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

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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 (Podsakoff and Dalton, 1987; Grix, 2002; Bryman, 2012). The up-stream decisions shape the questions asked, how questions are posed, how answers are sought, and how they are interpreted and used (Podsakoff and Dalton, 1987; Grix, 2002; Bryman, 2012). 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; Meier, 2011; López-Duarte *et al.*, 2016) in a disjointed, accidental manner, which has impeded its collective advancement (Shi *et al.*, 2011).

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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 (Podsakoff and Dalton, 1987; Grix, 2002; Bryman, 2012; Gray, 2013). Moreover, revealing the intellectual structure of the field improves the organization and the exploitation of research outcomes.

The rest of the paper is organized 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; Oxley and Wada, 2009; Inkpen and Tsang, 2016). 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., Kale *et al.*, 2001; Grant and Baden-Fuller, 2004; 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 (Reid *et al.*, 2001; Burgess *et al.*, 2006; Meier, 2011; Christoffersen, 2013; Gomes *et al.*, 2016; López-Duarte *et al.*, 2016, 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; Gomes *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 *et al.* (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.

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

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 <i>et al.</i> (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 criterion was clearly articulated. Some 100 papers were reviewed.	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 of the intellectual structure covered, and the time frame.

Table 1 (Continued)

Study	Themes and Description						Level of overlap with the current review (None, Low, Medium, High)
	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	
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. Some 81 papers were reviewed.	1996–2009 (date of latest paper reviewed)	Down-stream	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.	None, despite similarity in definition of strategic alliance, due to significant differences in aim, focus, and time frame.
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.	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.
						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.	

Table 1 (Continued)

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
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 alliance related research in such journals; (c) to examine the underpinning research methodology; and (d) to examine the thematic evolution of strategic alliance research.	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	<p>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 covered in this study. Comprising of papers addressing both pre and post agreement phases.</p> <p>Cross-sectional</p> <p>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 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.</p> <p>Level of overlap with the current review (None, Low, Medium, High)</p> <p>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, extraction criteria in charting the intellectual structure of the field, focus, granularity, and time frame.</p>

Table 1 (Continued)

Study	Themes and Description							Level of overlap with the current review (None, Low, Medium, High)	
	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
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.

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, for example, 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:

- 1 What methodology and methods are used?
- 2 What are the boundaries for these studies?
- 3 What are the independent and dependent variables and analytical methods?

Ontological and epistemological assumptions underpin methodology and method (Blaxter et al., 2006; Blaikie, 2000). 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, p. 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., Inkpen and Dinur, 1998; Gulati et al., 2000; Culpan, 2009) and because of its similarity with the definition used in prior reviews

(Meier, 2011; Christoffersen, 2013; López-Duarte *et al.*, 2016). 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

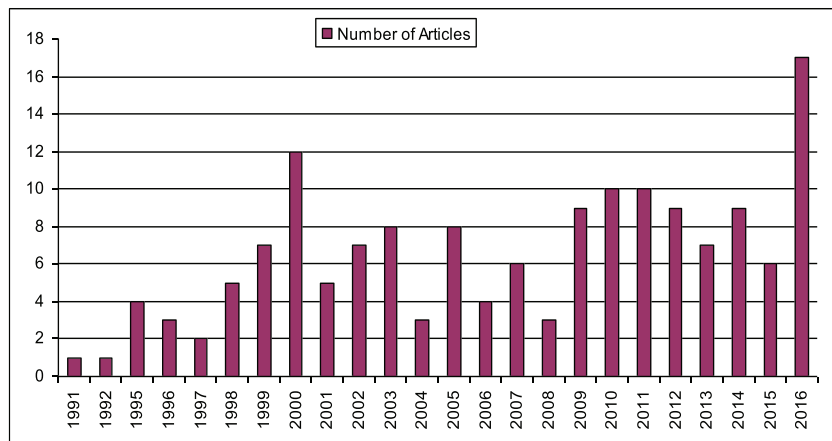


Figure 1 Number of reviewed articles between 1990 and 2016

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.

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). 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 *et al.*, 1984). In the second step, the researchers discussed the disputed cases – where coding differences were present – and agreement was reached in all cases.

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).

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., Dyer and Nobeoka, 2000; Sornn-Friese and Sorensen, 2005; Berard and Perez, 2014), 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

Table 2 Coding dimensions

Main components of the review	Dimension
Key characteristics of research effort	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
Strategic alliances and knowledge transfer	Type of inter-firm relationship
	Type of inter-firm knowledge transfer
	Knowledge transfer process
Variables and analysis	Number of dependent variables
	Type (operationalization) of dependent variables
	Measures of dependent variables
	Number of independent variables
	Type (operationalization) of independent variables
	Number of facets of independent variables
Validation and verification	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

epistemological position is positivism (e.g., Hult *et al.*, 2004; Sornn-Friese and Sorensen, 2005; Musarra *et al.*, 2016). 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).

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

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

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., Nielsen and Gudergan, 2012; Lew *et al.*, 2013).

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

Table 5 Relationship between data collection method and key sample characteristics

	Main strategy of data collection			
	Overall	Survey	Field	Archival
Sample Size (N) *				
Mean	336.21	165.63	9.07	989.50
Std. Deviation	1126.73	101.20	12.13	2167.90
Range	1–12,811	31–555	1–41	1–12,811
Data collection method				
Single method	85.9%	96.6%	40.0%	97.4%
Mixed methods	8.3%	2.3%	33.3%	2.6%
(2)				
Mixed methods	5.8%	1.1%	26.7%	-
(2+)				
Total	100.0%	100.0%	100.0%	100.0%
Means of data collection				
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%	-
Number of Respondent				
Single	49.4%	83.0%	10.0%	2.6%
Multiple	26.3%	17.0%	86.7%	-
respondents				
N.A.	24.4%	-	3.3%	97.4%
Total	100.0%	100.0%	100.0%	100.0%
Time Frame				
Cross-sectional	72.4%	97.7%	63.3%	21.1%
Cross-sectional	17.9%	-	-	73.7%
time-series				
Longitudinal	9.6%	2.3%	36.7%	5.3%
Total	100.0%	100.0%	100.0%	100.0%

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., Lane and Lubatkin, 1998; Heimeriks, 2010; Heimeriks *et al.*, 2015). 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

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%

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.

Types of inter-firm knowledge transfer

Four types of learning – ‘learning from’, ‘learning together’, ‘learning to manage’, and ‘learning about’ – take place within a 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 categorized 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

Table 7 Types of learning

	Main strategy of data collection			
	Overall	Survey	Field	Archival
Type of learning				
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%
Learning process examined				
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%	

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.

These findings also have important implications for the development of the field. Implicitly, studies examining ‘learning from’ draw on the knowledge-based view (KBV) (Kogut and Zander, 1992; Grant, 1996). 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 economize 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 (Mahoney, 2001; Heiman and Nickerson, 2002; 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., Wu and Cavusgil, 2006; Lin and Wu, 2010; Heras and Henar, 2014). 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, a 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., Hult *et al.*, 2004; He *et al.*, 2013).

Table 8 Scope of study and unit of analysis

	Main strategy of data collection			
	Overall	Survey	Field	Archival
Unit of analysis				
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%
Scope of study				
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%

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 (Heide and Miner, 1992; Hult et al., 2004; Muthusamy and White, 2005; Dyer and Hatch, 2006). 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.

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%) did not specify the type of SA (e.g., Lin and Wu, 2010; Berard and Perez, 2014). 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,

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

	Scope of study			
	Overall	Unilateral	Dyadic	Network
Inter-firm relationship				
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%
Type of learning				
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 ^a	0.6%	0.8%	-	-
Total	100.0%	100.0%	100.0%	100.0%

Note: ^a No ‘learn about’ study was indicated in this review.

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., Gassmann et al., 2010; Bogers, 2011).

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; Squire et al., 2009; Satta et al., 2016). Organizational performance assessed process or financial improvements attributable to the KT (e.g., Kotabe et al., 2003; Hult et al., 2004). 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).

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.

Table 10 Type, number and measures of dependent variable

	Main strategy of data collection			
	Overall	Survey	Field	Archival
Type of dependent variable				
Learning performance	40.4%	33.3%	46.7%	52.6%
Organizational 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. ^a	4.4%	1.1%	16.7%	2.6%
Total	100.0%	100.0%	100.0%	100.0%
Number of dependent variables				
Single	59.6%	56.8%	46.7%	76.3%
Multiple	36.5%	42.0%	36.7%	23.7%
N.A. ^a	3.8%	1.1%	16.7%	-
Total	100.0%	100.0%	100.0%	100.0%
Measures of dependent variable				
Subjective	66.0%	89.8%	73.3%	5.3% ^b
Objective	25.0%	3.4%	3.3%	92.1%
Mixed	5.8%	5.7%	10.0%	2.6%
N.A. ^a	3.2%	1.1%	13.3%	-
Total	100.0%	100.0%	100.0%	100.0%

Notes:

^a N.A. refers to studies without explicit dependent variable.

^b Studies involve subjective interpretation of archival data.

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 (Hemmer, 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.

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 modelling

Table 11 Type, facets and number of independent variables

	Main strategy of data collection			
	Overall	Survey	Field	Archival
Type of independent variable ^a				
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%
Facets of independent variable ^b				
Single	35.3%	35.2%	20.0%	47.4%
Multiple facets	61.5%	63.7%	66.7%	52.6%
N.A. ^c	3.2%	1.1%	13.3%	-
Total	100.0%	100.0%	100.0%	100.0%
Number of independent variables				
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. ^c	5.1%	1.1%	23.3%	-
Total	100.0%	100.0%	100.0%	100.0%

Notes:

^a Percentage indicates proportion of studies that included the variable in different categories;

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

^c 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%

(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.

Validation and result verification

Central to the scientific approach is a degree of scepticism of findings and their meaning (Robson, 1993). 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.

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.

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 conceptualization of theories, links between research methods and theories, and generalizability of research methods. Salient gaps in the SA–KT studies are identified, leading to the delineation of implications for future researchers.

Conceptualization 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

Table 14 Result verification

		Main strategy of data collection			
		Overall	Survey	Field	Archival
Robustness analysis/competing analysis	analysis/model	20.5%	11.4%	3.3%	55.3%
Confirmatory analysis	factor	9.6%	15.9%	-	2.6%
Cross-validation		3.2%	4.5%	-	2.6%
Exploratory factor analysis		3.2%	5.7%	-	-
Multi-method ^a		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:

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

studies can lay claim to generalization. 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 generalizability 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 organizational 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, for example, 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 organizational learning is a dynamic process and takes time to be realized (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 Galleary, 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 the form of culture, is likely to affect SA–KT. Hence, the need for greater geographic dispersion, in particular drawing on firms operating in BRICs (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, for example, ‘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 conceptualizations 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 generalizability 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

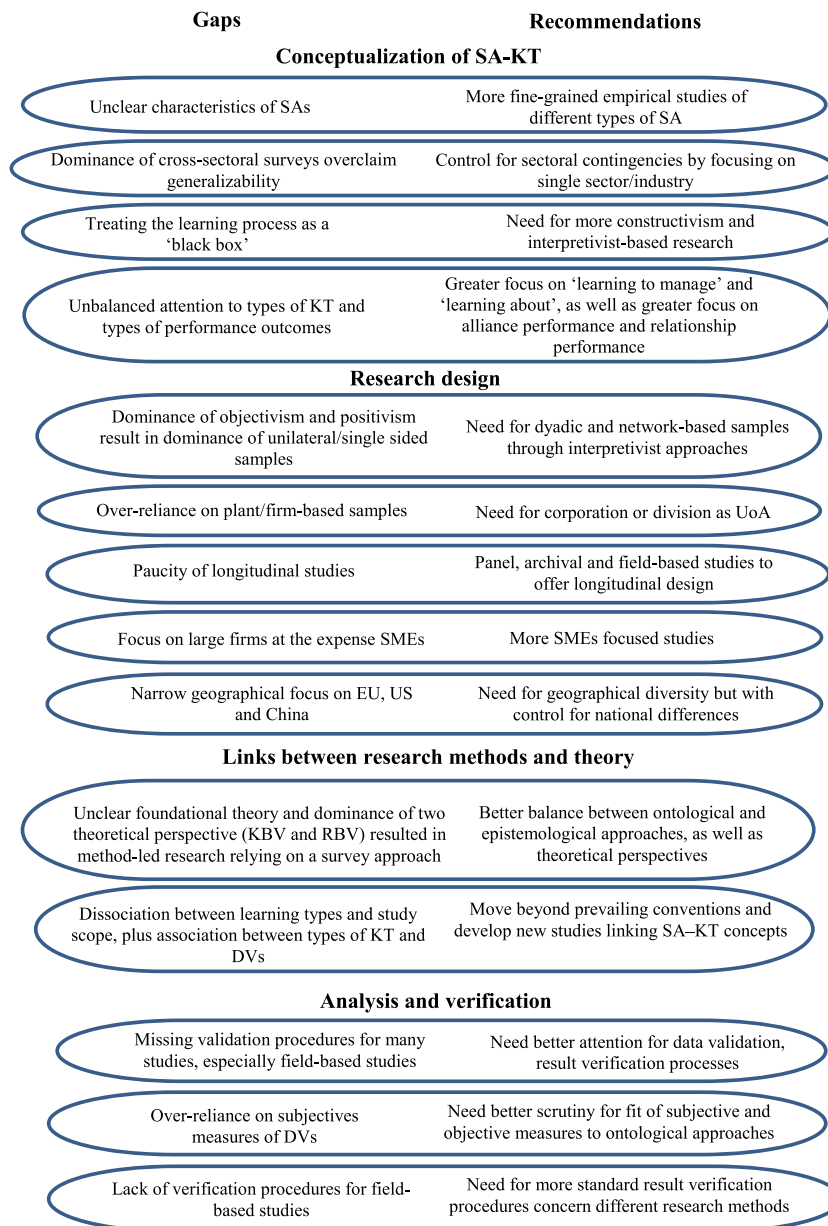


Figure 2 Framework of research gap and recommendations

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.

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.

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