

Knowledge Sharing Routines in Inter-Organizational Relationships and in the Presence of Partner-Specific Absorptive Capacity and Incentives for Transparency: The Moderating Role of Information Technology

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Anand Simha

State University of New York at Buffalo
ansimha@buffalo.edu

ABSTRACT

To stay competitive, organizations frequently need to access and manage knowledge resources external to their boundaries. Inter-organizational relationships (IORs) are a typical mechanism to achieve these goals. Relational governance mechanisms are germane to this context and knowledge sharing routines (KSR), a component of relational governance, are critical to knowledge management in such situations. This paper examines the relationship between KSR and IOR outcomes in normal contexts, and in the presence of partner-specific absorptive capacity and of incentives encouraging transparency. The moderating role of IT usage on all these relationship is examined. The hypotheses are validated using meta-analytic procedure, which enables one to glean an overall view of findings in prior literature on the relationships of interest.

Keywords

Knowledge Management; Knowledge Sharing Routines; IT appropriation; IT usage; Relational Governance; Relational Rent; Absorptive Capacity; Partner-Specific Absorptive Capacity; Transparency.

INTRODUCTION

The concept of knowledge management (KM), which emerged from the field of organization theory (Nonaka, 1991), was early found apposite for examination in the context of information systems (Alavi and Leidner, 2001) and now comprises a major field of inquiry in the field of management information systems (MIS). Indeed, so strong is that links that it is increasingly moot to discuss KM without reference to information technology (IT). Further, both KM and IT demand substantial investments of money and effort to institute, and are alike complex to negotiate for the layman. The incremental benefit accruing from such appropriations is arguably less evident for KM than for IT. Small wonder then that the doubts expressed about IT investments, such as the productivity paradox (Brynjolfsson, 1993) are also being raised about knowledge management.

This study seeks to answer these doubts by gleaning an understanding of the overall findings in existing literature about the relation between knowledge sharing routines, a key component of KM, and outcomes in the context of inter-organizational relationships (IORs). It also examines the role of IT in moderating that relationship, to ascertain whether existing literature, in the overall, evidences a positive benefit to IT usage in knowledge sharing. The effect of the presence of two specific relationship characteristics, namely partner-specific absorptive capacity and incentives to encourage transparency, are also examined in the context of knowledge sharing routines within IORs, as is the effect of IT usage in both these situations. Meta-analysis is the methodology most appropriate for such a review exercise and has therefore been employed.

The paper is organized as follows: the next section summarizes in three subsections the theoretical foundations and past literature which inform this study. The following section presents the research model and hypotheses. The methodology followed in collecting and analyzing data is detailed in the next section and results and discussion thereafter. The concluding section discusses implications, contributions and possible extensions.

THEORETICAL FOUNDATIONS

This paper is based on three broad streams of management literature: Knowledge Management, Relational Governance and IT Appropriation.

Knowledge Management

The knowledge based view of the firm holds that firms exist since they provide a structured context for the synthesis of knowledge and do this more efficiently than would be possible in a free market (Kogut and Zander, 1992). It holds that knowledge is the principal resource a firm commands: its performance in the external environment depends on how its tangible and intangible resources are combined and deployed, which is a function of its know-how (Alavi and Leidner, 2001). The knowledge-based resources that underlie a firm's functioning are complex and difficult to imitate and hence provide competitive advantage to the firm. Effective knowledge management is therefore indispensable to a firm's competitive strategy and a major determinant of organizational outcomes (Martensson, 2000).

Davenport and Prusak (1998, p.5) define knowledge management as "a fluid mix of framed experiences, values, contextual information and expert insight that provides a framework for evaluating and incorporating new experiences and information." Others have placed even greater emphasis on external relationships, as when Chalmers and Grangel (2008, p.742) define it as the "capacity to collect, organize, access and use knowledge." Meso et al. (2002) view it as the process of capturing collective expertise and intelligence inside and outside an organization and deploying it for organizational learning. Alavi and Leidner (2001) define the objectives of a knowledge management system as being to support the creation, transfer and application of knowledge.

There is thus significant recognition in literature of the potency of KM in the context of inter-organizational relationships. The subject has lately acquired renewed topicality with the recognition that firm structures are becoming increasingly ambiguous with the emergence of practices like outsourcing and geographical distribution of work. These new practices involve managing relationships in an IOR context and are strongly predicated on effective IT usage. These are the two other fields of research on which this paper is based.

Relational Governance

Inter-organizational relationships (IORs) are relations existing between two organizations which expect some benefit to emerge from mutuality that would not be generated by them separately. That benefit is termed "relational rent (RR)" in management literature (Dyer and Singh, 1998).

The efficacy of an IOR in garnering relational rent is contingent on relationship management. Several mechanisms are available to organizations as they contemplate how best to govern such a relationship. These mechanisms can be broadly classed into two types: third-party safeguards and self-enforcing safeguards. Third party enforcement mechanisms involve defined arbitration procedures or law courts to resolve issues or disputes. They leave little scope for relationships to recover and for future beneficial exchange once a breakdown occurs. Since they depend heavily on contracts for validation, IORs using such mechanisms are marked by wariness to deviate from contract to accommodate the other party and are not adaptable to changing circumstances. There is loss of opportunity and additional expense due to the need for formal mechanisms of oversight and control. This type of governance mechanism is therefore inefficient in several ways.

The other option is to institute self-enforcing mechanisms to prevent or mitigate problems and provide safeguards against opportunistic behavior in the partner. Two types of self-enforcement mechanisms avail: formal and informal self-enforcement. Formal self-enforcement mechanisms rely on specific, valuable hostages, such as financial investments or customized, non-recoverable assets to curb opportunism and encourage normative behavior in the partner (Klein, 1980; Williamson, 1981; Williamson, 1991). Informal self-enforcement mechanisms rely on more abstract, socially embedded mechanisms, such as notions of mutuality, reciprocity, long-term interests, social norms or behavior, consideration of market and network reputation and relationship trust, to safeguard interests (Geyskens et al., 2006; Macneil, 1980; Poppo and Zenger, 2002).

The use of such informal self-governance mechanisms in IORs has come to be known as "relational governance (RG)" in management literature. Dyer and Singh (1998) present a model of RG that typifies these numerous and diverse constructs into a coherent framework. They identify four distinct classes of RG mechanisms, namely Relationship Specific Assets, Complementary Resources and Capabilities, Effective Governance and Knowledge Sharing Routines. Among these, Knowledge Sharing Routines (KSR) deals expressly with the sharing and transfer of knowledge between parties and is therefore especially pertinent to the field of knowledge management. The model and analysis of this study is based on KSR as understood in the literature on RG.

Appropriation of Information Technology

The foundational concern of the field of MIS is to examine the antecedents and consequences of IT usage in various settings. While a large body of literature focuses on adoption (Davis, 1989), another stream of inquiry examines performance outcomes of IT usage; that is, the moderating effect of IT. Issues as diverse as collaboration technologies (Katz and Te'eni, 2007), virtual or distributed teams (Ahuja and Carley, 1999) and knowledge management (Ko and Dennis, 2011; Nunamaker et al., 2001) have been examined in this literature. Other studies link IT usage to competitive advantage; Rai & Xinlin (2010) examine leveraging IT to enhance IORs, and Pavlou & El Sawy (2010) examine the capacity of IT to enhance improvisation capability and thus competitive advantage. Indeed, literature on IT as relating to IORs is both large and diverse. Nevertheless, the effects of IT usage in the specific context of relational governance in IORs have not received much attention. This paper contributes to the sparse literature on that topic by examining the effect of IT usage on knowledge sharing routines in IORs.

RESEARCH MODEL AND HYPOTHESES

Figure 1 depicts the research model, which has been developed based on the framework of relational governance presented in Dyer and Singh (1998).

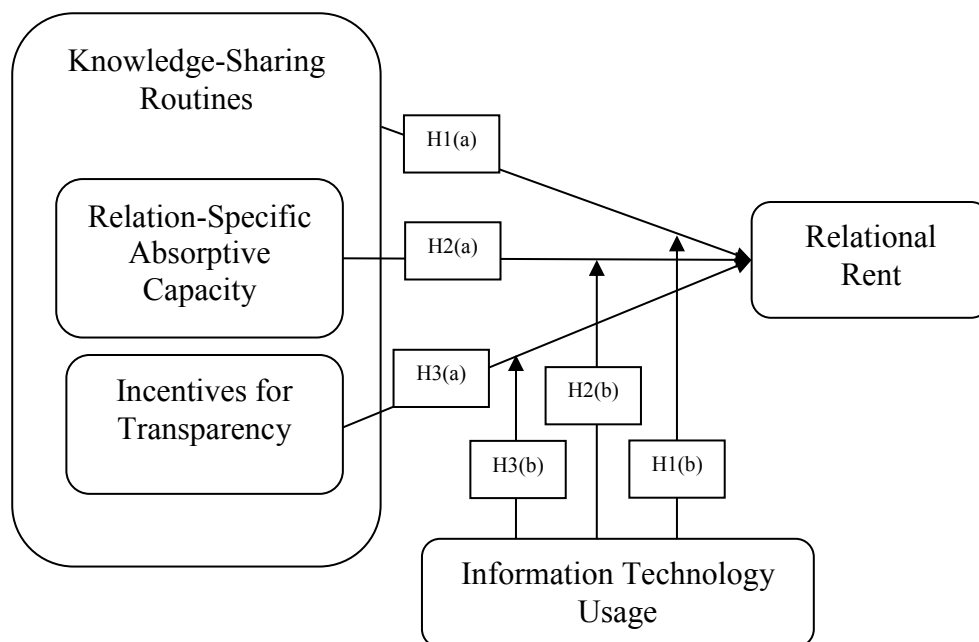


Figure 1. The research model.

Knowledge Sharing Routines and Relational Rent

Knowledge sharing routines are defined as regular patterns of inter-organizational interaction that enable the transfer, combination or creation of specialized knowledge (Dyer and Singh, 1998). Prior literature attests to the potency of knowledge sharing, transfer and integration as determinants of favorable outcomes in IOR contexts (Khanna et al., 1998; Mowery et al., 1996; Nonaka, 1994). Projected benefits include cost reduction, value creation, improved performance and reduced operational problems (Cannon and Homburg, 2001; Wasko and Faraj, 2005; Yli-Renko et al., 2001).

From a basic communications and cognition perspective, knowledge sharing in IORs reduces information asymmetry, engenders trust, increases cognition of the issues faced by the partner (Tsai and Ghoshal, 1998) and helps parties understand what is expected from them. It thus facilitates collaboration and enhances adaptability and synergy. Prior literature (Im and Rai, 2008) posits performance gains arising from two types of knowledge sharing – exploitative and exploratory – based on intended purpose, and these paradigms are associated with operational and strategic goals respectively. From an operational perspective, knowledge sharing is often critical

to IOR outcomes; indeed, IORs are built on pragmatic considerations involving access to competencies and efficiencies required for one's own efficient functioning, and knowledge sharing is critical to garnering the benefits anticipated from such relationships. IT usage has been shown to improve outcomes significantly in terms of enhanced efficiencies and decreased costs; operational procedures such as Just-In-Time (JIT) and Electronic Data Interchange (EDI) implementations are major examples of explicit implementations of this type. From a strategic perspective, knowledge sharing with partners is a strategic choice that firms make to secure competitive advantage and enhance their market position. Prior research indicates that harnessing IT resources to strategic ends is highly efficacious in producing favorable outcomes; Kumar et al. (1998) identify a distinct class of systems, termed networked IOS systems, that facilitate such deployments. Thus, in several ways, structured knowledge sharing creates value and IT is critical for many processes associated with such sharing. Based on this discussion, it is hypothesized that:

H-1(a): *In inter-organizational relationships, a positive relationship exists between knowledge sharing routines and relational rent.*

H-1(b): *In inter-organizational relationships, use of information technology in knowledge sharing routines amplifies the positive relationship between knowledge sharing routines and relational rent*

Partner-specific absorptive capacity

Dyer and Singh (1998) identify two relationship characteristics that facilitate knowledge sharing routines in an IOR. These are the existence of partner-specific absorptive capacity and of incentives encouraging transparency.

Absorptive capacity may be defined as "the ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends" (Cohen and Levinthal, 1990, p.128). The essence of the concept is that knowledge already held by a firm informs its ability to recognize and utilize new knowledge (Zahra and George, 2002). At its most mundane, this means that a baker is able to knowledgeably assess and appreciate refinements in baking technology and also effectively use the same. This is the "absorptive capacity" which enables both recognition and deployment of new knowledge. Viewed in the light of interactions between entities and benefits to both of them, a further refinement of the concept suggests itself: would it not be salutary if the salesman pushing the improved technology be knowledgeable *inter alia* of bakery operations; that commonality would enable effective knowledge sharing between the two, leading to operational improvements for one party and revenue enhancement for the other. This commonality is manifestly contextual and is termed "partner-specific absorptive capacity" in prior literature (Dyer and Singh, 1998; Lane and Lubatkin, 1998).

The concept of absorptive capacity was first expounded in terms of innovation and organizational learning (Cohen and Levinthal, 1990); it has since developed as a major paradigm in scholarly literature in these fields. In the IOR contexts, absorptive capacity is essentially about overlapping knowledge bases leading to superior conjoint outcomes in terms of innovation and organizational learning (Mowery et al., 1996). These overlapping knowledge bases have a bilateral benign effect vis-à-vis interaction and knowledge sharing between parties (Dutta, 2012). Not only do common interest, context and knowledge bases enrich interaction and responsiveness (Liao et al., 2003; Sai Ho and Sheng, 2005), the knowledge bases themselves grow with such interaction (Hotho et al., 2012; Mowery et al., 1996) and result in the creation of new knowledge, as reflected in innovation-related outcomes (Liao et al., 2007; Shanxing et al., 2008). Major innovations and knowledge creation are invariably the result of intense, extended and iterative interaction (Dyer and Singh, 1998), something much facilitated by IT usage. Prior research on absorptive capacity (Liao et al., 2007; Malhotra et al., 2005) repeatedly indicates that IT usage in IORs enhances outcomes; indeed that the integration of IT with a firm's knowledge sharing initiatives amounts to a "strategic necessity" (Liao et al., 2007, p.341). Based on this, it is hypothesized that:

H-2(a): *In inter-organizational relationships characterized by partner-specific absorptive capacity, a positive relationship exists between knowledge sharing routines and relational rent.*

H-2(b): *In inter-organizational relationships characterized by partner-specific absorptive capacity, the use of information technology in knowledge sharing routines amplifies the positive relationship between knowledge sharing routines and relational rent*

Incentives to encourage transparency

The term "incentives to transparency" refers to motivating factors that encourage comprehensive knowledge sharing in an IOR. Relationships between organizations are invariably actuated by anticipations of mutual benefit. A range of possible benefits in terms of operational efficiencies, market efficiencies, innovation and others have been discussed in preceding sections. However, several caveats may be proposed at this stage. A large proportion of IORs are actuated by business and market transaction oriented considerations rather than the considerations delineated above. This is the case, for instance, in typical buyer-supplier and manufacturer-retailer relations. In many IORs, the benefits of knowledge sharing may not be immediately evident to the

managements or may be deemed more beneficial to one party than the other; the example of the auto ancillary industry, where suppliers were unwilling for this reason to make investments in knowledge sharing routines with an auto major, is cited in Dyer and Singh (1998). Even in IORs where considerations related to efficiency, innovation and other such factors are primary motivations for the alliance, parties may be inclined to behave opportunistically and withhold knowledge inputs; also, wariness of the other party behaving similarly may be a fact of life. If nothing else, parties with only a voluntary and non-permanent alliance between them may simply not have systems in place for effective knowledge sharing, nor the inclination to invest in such systems.

Thus, several factors may militate against comprehensive knowledge sharing in an IOR. Incentives which align the interests and motivations of parties in an IOR would circumvent these adverse considerations and conduce to effective knowledge sharing. Such “incentives to encourage transparency” may be either financial, in terms of equity participation; or social, based on norms of reciprocity and mutuality (Dyer and Singh, 1998). Prior research identifies equity arrangements as being the more potent of the two for aligning partner motivations vis-a-vis knowledge sharing (Mowery et al., 1996). Equity arrangements constitute a clear motivation for parties in an IOR to share knowledge; they also provide reason and confidence for parties to institute long-term IT-based assets to promote such sharing. These could include EDI systems, application platforms and even ERP implementations involving both parties. These would promote both operational and strategic efficiencies and produce significant enhancements in outcomes. Based on this discussion, it is hypothesized that:

H-3(a): *In inter-organizational relationships where incentives to encourage transparency exist, a positive relationship exists between knowledge sharing routines and relational rent.*

H-3(b): *In inter-organizational relationships where incentives to encourage transparency obtain, the use of information technology in knowledge sharing routines amplifies the positive relationship between knowledge sharing routines and relational rent*

DATA AND METHODOLOGY

Meta-analysis is a survey procedure in which secondary data is collected from existing research studies that report findings germane to the research question. The procedure aggregates the findings of numerous existing studies and standardizes them quantitatively to allow for overall inferences to be drawn (Lipsey and Wilson, 2001) and is useful for getting a sense of the overall view of existing literature on the questions of interest. Due to its strict quantitative procedure, meta-analysis is relatively less subjective than other forms of review.

The meta-analytic procedure followed here was as described in Lipsey & Wilson (2001) and Viswesvaran & Ones (1995); the same has been used in numerous prior studies (Geyskens et al., 2006; Kirca et al., 2011). After formulating the research question, the constructs of interest were identified. The relevant literature was revisited to understand the various perspectives that prior researchers had approached these constructs from and the operationalizations that resultantly obtained. A coding sheet was developed, containing guidelines that would govern the coding process, including what factors would result in the inclusion or exclusion of a paper or study in the meta-analytic set; what data to collect; and what characteristics would mark a variable in a given study for being coded as one of the constructs of interest.

Meta-analytic Dataset. Having determined the focus of the study during the theory building phase, the next step was to collect existing studies dealing with this subject and create the meta-analytic dataset. An electronic database, Business Source Complete (EBSCO) was used to search for scholarly papers pertaining to the field of Management published in the last 20 years. Also, messages were posted on several suitable e-groups seeking unpublished or forthcoming papers relevant to relational governance. Over 1000 papers *prima facie* relevant to RG in IORs obtained; these were examined to ensure that several requirements were met: firstly, the paper must be empirical and quantitative, not qualitative or conceptual; secondly, correlation data must be available; thirdly, the study should have been conducted at the inter-organizational level and should report results relevant to relationship outcomes; finally, at least one usable relationship must obtain from each paper. In accordance with the last-named criterion, papers that dealt with constructs of RG other than knowledge sharing routines, namely relation-specific assets, complementary resources & capabilities and effective governance, were discarded. A total of 63 papers met these criteria and were used in this meta-analysis; a listing is available on request.

Coding of variables and collecting qualitative data. Each paper in the meta-analytic set was perused to identify relevant variables and code them as one of the constructs used in this study. For papers that provided their survey instruments, coding judgment was based on survey items. For papers that did not provide their instruments or relied on non-survey data, coding judgment was based on the definitions and understandings of each construct as stated in that paper. After constructs were thus identified, required quantitative data was

collected from each paper. This included the correlation coefficients pertaining to the specific relationships of interest; reliability estimates of each variable, where available; the sample size on which each study was based; and the type of relationship (such as buyer-supplier or vendor-client) between the parties studied in each paper. Variables within a paper were included on the basis of whether their operationalization indicated that they represent a knowledge-sharing routine in an IOR or else a relational rent resulting from that IOR. A noting was made of whether the construct identified as a KSR evidenced use of IT. The assessment of whether partner-specific absorptive capacity exists was naturally made at the level of the study rather than of the construct. This was based on whether the IOR was about R&D of any sort, as per the understanding of absorptive capacity discussed elsewhere. Similarly, assessment of the existence of incentives for transparency was also naturally made at the study level, the main criterion being the existence of equity investments and commitments.

Meta-analysis procedure

Thus, the correlation coefficients for each relevant bivariate relationship and the reliability estimates of each variable in each dataset were recorded. This data was used to correct the correlation coefficients using the formula given in Lipsey & Wilson (2001):

$$ES'_r = \frac{ES_r}{\sqrt{r_{xx}} \sqrt{r_{yy}}},$$

Where ES_r is the raw correlation effect size taken from each dataset and r_{xx} and r_{yy} are the reliability estimates of the two relevant variables. This correction is done to decrease the unreliability of the variables contributing to the correlation. In cases where the reliability estimate was unknown, the average reliability value for that variable type was imputed. The next step in the meta-analytic procedure was to transform the corrected correlation values using Fisher's Z-transform formula, being:

$$ES_{Z_r} = 0.5 \log_e \left[\frac{1+r}{1-r} \right]$$

Where r is the corrected correlation coefficient and \log_e is the natural algorithm (Lipsey and Wilson, 2001). It often happened that two or more constructs in a study were coded as a constructs of interest, resulting in two relations and two correlation coefficients being recorded for one relationships of interest, say KSR→RR. In such cases, the average of the transformed values of the relationships containing such variables was calculated as per standard procedure (Lipsey and Wilson, 2001). Thus, each dataset would contain exactly one effect size for any relationship of interest, but may yield more than one relationship of interest. The average values were transformed back into standard correlation form by using the formula to inverse of the Z_r -transformation, being:

$$r = \frac{e^{2ES_{Z_r}} - 1}{e^{2ES_{Z_r}} + 1}$$

Where r is the individual or mean correlation (hereon termed "effect size" in this study) ES_{Z_r} is the corresponding individual or mean Z_r -transformed correlation, and e is the base of the natural logarithm or approximately 2.718. The r calculated here is the critical Effect Size statistic for each relationship in each dataset, which makes aggregations and analysis across studies possible. In order to perform such operations, separate tables pertaining to each bivariate relationship between two constructs were created. These tables contained, in each row, the effect sizes for that relationship derived from each individual dataset. This process of simultaneously disaggregating each study into its constituent relationships and aggregating those relationships into separate tables makes comparisons and other analyses possible within and across relationships. In each table, operations were performed to ascertain the Weighted Mean Effect Size (WMES) and Standard Error (SE) for the relationship. These were used that to construct a confidence interval for the effect size values. At the 95% level, the confidence interval is constructed by using the formula $CI = WMES \pm (1.96)*SE$. The formula used to calculate WMES was:

$$WMES = \frac{\sum (n-3) * ES}{\sum (n-3)}$$

While the Standard Error was calculated using the formula:

$$SE = \sqrt{1/\sum (n-3)}$$

Where ‘n’ is the sample size of each dataset. The effect size distribution was then tested for homogeneity. In a homogeneous distribution, the dispersion of the effect sizes around their mean value does not exceed sampling error. The homogeneity test was based on the *Q* statistic, which is distributed as a chi-square with *k-1* degrees of freedom, where *k* is the number of effect sizes. The formula used to calculate *Q* was:

$$Q = \sum w_i (ES_i - \overline{ES})^2$$

Where *ES_i* is the individual effect size for *i* = 1 to *k*, \overline{ES} is the weighted mean effect size over the *k* effect sizes, and *w_i* is the individual weight for *ES_i*. The calculated *Q* values were compared with corresponding critical values for a chi-square with (*k-1*) degrees of freedom from standard tables. The presence of a significant *Q*-statistic would suggest that the effect sizes are not estimating the same population mean.

Next, to address the publication bias problem often associated with meta-analysis (Lipsey and Wilson, 2001; McDaniel et al., 2006), the Fail-safe *k* statistic was calculated. The Failsafe *k* statistic refers to the number of studies with null effects needed to reduce a statistically significant meta-analytic effect to non-significance (Sedikides and Ostrom, 1988). For a 5% significance level, the fail-safe *k* is calculated using the formula:

$$k = \frac{Z^2}{(2.33)^2} - 1$$

Where the Z-value is calculated using the formula

$$Z = \sum (ES_i * \sqrt{n_i})$$

where *ES_i* is the Effect Size of the relevant bivariate relationship in the *ith* dataset and *n_i* is the sample size for that dataset.

RESULTS AND DISCUSSION

The results obtained by testing the hypotheses using the meta-analysis procedures described above are summarized in table 1.

Predictor	Hypothesis		Result	No. of studies (k)	Total sample size (n)	Weighted Mean Effect Size	Std. Error of ES	95% CI	failsafe <i>k</i>	Q
KSR → RR	Overall	H1(a)	Supported	72	12529	0.3259	0.009	0.308-0.344	16362	440
	Without IT	H1(b)	Supported	47	8401	0.2875	0.011	0.266-0.309	6289.88	350.92
	With IT			30	5575	0.3243	0.013	0.298-0.35	3168.8	194.64
KSR → RR (given AC)	Overall	H2(a)	Supported	19	2662	0.349	0.019	0.31-0.387	1087.78	90.16
	Without IT	H2(b)	Supported	11	1591	0.3311	0.025	0.281-0.381	336.39	66.51
	With IT			8	1071	0.4582	0.034	0.391-0.525	212.99	29.48
KSR → RR (given IFT)	Overall	H3(a)	Supported	6	828	0.475	0.035	0.406-0.544	195.15	11.03*
	Without IT	H3(b)	Not Supported	3	409	0.5889	0.05	0.49-0.687	71.9	76.22*
	With IT			3	419	0.3639	0.049	0.267-0.46	28.87	0.178*

*Indicates that the *Q* statistic fails the homogeneity test.

Table 1. Results of the meta-analytic study.

It may be observed in table 1 that in the case of KSR \rightarrow RR, the number of studies for the overall sample is 72, whereas the two sub-samples add up to 77; also, our meta-analytic sample comprised of a total of 63 papers. The reasons for these anomalies are two-fold. Firstly, several of the 63 papers yielded two datasets; for instance, some papers reported data of surveys conducted on buyers and suppliers separately. Thus, a total of 72 datasets were gleaned from the 63 papers. Secondly, it was at the construct level that the coding was done regarding whether the use of IT abided in its operationalization. Thus, when variables in a paper were coded as representing a construct of interest, it was possible for one construct in a paper to represent KSR using IT and another construct to represent KSR without IT. Such a dataset would produce separate entries for the tables with and without IT, and a single average entry for the overall table. This happened in five cases; hence the difference between 72 and 77. For analyses regarding partner-specific absorptive capacity and incentives to transparency, the assessment of whether these quality exist in the IORs being examined in each of the 63 papers could logically only be done at the paper level; therefore the number of studies in the sub-samples with and without IT add up neatly to the overall figure. All of this is as per standard meta-analytic procedure.

Knowledge Sharing Routines \rightarrow Relational Rent. H-1 is robustly supported, with a weighted mean effect size (WMES) of 0.3259. The failsafe *k*. figure indicates that as many as 15362 studies of similar size and contrary results would need to be included in the analysis for this conclusion to be invalidated. Predictably, the sample with its large size passes the Q-test for homogeneity by a large margin. We can confidently conclude that a positive relationship does obtain between KSR and RR.

Effect of IT usage on KSR \rightarrow RR relationship. H-2 is also robustly supported. WMES for the sample without IT usage is 0.2875, which moves up to 0.3243 for the sample with IT usage. In both cases, the ‘k’ and ‘n’ are large, the Q-test is satisfied by large margins, and failsafe *k* statistics are in the thousands. Evidently, IT usage in knowledge-sharing routines in IORs does indeed produce enhancements in relational rent.

KSR \rightarrow RR in the presence of partner-specific absorptive capacity. H-3 is robustly supported with WMES of 0.349. The failsafe *k*. of 1087 and the Q-statistic of 90 indicate robustness of result. Knowledge sharing routines in IORs where partner-specific absorptive capacity exists clearly has a positive relation to relational rent.

Effect of IT usage on KSR \rightarrow RR relationship given PSAC. H-4 is also robustly supported. IT usage in an IOR where partner-specific absorptive capacity exists corresponds to a substantial rise in WMES from 0.331 to 0.458, the largest rise in the table. Both samples pass the Q-test for homogeneity and the Failsafe *k* in both cases is comfortable at 336 and 212 respectively. Results are robust and highly significant from a theoretical perspective; they indicate that when PSAC exists between parties in an IOR, the use of IT for knowledge sharing between them can take on a dynamic of its own to substantially enhance outcomes.

KSR \rightarrow RR in the presence of incentives for transparency. H-5 posits a positive relation between KSR and RR when incentives for transparency exist; this hypothesis finds support in the data with WMES of 0.475. Indeed, this WMES is among the highest found in the table, and it would require 195 studies with adverse results to invalidate this finding. However, the Q-statistic of 11.03 is marginally below the corresponding chi-square statistic of 11.07 and presents a borderline case for the homogeneity of the sample on which findings are based. Thus, the hypothesis is indeed supported, although the mixed indications vis-à-vis robustness (adequate figure for Failsafe *k* but borderline failing of the Q-test for homogeneity) is chagrining.

Effect of IT usage on KSR \rightarrow RR relationship given incentives for transparency. H-6 is not supported by the data. Results indicate that while WMES for the sample without IT usage is 0.5889, it declines to 0.3639 with the use of IT. This counter-intuitive result is extremely non-robust; the Q-statistic at 0.178 is most damaging and the Failsafe *k* of 28 is also far from satisfactory; both of these indicate a clear absence of robustness.

Clearly, small sample size is the cause for this non-robustness and also arguably for the counter-intuitive result. A mere six datasets, three with and three without IT, comprise the entire sample; increase in the sample size would improve robustness and also impact results as reflected in effect size. This study uses a rigid criterion based on equity commitments for determining whether incentives to transparency exist in an IOR. That criterion is perhaps too exclusive; indeed, while Dyer and Singh (1998) single out equity arrangements as most efficacious in aligning incentives, they mention “informal norms of reciprocity” as being another incentive to transparency. The latter criterion is too nebulous for a meta-analysis which must categorize numerous studies by the type of relation existing between parties being examined in each study by other scholars. Therefore the more rigid equity-based criterion was adopted. A survey-based study built on the findings of this paper and focused on IORs with equity participation, would have a larger sample size and produce more robust results.

IMPLICATIONS, CONTRIBUTIONS AND FUTURE RESEARCH

This study contributes to management literature by gleaming the overall view in existing literature of the relation between knowledge sharing routines and outcomes in the context of IORs. It establishes that knowledge sharing routines between organizations in an IOR have a positive impact on outcomes, and that the use of IT in such routines amplifies this relationship significantly. It also finds that the KSR->RR relationship is positive when partner-specific absorptive capacity exists, and that in such circumstances, IT usage for KSR produces an even larger and more significant amplification of outcomes.

These findings will be of interest to practitioners and scholars alike; it indicates that organizations which ensure that they share a common knowledge base with potential partners will gain most from knowledge sharing routines and the use of IT in such routines. Investments in both IT infrastructure and knowledge sharing will have maximal payoff if efforts are made to gauge and enhance the knowledge overlap between them and their partners. These findings can be used to justify investments into knowledge management and IT infrastructure. They also indicate that managers should pay special attention to the presence of partner-specific absorptive capacity paradigms, especially in terms of knowledge-based, technological competencies, when contemplating alliance formation with other organizations.

There are several limitations to this study, some of them coming from the nature of the meta-analysis procedure. An element of subjectivity abides in the coding procedure and this would improve from the presence of a second coder, measurement of inter-coder reliability and the process of coding reconciliation. The meta-analysis methodology aggregates and summarizes data from existent studies and a certain loss of nuance or granularity is inherent. A survey-based study designed specifically to address the hypotheses discussed in this paper may well throw up unexpected insights. Indeed, that would be one focus of future development of this study. A survey-based study focusing specifically on joint ventures and IORs with equity participation in the context of incentives for transparency would also extend our understanding of these dynamics significantly. An examination of the other drivers of relational rent and their underpinnings calls for scholarly attention.

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