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Liang Chen Gatton College of Business & Economics, University of Kentucky, liang.chen@uky.edu

Scott C. Ellis Gatton College of Business & Economics, University of Kentucky, scott.ellis@uky.edu

Clyde W. Holsapple Gatton College of Business & Economics, University of Kentucky, cwhols@email.uky.edu

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A Knowledge-sharing Perspective on Supplier Development Activities

Liang Chen Gatton College of Business & Economics, University of Kentucky liang.chen@uky.edu Scott C. Ellis Gatton College of Business & Economics, University of Kentucky scott.ellis@uky.edu

Clyde W. Holsapple Gatton College of Business & Economics, University of Kentucky cwhols@uky.edu

ABSTRACT

Based on knowledge resource theory, this study introduces a framework to organize supplier development activities from a knowledge-sharing perspective. In this framework, supplier development activities are classified into two categories: knowledge-sharing activities and knowledge-sharing enablers. Together, they create value for a supply chain. This framework contributes to understanding of a key issue in the practice of supply chain management – supplier development activities – and does so from a knowledge-sharing perspective. Results of preliminary content analysis support the framework and its mappings. Research results from larger-scale study along the lines indicated here can provide useful guidance for companies to carry out supplier development in practice and for researchers to accommodate supplier development in their future research.

Keywords

Supplier development, knowledge-sharing, knowledge resources, supply chain.

INTRODUCTION

Over the past 20 years, competitive pressures have progressively become stronger and vertical partnership or cooperation has played an increasingly important role within firms' strategies. Competition is not only among companies, but also among supply chains. In this environment, even if a company is very competitive in its own markets, it cannot attain continuous competitive advantages without good supply chain partners and effective collaboration. Among these partners, suppliers play a very important role in building competitive advantages. In fact, previous research finds that suppliers can help the buying company achieve advantages by facilitating buyers' performance in many areas, including productivity (e.g., Kaynak, 2005), agility (e.g., Humphreys, Li and Chan, 2004), innovation (e.g., Wagner, 2006a), and reputation (e.g., Dyer and Hatch, 2006).

The importance of suppliers has motivated many firms to invest in suppliers' operation through supplier development strategies or programs. According to Trent and Monczka (1998), more than 87% of companies engage in some form of supplier development. Comparing the use of supplier development practices in high-success versus low-success companies, Ragatz, Handfield and Scannell (1997) find that the high-success companies tend to use these practices more intensively. Krause and Ellram (1997) reach a similar conclusion: successful companies are more likely to to engage in supplier development activities. Furthermore, many well-known companies are effective at supplier development; these include Toyota (Dyer and Hatch, 2006; Dyer and Nobeoka, 2000), Italtel (Colombo and Mariotti, 1998), Honda (MacDuffie and Helper, 1997), and Kodak (Ellram and Edis, 1996).

Concomitant with the growth of supplier development adoption within the business community, researchers have similarly sought to advance understanding on this topic. Figure 1 shows the publication trend for supplier development from 1985 through 2009. In the past 25 years, the number of the related publications has increased by 212.5 times. Moreover, publications on supplier development have increased at a faster rate (compound annual growth rate 25%) than those for 3 of

the 5 research disciplines that prominently involve supplier development: quality management (18%), operations management (16%), and cost management (15%). The other two are supply chain (32%) and knowledge management (33%). Accordingly, research interest in supplier development is increasing at a rate that is at least comparable to rates being experienced by related research areas.



Figure 1. Publication Trends for "Supplier Development"

(Source: Google Scholar, Dec 2nd, 2010)

An important aspect of supplier development is its role in facilitating knowledge sharing across organizational boundaries. Current theory suggests that knowledge, and the ability to share and process it, are creating more value within and among companies. Researchers have become increasingly aware of the importance of knowledge sharing, creation, and assimilation in supply chains (Wagner and Buk ó, 2005; Wang, Fergusson, Perry and Antony, 2008). Our review suggests that contemporary supplier development activities (SDAs) involve an increasing number of knowledge-sharing/transfer behaviors in practice. For example, to facilitate supplier development, Toyota built a knowledge-sharing network to create and then manage network-level knowledge (Dyer and Nobeoka, 2000). In addition, we find that knowledge-sharing activities such as training, best-practice transfer, and face-to-face communication are important factors considered within the supplier development literature.

Theoretical and empirical evidence of linking supplier development and knowledge-sharing remains sparse. Few current studies on supplier development focus on knowledge-sharing/transfer (Dyer and Hatch, 2006; Kotabe, Martin and Domoto, 2003; Modi and Mabert, 2007). Further, extant research has not yet identified the full range of possible SDAs. In the absence of systematic study, it's difficult to describe the importance of knowledge-sharing in supplier development and subsequently provide some practical guidance for companies.

We present a knowledge-sharing perspective for understanding SDAs. In particular, we employ knowledge resource (KR) theory, formally described by Holsapple and Joshi (2004), to develop a framework that links supplier development and knowledge-sharing (SDKS). Further, we adopt content analysis to verify this framework. In particular, we adopt a multi-stage methodology in which we first identify and review roughly 100 articles that address supplier development activities, and then develop a list of more than 500 SDAs. Through classification, consolidation, and construction, we generate a reduced list of purified types of SDAs. Subsequently, we partition these activities into knowledge-sharing activities and knowledge-sharing enablers and integrate them into our SDKS framework. Overall, this study not only clarifies relationships between supplier development and knowledge-sharing, but also identifies operative knowledge-sharing activities and enablers in the supplier development context, explores what could be shared in supplier development, and gives some practical suggestions on knowledge-sharing in supplier development.

LITERATURE REVIEW

Supplier Development

It's generally accepted that the term "supplier development" was first used by Leenders (1966) to describe efforts by manufacturers to increase the number of viable suppliers and improve suppliers' performance. Formally, we adopt the definition given by Krause, who defines supplier development as "any initiative undertaken by a buying firm to improve supplier performance, to harness supplier capabilities, and/or to meet the buying firm's short- and/or long-term supply needs" (Krause, 1999, p. 206).

Many kinds of SDAs have been proposed and utilized in practice and research. Commonly noted SDAs include supplier evaluation, supplier training/education, provision of incentives, performance expectations, financial support, technical assistance, supplier involvement, information sharing, supplier recognition, and plant visiting. However, no single research work covers all SDAs. We have found that only Krause (1997), Trent and Monczka (1999), and Li, Humphreys, Chan and Kumaraswamy (2003), mention more than 10 SDAs in their respective studies.

SDAs have been categorized according to various methods, as exemplified in Table 1. Krause, Scannel and Calantone (2000) classify SDAs into two types: externalized SDAs and internalized SDAs (See Table 1). Correspondingly, Wagner (2006a, b) puts forth the notions of indirect SDAs and direct SDAs, asserting that they're the same as externalized SDAs and internalized SDAs, respectively.

Krause (1999) presents transaction-specific SDAs and points out that they are the core practice of supplier development. Later, Krause et al. (2000) hold a view that direct development efforts (internalized SDAs) represent transaction-specific investments. However, comparing the specific activities included in transaction-specific SDAs, with those for internalized SDAs, we find some differences. For example, supplier evaluation is included in transaction-specific SDAs by Krause (1999), but it's included in externalized SDAs by Krause et al. (2000). Moreover, in Humphreys et al. (2004), supplier evaluation is an infrastructure factor, rather than a transaction-specific SDA. Ghijsen, Semeijn and Ernstson (2010) introduce another type: relationship-specific SDAs. From their description and examples, we can see that relationship-specific SDAs are comparable to transaction-specific SDAs, even though their names are obviously different.

| Study | Types | Description | Examples | | |
|--------------------------|---|---|---|--|--|
| Krause et al. (2000) | Externalized SDAs | Buyer makes use of the external market to instigate supplier performance improvements | Competitive pressures, supplier assessment, supplier incentives | | |
| | Internalized SDAs | Also called direct involvement activities, a direct investment of the buyer's resources in the supplier | Training and education of a supplier's personnel, assign buyer's personnel to a supplier temporarily | | |
| Humphreys et al. | Transaction- specific SDAs | Direct involvement of the buying company in developing suppliers | Performance expectation, direct investment in human/physical assets, joint action | | |
| (2004) | Infrastructure factors | The environment that supports effective use of transaction-specific activities | Effective communication, supplier evaluation, trust | | |
| Wagner (2006a, b) | Indirect SDAs | Buyer commits no or limited resources to a specific supplier | Evaluate suppliers in formal manner, provide feedback, supplier rewards | | |
| | Direct SDAs | Buyer dedicates human and/or capital resources to a specific supplier | Human: advice, know-how transfer; Capital: financial support | | |
| Krause (1999) | Transaction- specific SDAsDirect development efforts are invested into the supplier by the buying firm | | Formal evaluation, training, supplier certification, site visits, inviting supplier's personnel to buyer's site | | |
| Ghijsen et al. (2010) | Relationship- specific SDAs | Buyer directly commits itself to the supplier by time and resources investments | Human-specific: site visit, technical assistance Capital specific: providing equipment or tools | | |

| Table | 1. | Some | Types | of | SDAs |
|-------|----|------|-------|----|------|
|-------|----|------|-------|----|------|

In conclusion, to make progress toward a clear and practical categorization of SDAs, it's necessary to identify all SDAs that have been examined by researchers and, then, bring these together into parsimonious, unified, and well-organized classification. This paper describes an approach to accomplishing this through the lens of knowledge management, and presents some preliminary results.

Knowledge Sharing

Knowledge, a core resource in an organization, has potential to be applied in ways that create significant value and competitive advantage for an organization (Holsapple and Singh, 2001). From the KM ontology, we adopt the following definition of a KR: "knowledge that an entity has available to manipulate in ways that yield value" (Holsapple and Joshi, 2004, p. 598). The ontology recognizes two KR classes: schematic knowledge and content knowledge. While the former class refers to KR that is dependent upon the existence of an organization, the latter involves KR that can exist independently of an organization to which it belongs. Schematic resources include the purpose, strategy, culture, and infrastructure of an organization. Content resources include knowledge held by an organization's participants (human-based or computer-based), plus knowledge conveyed in/by artifacts. The KR characterization is depicted in Figure 2.



Figure 2. Classes of Organizational KRs (Adopted from Holsapple and Joshi, 2004)

Not only can suitable use of KRs bolster an individual firm's competitiveness, it can also create competitive advantages for a supply chain (Crone and Roper, 2001; Holland, 1995). Different firms maintain different KRs, some of which are exclusive or unique. However, no single firm is omniscient in that it may not possess all KRs that it will ever need. Thus, a firm needs the ability to acquire complementary knowledge from external sources. In a practical sense, the epitome of this is the knowledge sharing that occurs among supply chain members. Such knowledge sharing is a kind of trans-organizational activity that is essential for the coordination and alignment of members' planning, design, and operations in ways that not only allow each member to add value the supply chain's processes and outcomes, but also allow the creation of a synergy in which the supply chain is more than the sum of its member parts. Inter-firm knowledge-sharing routines are considered one of four possible sources of relational rents whereby "a supernormal profit [is] jointly generated in an exchange relationship that cannot be generated by either firm in isolation" (Dyer and Hatch, 2006; Dyer and Singh, 1998, p. 662).

Knowledge sharing between buyer and supplier can enhance performance for both members (De Clercq and Rangarajan, 2008; Dyer and Hatch, 2006; Wagner, 2006a). Selnes and Sallis (2003) refer to such sharing of KRs as relationship sharing, which is defined as "a joint activity between a supplier and a customer in which the two parties share information, which is then jointly interpreted and integrated into a shared relationship-domain-specific memory that changes the range or likelihood of potential relationship-domain-specific behavior" (p. 80).

Knowledge Sharing and Supplier Development

The case for a link between knowledge-sharing and supplier development is built on the following three reasons.

First, extant research suggests that knowledge-sharing is inherent within supplier development strategy. Among the various SDAs, knowledge sharing is recognized as an important success factor (Wagner and Krause, 2009). It facilitates the transition from a general transactional relationship to a cooperative relationship that offers mutual benefits. For instance, the timely and effective sharing of knowledge about manufacturer requirements increases the understanding of the relationship (Krause, Handfield and Scannell, 1998).

Second, supplier development is, to some extent, an instrument of knowledge-sharing because it generally requires effective interaction, and exchange of resources, between suppliers and the buyer. In the knowledge economy age, the exchange of knowledge between supplier and buyer is becoming increasingly important. Dyer (1996) introduces co-specialization (inter-firm specialization) to explain the relationship between knowledge sharing in supplier development and performance. Through knowledge-sharing, both buyer and supplier can achieve co-specialization and superior performance.

Last, a majority of current SDAs are related to knowledge-sharing in practice. For example, site visits, training programs, joint action, and know-how transfer involve knowledge-sharing. Therefore, SDAs are becoming knowledge-intensive. Much recent research (Dyer and Hatch, 2006; Kotabe et al., 2003; Theodorakioglou, Gotzamani and Tsiolvas, 2006; Wagner and Krause, 2009) even considers knowledge-sharing activities between suppliers and buyers as supplier development practices directly. Further, Modi and Mabert (2007) suggest that knowledge-sharing activities are influenced by other SDAs. Taken together, these studies lead to the conclusion that knowledge sharing is a high-level SDA.

RESEARCH FRAMEWORK

In light of the foregoing examination/analysis of supplier development and knowledge-sharing literatures, we introduce a knowledge-oriented framework for SDAs, as illustrated in Figure 3. In this framework, SDAs are viewed in terms of knowledge sharing, and are partitioned into those that enable (or influence) the sharing of knowledge, and those that involve flows of knowledge involving one (or more) of the six distinct types of KRs among supply chain members. The framework maintains that these two aspects of knowledge-sharing create value for suppliers, buyers, and even the entire supply chain. The value manifests in such ways as higher performance or greater competitiveness.



Figure 3. Knowledge-sharing Framework for SDAs

Thus, there are SDAs that enable knowledge sharing and SDAs that essentially are knowledge-sharing activities. Knowledgesharing enablers are defined as the SDAs that influence the knowledge-sharing activities that occur during supplier development. An example of this kind of SDA is supplier evaluation. Results from evaluating suppliers can influence what knowledge should be shared with which members and at what times it should be shared. In short, the enablers are SDAs concerned with getting the right knowledge in the right formats to the right members at the right times for the right costs and for the cultivation of right relationships within the context of supplier development. In contrast, knowledge-sharing activities in the framework are defined as the SDAs that exist within this context to execute the flows of knowledge for various purposes of supplier development and in various ways. An example of this kind of SDA is the training and education of suppliers.

The knowledge-sharing framework advances a systematic, yet simple, means for understanding connections between knowledge sharing and supplier development, as well as relationships among SDAs themselves. The value of the framework will ultimately be seen in the results of its application with respect to research and practice in the area of supplier development. In particular, we demonstrate how the knowledge-sharing framework can be used to meaningfully organize extant SDA literature. The resulting framework adds to extant literature by positioning SDA in terms of knowledge-sharing parameters and highlighting rich opportunities for future SDA research Moreover, this study provides practitioners with a knowledge-sharing lens that may benefit the design and implementation of their SDA initiatives.

RESEARCH METHODOLOGY

Here, we outline our content analysis methodology that guides the development of our integrative SDKA framework. We begin with the identification SDA articles that serve as the basis for our analysis. To guide the identification of relevant research articles, we employed the several search criteria. In particular, we only considered scholarly articles that were recently published in refereed academic journals and directly address at least one SDA in a concrete fashion. Further, we limited our analysis to include empirical studies only. Accordingly, we omitted abstract or conceptual studies of SDA's from our analysis.

Using these criteria, we constructed a modest test-set of such articles to explore the applicability of our framework. While the resultant analysis, which maps articles' SDAs into knowledge-sharing concepts, is not comprehensive, it can signal whether a more complete study along those lines is promising. If so, then we contend that further study of connections between knowledge sharing and SDA is warranted, perhaps leading to refinements or extensions to the framework, as well application to exploring researcher and practitioner issues in the area of supplier development.

In assembling the small test-set, we found that both quantitative and qualitative research approaches have been used to study supplier development phenomena. Further, we have found supplier development research adopts a buyer's perspective, a supplier's perspective, or both. Moreover, we have found relevant articles in many journals. Unsurprisingly, we culled most articles from journals devoted to supply chain management, but also from many journals devoted to the reference discipline of operations management (most notably, the *Journal of Operations Management*). Relevant articles are also evident in journals of other reference disciplines such as strategy and in multi-disciplinary journals (e.g., *Decision Sciences*).

We advocate the use of content analysis to explore the relationship between SDAs and knowledge-sharing. Our preliminary study of the test-set proceeded as follows. For each test-set article, the SDAs being studied were identified. Most articles yield several SDAs. We then classified the overall list of SDAs into 1) those that have a direct knowledge-sharing focus, 2) those that are not direct knowledge-sharing activities, but which can influence the way in which the knowledge involved in supplier development is shared – be it directly or indirectly, and 3) those that are unrelated to knowledge sharing. Because we found no SDAs in the latter category, we proceeded with the first two classes. However, we recognize that a more comprehensive study must remain open to the possibility that SDAs unrelated to knowledge sharing may exist in the literature.

The list of SDAs in each class was reduced by eliminating duplicates and consolidating similar items. In cases where two or more of the remaining SDAs were aspects or specializations of a single type of SDA, these were mapped into a single SDAs type. For example, "formal assessment of supplier's capability", "assessment of supplier's performance through informal evaluation", and "formal, periodic written evaluation of suppliers" could be clustered into a SDA type called "supplier evaluation." Finally, we then proceeded to map the resulting SDA typology into the knowledge-sharing framework.

ILLUSTRATIVE RESULTS

For each member of the class of knowledge-sharing activities, the interpretive mapping yielded an indication of which types of KRs are being shared in the SDA (at least as gleaned from the test-set articles). Table 2 shows results for five SDA types identified from test-set articles. They suggest that two of the five SDAs involve the sharing of infrastructure knowledge (i.e., an organization's roles, relationships, and regulations), two different SDAs involve the sharing of artifacts, three kinds of knowledge (strategy, participants', and artifact) are of particular sharing importance when it comes to the "Managerial Assistance" SDA, and so forth. The results, for instance, imply that researchers interested in studying the "Supplier Training" SDA should be sure to design the investigation in a way that takes into account the sharing of both participants' knowledge and artifacts. But, the second row of Table 2 also suggests the possibility of a new research direction – exploring whether it could be worthwhile to share infrastructure or culture knowledge as part of providing supplier training. We expect that a more comprehensive set of SDAs will not only lengthen the content of Table 2, but also enrich it.

We can also map each SDA type for the class of knowledge-sharing enablers into the framework. However, rather than map all of them into the single concept of enabler that is shown in Figure 3, we suggest that the enabler concept has several dimensions – each characterizing a distinct type of enablement – and the SDA types can be usefully mapped into these distinct kinds of enablement. It's beyond the scope of this paper to fully develop the dimensions of enablement. Nevertheless, we do consider a few such dimensions into which SDA types can be mapped: measurement, motivation, resource, and environment. These are defined in Table 3.

| SDA Type | KR1 | KR2 | KR3 | KR4 | KR5 | KR6 | Meaning |
|------------------------------------|-----|-----|-----|-----|-----|-----|--|
| Furnish Supplier Training | | | | | Y | Y | Provide training/education to supplier's personnel on any relevant topic |
| Undertake Joint Action | | | Y | Y | Y | | Collaborate/cooperate/work with suppliers in some capacities |
| Managerial Assistance | | Y | | | Y | Y | Provide support/assistance in quality management, inventory management, etc. |
| Instill Shared Values | | | Y | | | | Share buyer's beliefs, norms, and values with suppliers |
| Commit to Social Responsibility | Y | | | | | | State purchasing social responsibilities to suppliers |

KR1, KR2, KR3, KR4, KR5, and KR6 denote purpose, strategy, culture, and infrastructure, participants' knowledge, and knowledge conveyed in/by artifacts respectively.

Y denotes this type is related with the corresponding KR.

Table 2. Sample Knowledge-sharing Activities in Supplier Development

| Dimension | Description |
|-------------|--|
| Measurement | Evaluating suppliers' performance, capabilities, and some other variables before, in and after knowledge-sharing. |
| Motivation | Stimulating suppliers to improve their performance by using shared knowledge and to participate actively in knowledge-sharing by intrinsic and extrinsic motivation. |
| Resource | Providing necessary resources for suppliers and ensuring they own required resources to make use of shared knowledge. |
| Environment | Creating a good atmosphere for suppliers and assuring that knowledge-sharing is feasible. |

Table 3. Four Dimensions of Knowledge-sharing Enablement

The corresponding framework, shown in Figure 4, is an example of a more detailed rendition of the original framework that was presented in Figure 3. In addition to knowledge-sharing activities acting on KRs, knowledge-sharing enablers projecting along various dimensions must be considered in supplier development. This is because enablers may become constraints if ignored, poorly implemented, or inadequately controlled.

| | | Kno | wledge-sha | aring Enabl | ers | | | |
|------------------------------|--------|-----|------------|---------------------|-----------------|-----------|-----------|--|
| Measure | ment | M | otivation | Resour | rce | Env | rironment | |
| Knowledge-sharing Activities | | | | | | | | |
| Purpose | Strate | ≘gy | Culture | Infra- structure | Partic pants | ci- s' | Artifacts | |

Figure 4. An Example of a Knowledge-sharing Framework for SDAs

Accordingly, we map SDAs discovered from the test-set into the enabler dimensions identified in Figure 4. The mapping that results from this interpretation indicates the enabling role(s) that each type of SDA plays. Table 4 shows results for four SDA types identified from test-set articles. They suggest that two of the four SDAs influence knowledge sharing along a

motivational direction, two enabling dimensions are affected by one of the SDAs (e.g., certification programs), and so forth. The results, for instance, imply that someone researching motivational issues in the enablement of knowledge-sharing activities for supplier development should be sure to design the investigation in a way that takes into account at least two kinds of SDAs: direct incentives and certification programs. We expect that a more comprehensive set of SDAs will not only lengthen, but also enrich, the content of Table 4.

| SDAs | Measurement | Motivation | Resource | Environment | Meaning |
|---|-------------|------------|----------|-------------|--|
| Direct Incentives | | Y | | | Recognize supplier's performance in the form of monetary awards |
| Use Certification Programs for Suppliers | Y | Y | | | Evaluate supplier's degree of competence via certifications |
| Provide Financial Support | | | Y | | Provide capital for investments |
| Build Trust | | | | Y | Build mutual trust between buyer and its suppliers |

Y denotes this type is related with the corresponding knowledge-sharing enabler.

Table 4. Sample Knowledge-sharing Enablers in Supplier Development

CONCLUSION

Drawing on KR theory and detailed review of all SDAs in current research, we have argued that supplier development is essentially a knowledge-sharing phenomenon. In short, knowledge sharing is the "heart" of supplier development. We have introduced a knowledge-sharing framework of SDAs, which distinguishes between SDAs that are knowledge-sharing activities and SDAs that enable/influence these knowledge-sharing activities. Each SDA that functions as a knowledge-sharing enabler manifests in one or more directions that influence the way and degree in which knowledge sharing happens.

This study is a prototype for developing a relatively comprehensive and unified picture of SDAs, delineating relationships between supplier development and knowledge sharing, and specifying a framework to organize an understanding of supplier development from a knowledge-sharing perspective. We recognize that this study has some limitations. First, it's a prototype. While it establishes some landmarks along a new path for supplier-development inquiry, it's too incomplete to be definitive. Future research needs to identify and process a full set of publications dealing with supplier development. Second, the interpretive aspect of this may suffer from subjective bias. Such bias can be considerably reduced in future research by developing and testing a codebook to be applied when interpreting a specific SDA. Third, SDAs collected from academic research articles may not represent all SDAs that exist in practice. In-depth interviews to check on this may be a worthwhile direction for future research. Fourth, more extensive and quantitative analyses are possible with a full set of SDAs developed from a large number of journal articles.

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