedded knowledge: Problems of collaboration and knowledge transfer in global cooperative ventures". *Organization Studies*, 18(6): 973–996.
- Lane, P. J. and M. Lubatkin, M., 1998, "Relative absorptive capacity and interorganizational learning". *Strategic Management Journal*, 19(5): 461–478
- Lew, Y. K., R. R. Sinkovics, R. R. and Q. Kuivalainen, 2013, "Upstream internationalization process: Roles of social capital in creating exploratory capability and market performance". *International Business Review*, 22: 1101–1120
- Lichtenthaler, U. and E. Lichtenthaler, 2009, "A capability-based framework for open innovation: Complementing absorptive capacity". *Journal of Management Studies*, 46: 1315–1338
- Lin, B.-W. and C.-H. Wu, 2010, "How does knowledge depth moderate the performance of internal and external knowledge sourcing strategies?". *Technovation*, 30(11-12): 582–589

- López-Duarte, C., M. González-Loureiro, M. M. Vidal-Suárez and B. González-Díaz, 2016, "International strategic alliances and national culture: Mapping the field and developing a research agenda". *Journal of World Business*, 51: 511–524
- Mahoney, J., 2001, "A resource-based theory of sustainable rents". *Journal of Management*, 27: 651–666
- Meier, M., 2011, "Knowledge management in strategic alliances: A review of empirical evidence". *International Journal of Management Reviews*, 13: 1–23
- Miller, D. and P. H. Friesen, 1984, *Organizations: A quantum view*. Englewood Cliffs, NJ: Prentice Hall.
- Musarra, G., M. J. Robson and C. S. Katsikeas, 2016, "The influence of desire for control on monitoring decisions and performance outcomes in strategic alliances". *Industrial Marketing Management*, 55: 10–21
- Muthusamy, S. K. and M. A. White, 2005, "Learning and knowledge transfer in strategic alliances: A social exchange view". *Organization Studies*, 26: 415–441
- Neuendorf, K. A., 2002, *the content analysis guidebook*. London: Sage Publications.
- Nickerson, J. A. and T. R. Zenger, 2004, "A knowledge-based theory of the firm – the problem-solving perspective". *Organization Science*, 15: 617–632
- Nielsen, B. B. and S. Gudergan, 2012, "Exploration and exploitation fit and performance in international strategic alliances". *International Business Review*, 21: 558–574
- Oxley, J. and T. Wada, 2009, "Alliance structure and the scope of knowledge transfer: Evidence from US–Japan agreements". *Management Science*, 55: 635–649
- Podsakoff, P. M. and D. R. Dalton, 1987, "Research methodology in organizational studies". *Journal of Management*, 13: 419–441

- Podsakoff, P. M., S. B. MacKenzie, J. -Y. Lee and N. P. Podsakoff, 2003, "Common method biases in behavioral research: A critical review of the literature and recommended remedies". *Journal of Applied Psychology*, 88: 879–903
- Ramasamy, B., K. W. Goh and M. C. H. Yeung, 2006, "Is Guanxi (relationship) a bridge to knowledge transfer?" *Journal of Business Research*, 59: 130–139
- Reid, D., D. Bussiere and K. Greenaway, 2001, "Alliance formation issues for knowledge-based enterprises". *International Journal of Management Reviews*, 3: 79–100
- Robson, C., 1993, *Real world research: A resource for social scientists and practitioner-researchers*. Oxford, UK: Blackwell.
- Rousseau, D., J. Manning and D. Denyer, 2008, "Evidence in management and organizational science: Assembling the field's full weight of scientific knowledge through syntheses". *The Academy of Management Annals*, 2: 475–515
- Santos, J. N. and C. S. Baptista, 2016, "Information exchange within horizontal relationships: A fuzzy-set approach to companies' characteristics role". *Journal of Business Research*, 69(11): 5255–5260
- Satta, G., F. Parola, L. Penco and S. Esposito de Falco, 2016, "Insights to technological alliances and financial resources as antecedents of high-tech firms' innovative performance". *R&D Management*, 46(S1): 127–144
- Schildt, H., T. Keil and M. Maula, 2012, "The temporal effects of relative and firm-level absorptive capacity on interorganizational learning". *Strategic Management Journal*, 33(10): 1154–1173
- Scudder, G. D. and C. A. Hill, 1998, "A review and classification of empirical research in operations management". *Journal of Operations Management*, 16(1): 91–101

- Shi, W., J. Sun and J. E. Prescott, 2011, "A temporal perspective of merger and acquisition and strategic alliance initiatives: Review and future direction". *Journal of Management*, 38: 164–209
- Sornn-Friese, H. and J. S. Sorensen, 2005, "Linkage lock-in and regional economic development: the case of the Oresund medi-tech plastics industry", *Entrepreneurship and Regional Development*, 17(4): 267–291
- Squire, B., P. D. Cousins and S. Brown, 2009, "Cooperation and knowledge transfer within buyer-supplier relationships: The moderating properties of trust, relationship duration and supplier performance". *British Journal of Management*, 20(4): 461–477
- Teece, D. J., 1992, "Competition, cooperation, and innovation: Organizational arrangements for regimes of rapid technological progress". *Journal of Economic Behavior and Organization*, 18(1): 1–25
- Tranfield, D., D. Denyer and P. Smart, 2003, "Towards a methodology for developing evidence-informed management knowledge by means of systematic review". *British Journal of Management*, 14(3): 207–222
- Wiig, K. M., 1997, "Roles of knowledge-based systems in support of knowledge management". In Liebowitz J. and L. C. Wilcox (eds.), *Knowledge management and its integrative elements*. Boca Raton, Florida: CRC Press, pp. 69–88.
- Williams, C., 2007, "Transfer in context: Replication and adaptation in knowledge transfer relationships". *Strategic Management Journal*, 28(9): 867–889
- Williamson, O. E., 1981, "The economics of organization: The transaction cost approach". *American Journal of Sociology*, 87(3): 548–577
- Wolfswinkel, J. F., E. Furtmueller, and C. P. M. Wilderom, 2013, "Using grounded theory as a method for rigorously reviewing literature". *European Journal of Information Systems*, 22: 45–55

- Wood, G., P. Dibben and J. Meira, 2016, "Knowledge transfer within strategic partnerships: the case of HRM in the Brazilian motor industry supply chain". *International Journal of Human Resource Management*, 27(20): 2398–2414
- Wu, F. and S. T. Cavusgil, 2006, "Organizational learning, commitment, and joint value creation in interfirm relationships". *Journal of Business Research*, 59(1): 81–89
- Yang, J., G. Yu, M. Liu and M. Rui, 2016, "Improving learning alliance performance for manufacturers: Does knowledge sharing matter?". *International Journal of Production Economics*, 171(2): 301–308
- Yoo, S.-J., O. Sawyerr and W. -L. Tan, 2016, "The mediating effect of absorptive capacity and relational capital in alliance learning of SMEs". *Small Business Management*, 54(S1): 234–255
- Zahra, S. A. and G. George, 2002, "Absorptive capacity: A review, reconceptualization, and extension". *Academy of Management Review*, 27(2): 185–203
- Zineldin, M. and M. Dodourova, 2005, "Motivation, achievements and failure of strategic alliances: the case of Swedish auto-manufacturers in Russia". *European Business Review*, 17(5): 460–470

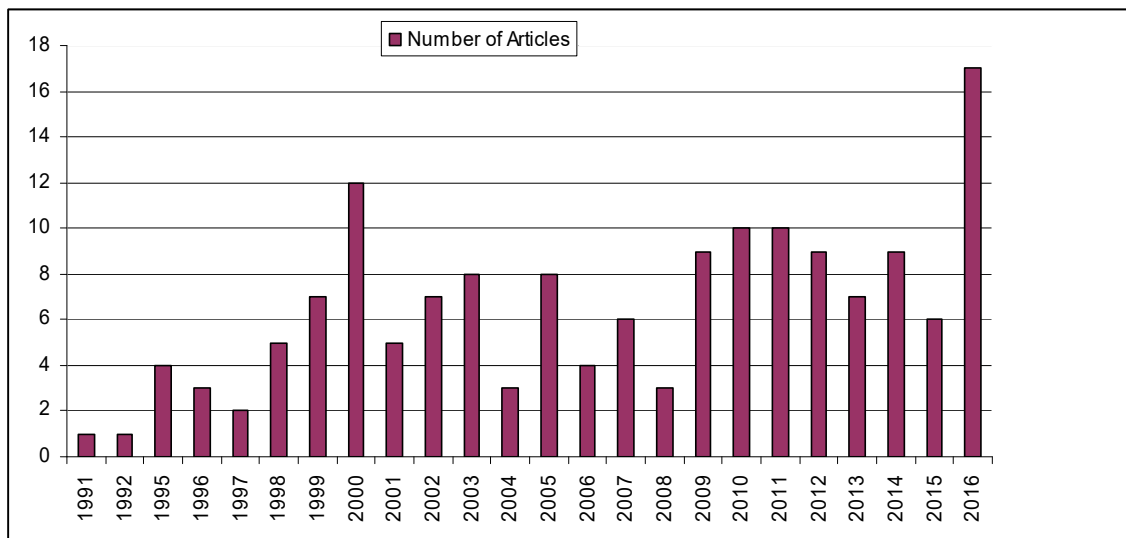


FIGURE 1 Number of reviewed articles between 1990 and 2016

Gaps	Recommendations
Conceptualization of SA-KT	
Unclear characteristics of SAs	More fine-grained empirical studies of different types of SA
Dominance of cross-sectoral surveys overclaim generalizability	Control for sectoral contingencies by focusing on single sector/industry
Treating the learning process as a 'black box'	Need for more constructivism and interpretivist-based research
Unbalanced attention to types of KT and types of performance outcomes	Greater focus on 'learning to manage' and 'learning about', as well as greater focus on alliance performance and relationship performance
Research design	
Dominance of objectivism and positivism result in dominance of unilateral/single sided samples	Need for dyadic and network-based samples through interpretivist approaches
Over-reliance on plant/firm-based samples	Need for corporation or division as UoA
Paucity of longitudinal studies	Panel, archival and field-based studies to offer longitudinal design
Focus on large firms at the expense SMEs	More SMEs focused studies
Narrow geographical focus on EU, US and China	Need for geographical diversity but with control for national differences
Links between research methods and theory	
Unclear foundational theory and dominance of two theoretical perspective (KBV and RBV) resulted in method-led research relying on a survey approach	Better balance between ontological and epistemological approaches, as well as theoretical perspectives
Dissociation between learning types and study scope, plus association between types of KT and DVs	Move beyond prevailing conventions and develop new studies linking SA-KT concepts
Analysis and verification	
Missing validation procedures for many studies, especially field-based studies	Need better attention for data validation, result verification processes
Over-reliance on subjective measures of DVs	Need better scrutiny for fit of subjective and objective measures to ontological approaches
Lack of verification procedures for field-based studies	Need for more standard result verification procedures concern different research methods

FIGURE 2 Framework of research gap and recommendations

TABLE 1
Summary analysis of prior literature reviews

Study	Themes and Description								
	Aim(s)	Review methodology	Review time frame	Focus of review (up-stream or down-stream)	Underpinning Theory	Form and phase of Inter-organizational collaboration covered	Industry scope	Key findings	Level of overlap with the current review (None, Low, Medium, High)
Reid (2001)	To demonstrate the link between motivation to collaborate and structure, partner characteristics, operating norms and performance for KBEs.	Narrative using literature in support of a conceptual model.	Not stated	Down-stream	Resource Dependence Theory	Joint venture. equity alliance. Non-equity alliance. Pre agreement phase.	Knowledge Based Enterprises (KBE)	The study made a case for alliance (as opposed to the alternative merger and acquisition) as the optimal collaborative structure for the KBE. It further identified partnership charities and structural choices as critical factors at the formative stage in each case identifying a number of sub-factors.	None, due to differences in aim, focus, phase of the inter-organizational collaboration involved, industry scope, and time frame.
Burgess <i>et al.</i> (2006)	To identify the conceptual and methodological characteristics of supply chain management (SCM) research.	Systematic review. The inclusion / exclusion criteria are underdeveloped consisting only of peer reviewed journal article. The extraction criterial was clearly	1985–2003	Up-stream scoping of partial characteristics of the intellectual structure.	Exploratory study	Informal transactional relationship or supply chain partnership. Phase consideration not applicable due to nature of collaboration covered.	Cross sectional	The dominant research approach will produce more of the same. To avoid stagnation authors suggest adoption of Lakatosian approach can overcome “operations management, manufacturing, process, positivistic dominance.	None, despite some overlap between aims, due to significant differences between the form and phase of inter-organizational collaboration covered, span

		articulated. Some 100 papers were reviewed.							of the intellectual structure covered, and the time frame.
Meier (2011)	Identifying the determinants of knowledge outcomes in context of strategic alliances.	Systematic review including inclusion and exclusion criteria save the period covered by the review. Review included sample of theoretical and empirical peer reviewed articles published in journals included the social sciences citation index (SSCI). Extraction criteria is implicit governed by the framework of the relationship between knowledge outcome and its determinants.	1996–2009 (date of latest paper reviewed)	Down-steam	Knowledge Based View and Agency Theory	Equity and non-equity strategic alliances utilising a definition similar to the definition used in the current paper. Post agreement phase.	Cross-sectional.	The paper proposes a framework depicting the influence of knowledge characteristics, partner characteristics, partner interaction and active knowledge management on strategic alliance knowledge outcome. Under each category, the paper highlights a number of considerations. For example under “knowledge characteristics”, it concludes that knowledge tacitness impedes knowledge transfer.	None, despite similarity in definition of strategic alliance, due to significant differences in aim, focus, and time frame.

		Some 81 papers were reviewed.							
Christoffersen (2013)	Identify the antecedents of international strategic alliance (ISA) performance.	Systematic review stating inclusion / exclusion and extraction clearly. Sample of papers reviewed came from journals indexed by SSCI. In total 165 empirical papers were reviewed.	Implicit 1980–2010	Down-stream	Not explicitly stated. The extraction criteria implicitly rooted in transaction cost theory and resource-based view.	Equity and non-equity international strategic alliances. The alliance definition similar to definition adopted by this paper save the international dimensions limiting the selection criteria to cross border alliances. Post agreement phase.	Cross-sectional	The review concludes that knowledge regarding antecedents of ISA performance is subject to two sources of ambiguity. First, lack of attention to measurement of central constructs. Second, mechanism by which antecedents influence performance of ISA.	None, due to major differences in aims, inclusion criteria in relation to strategic alliances covered (only cross border), focus (down-stream), and the time frame.
Gomes <i>et al.</i> (2016)	Fourfold aims: (a) to highlight the contribution of the leading mainstream management journals to the development of strategic alliances research; (b) to examine the characteristics of scholars publishing strategic	Systematic review articulating inclusion / exclusion and extraction criteria. Both conceptual and empirical papers were included. In total 805 articles were reviewed.	1990–2012	Covered both up- and down-stream	Exploratory review	Widest range of inter-organizational collaboration compared to previous reviews including equity, non-equity, formal and informal alliances, and network arrangements. Type of SAs covered is similar to that	Cross-sectional	The study concludes that leading management journals have played a pivotal role moving research emphasis from exploratory to formalize. They further observe a downward trend in multiple country authorship potentially affecting development adversely. Further, they suggest research design has become gradually more	Low, despite some overlap between aims of this study and our research aims. The key differences lie in inclusion / exclusion criteria in relation to phase of inter-organizational collaboration covered,

	alliance related research in such journals; (c) to examine the underpinning research methodology; and (d) to examine the thematic evolution of strategic alliance research.					covered in this study. Comprising of papers addressing both pre and post agreement phases.		systematic in nature. Finally, they identified several differences relating to the evolution of themes with some areas showing a clear increase in their popularity over time and others experiencing a decline. Knowledge transfer / management subject of our paper was among areas gaining in popularity.	extraction criteria in charting the intellectual structure of the field, focus, granularity, and time frame.
López-Duarte <i>et al.</i> (2016)	To explore the impact of national culture and cultural distance on firm-level management decisions relative to international strategic alliances.	Systematic review stating the inclusion / extraction criteria. The extraction criteria developed inductively and analysed using multiple correspondence method. In total 150 empirical papers drawn from high impact journals were reviewed.	2000–2012	Addressed both up and down-stream	Exploratory review	Broad range of international inter-organizational collaboration using a definition similar to our definition with addition of cross border. Although not explicitly stated the review covered both pre and post agreement phases.	Cross-sectional	Conclusions fall into four categories: theoretical approaches/frame-works, alliance contents and features, measurements and methods, and geographical scope. The paper highlights a number of issues under each category. For detailed discussion of findings, please refer to the paper.	None, due to significant differences in aims, focus of review, form and phase of inter-organizational collaboration aim, and time frame.

TABLE 2
Coding dimensions

Main components of the review	Dimension
<i>Key characteristics of research effort</i>	Data collection strategies
	Primary means of data collection
	Unit of analysis
	Industry sector covered by the study
	Sample size
	Position/occupation of the respondents
	Number of respondents
	Geographic location covered by the study
	Time frame (span) of the study
	Scope of study
<i>Strategic alliances and knowledge transfer</i>	Type of inter-firm relationship
	Type of inter-firm knowledge transfer
	Knowledge transfer process
<i>Variables and analysis</i>	Number of dependent variables
	Type (operationalisation) of dependent variables
	Measures of dependent variables
	Number of independent variables
	Type (operationalisation) of independent variables
	Number of facets of independent variables
<i>Validation and verification</i>	Method of analysis
	Validation procedures
	Result verification procedures

TABLE 3
Data collection strategy

Main strategy	Frequency	Percent
Archival	38	24.4
Field	30	19.2
Survey	88	56.4
Total	156	100.0

TABLE 4
Data collection country origin

Country	Frequency	Percent
US	42	26.9
Multiple countries	41	26.3
China	12	7.7
UK	11	7.1
Germany	6	3.8
Spain	6	3.8
Japan	5	3.2
Netherlands	5	3.2
Taiwan	5	3.2
Italy	3	1.9
Belgium	2	1.3
Finland	2	1.3
Vietnam	2	1.3
Others	14	9
Total	156	100.0

TABLE 5
Relationship between data collection method and key sample characteristics

	Main strategy of data collection			
	Overall	Survey	Field	Archival
<i>Sample Size (N) *</i>				
Mean	336.21	165.63	9.07	989.50
Std. Deviation	1126.73	101.20	12.13	2167.90
Range	1–12811	31–555	1–41	1–12811
<i>Data collection method</i>				
Single method	85.9%	96.6%	40.0%	97.4%
Mixed methods (2)	8.3%	2.3%	33.3%	2.6%
Mixed methods (2+)	5.8%	1.1%	26.7%	-
Total	100.0%	100.0%	100.0%	100.0%
<i>Means of data collection</i>				
Questionnaire	57.1%	94.3%	16.7%	2.6%
Interview	24.4%	9.1%	100.0%	-
Archival	36.5%	2.3%	56.7%	100.0%
Observation	3.2%	-	16.7%	-
<i>Number of Respondent</i>				
Single	49.4%	83.0%	10.0%	2.6%
Multiple respondents	26.3%	17.0%	86.7%	-
N.A.	24.4%	-	3.3%	97.4%
Total	100.0%	100.0%	100.0%	100.0%
<i>Time Frame</i>				
Cross-sectional	72.4%	97.7%	63.3%	21.1%
Cross-sectional time-series	17.9%	-	-	73.7%
Longitudinal	9.6%	2.3%	36.7%	5.3%
Total	100.0%	100.0%	100.0%	100.0%

TABLE 6
Strategic alliance format studied by prior research

	Main strategy of data collection			
	Overall	Survey	Field	Archival
Strategic alliance (In general)	41.0%	45.5%	20.0%	47.7%
Buyer-supplier partnership	26.9%	30.7%	40.0%	7.9%
R&D alliance	20.5%	12.5%	20.0%	39.5%
Joint-venture	10.3%	11.4%	13.3%	5.3%
Franchise	1.3%	-	6.7%	-
Total	100.0%	100.0%	100.0%	100.0%

TABLE 7
Types of learning

	Main strategy of data collection			
	Overall	Survey	Field	Archival
<i>Type of learning</i>				
Learn from	66.7%	69.3%	60.0%	65.8%
Learn together	23.1%	22.7%	36.7%	13.2%
Learn to manage	9.6%	6.8%	3.3%	21.1%
Learn about	0.6%	1.1%	-	-
Total	100.0%	100.0%	100.0%	100.0%
<i>Learning process examined</i>				
Yes	14.7%	12.5%	33.3%	5.3%
No	85.3%	87.5%	66.7%	94.7%
Total	100.0%	100.0%	100.0%	

TABLE 8
Scope of study and unit of analysis

	Main strategy of data collection			
	Overall	Survey	Field	Archival
<i>Unit of analysis</i>				
Alliance	37.8%	28.4%	50.0%	50.0%
Corporation	5.8%	1.1%	13.3%	10.5%
Plant	50.6%	62.5%	36.7%	34.2%
Department	3.2%	5.7%	-	-
Project	2.6%	2.3%	-	5.3%
Total	100.0%	100.0%	100.0%	100.0%
<i>Scope of study</i>				
Unilateral	76.2%	80.7%	50.0%	86.8%
Dyadic	14.1%	12.5%	23.3%	10.5%
Network	9.6%	6.8%	26.7%	2.6%
Total	100.0%	100.0%	100.0%	100.0%

TABLE 9
Scope of study and other inter-firm learning issues

	Scope of study			
	Overall	Unilateral	Dyadic	Network
<i>Inter-firm relationship</i>				
Strategic alliance (in general)	41.0%	46.2%	36.4%	6.7%
Buyer-supplier partnership	26.9%	23.5%	18.2%	66.7%
R&D alliance	20.5%	18.5%	27.3%	26.7%
Joint-venture	10.3%	10.1%	18.2%	-
Franchise	1.3%	1.7%	-	-
Total	100.0%	100.0%	100.0%	100.0%
<i>Type of learning</i>				
Learn from	66.7%	68.1%	63.6%	60.0%
Learn together	23.1%	20.2%	27.3%	40.0%
Learn to manage	9.6%	10.9%	9.1%	-
Learn about*	0.6%	0.8%	-	-
Total	100.0%	100.0%	100.0%	100.0%
Note: * No 'learn about' study was indicated in this review.				

TABLE 10
Type, number and measures of dependent variable

	Main strategy of data collection			
	Overall	Survey	Field	Archival
<i>Type of dependent variable</i>				
Learning performance	40.4%	33.3%	46.7%	52.6%
Organisational performance	18.5%	19.3%	10.0%	23.7%
Alliance performance	8.3%	11.4%	-	7.9%
Relationship performance	6.4%	5.7%	3.3%	10.5%
Multi-facets	21.8%	29.5%	23.3%	2.6%
N.A. *	4.4%	1.1%	16.7%	2.6%
Total	100.0%	100.0%	100.0%	100.0%
<i>Number of dependent variables</i>				
Single	59.6%	56.8%	46.7%	76.3%
Multiple	36.5%	42.0%	36.7%	23.7%
N.A. *	3.8%	1.1%	16.7%	-
Total	100.0%	100.0%	100.0%	100.0%
<i>Measures of dependent variable</i>				
Subjective	66.0%	89.8%	73.3%	5.3% ^a
Objective	25.0%	3.4%	3.3%	92.1%
Mixed	5.8%	5.7%	10.0%	2.6%
N.A. *	3.2%	1.1%	13.3%	-
Total	100.0%	100.0%	100.0%	100.0%

Note: * N.A. refers to studies without explicit dependent variable.
^a. Studies involve subjective interpretation of archival data.

TABLE 11
Type, facets and number of independent variables

<i>Type of independent variable*</i>	Main strategy of data collection			
	Overall	Survey	Field	Archival
Relationship structure	53.2%	53.4%	53.3%	52.6%
Knowledge transfer activity/Mechanism	42.9%	48.9%	50.0%	23.7%
Learning capacity	38.5%	36.4%	20.0%	57.9%
Institutional factor	28.2%	33.0%	33.3%	13.2%
Knowledge characteristics	18.5%	19.3%	26.7%	10.5%
Contingency factor	5.7%	3.4%	3.3%	13.2%
<i>Facets of independent variable^a</i>				
Single	35.3%	35.2%	20.0%	47.4%
Multiple facets	61.5%	63.7%	66.7%	52.6%
N.A. ^b	3.2%	1.1%	13.3%	-
Total	100.0%	100.0%	100.0%	100.0%
<i>Number of independent variable</i>				
Single	9.6%	6.8%	13.3%	13.2%
Two or three	46.8%	43.1%	43.3%	57.9%
Four or five	27.6%	37.5%	13.3%	15.8%
Six or more	10.9%	11.3%	6.7%	13.1%
N.A. ^b	5.1%	1.1%	23.3%	-
Total	100.0%	100.0%	100.0%	100.0%

Note: * Percentage indicates proportion of studies that included the variable in different categories;

^a Facets of independent variable: whether a study has single or multiple types of independent variables included in a single theoretical model.

^b N.A. refers to studies without explicit independent variable or studies that do not test causal relationships between independent and dependent variables.

TABLE 12
Method of analysis

	Main strategy of data collection			
	Overall	Survey	Field	Archival
Multiple regression	20.5%	25.0%	6.7%	21.1%
SEM	17.9%	31.8%	-	-
Panel regression	15.4%	-	-	63.2%
Hierarchical multiple regression	12.2%	20.5%	-	2.6%
Interpretative/Descriptive	10.9%	3.4%	40.0%	5.2%
Comparative case study	9.0%	-	46.7%	-
PLS-SEM	5.1%	9.1%	-	-
Logistic regression	3.8%	3.4%	-	7.9%
Path analysis	1.3%	2.3%	-	-
Cluster analysis	1.3%	2.3%	-	-
Partial likelihood estimation	0.6%	1.1%	-	-
Content analysis	0.6%	-	3.3%	-
Proportional-odds model	0.6%	1.1%	-	-
Fuzzy-set qualitative comparative analysis	0.6%	-	3.3%	-
Total	100%	100%	100%	100%

TABLE 13
Validation procedures

	Main strategy of data collection			
	Overall	Survey	Field	Archival
Reliability (Cronbach's alpha)	40.4%	70.5%	-	2.6%
Convergent validity	35.3%	61.4%	-	2.6%
Discriminant validity	35.3%	61.4%	-	2.6%
Face validity	28.2%	47.7%	6.7%	-
Composite reliability	25.5%	44.3%	-	2.6%
Criterion validity	11.5%	3.4%	26.7%	18.4%
Interrater reliability	7.1%	3.4%	20.0%	5.3%
Non-reported	40.2%	17.0%	70.0%	71.1%

Note: Percentage in each cell is the proportion of studies used the corresponding validation method.

TABLE 14
Result verification

	Main strategy of data collection			
	Overall	Survey	Field	Archival
Robustness analysis/competing model analysis	20.5%	11.4%	3.3%	55.3%
Confirmatory factor analysis	9.6%	15.9%	-	2.6%
Cross-validation	3.2%	4.5%	-	2.6%
Exploratory factor analysis	3.2%	5.7%	-	-
Multi-method*	1.9%	-	10.0%	-
Secondary respondents	0.6%	1.1%	-	-
Post hoc test of collinearity	0.6%	1.1%	-	-
Non-reported	60.3%	60.2%	86.7%	39.5%
Total	100%	100%	100%	100%

Note: * Multi-method — where multiple statistical models or approaches are used with the same data to examine the consistency of the result.