Impact of Knowledge Base on Knowledge Exchange: Commonalities and Differences in the Characteristics of Source and Recipient

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Abstract

In a knowledge transaction, information is shared between a source and recipient. It is argued that the knowledge base of the source and the knowledge base of the recipient will impact an exchange’s occurrence. The characteristics of the source’s knowledge base and the recipient’s knowledge base may be compared in two manners: (1) a single-value continuum and (2) commonalities and differences as separate dimensions. Explanations—economic, technological, organizational/strategic, and sociological—for knowledge sharing are explored using the single continuum and the two-dimension model. We conclude that the rhetoric must change when evaluating actors involved in knowledge sharing. Measurement ramifications for future research and implications for management practitioners are advanced.

“The benefit of knowledge integration is in meshing the different specialized knowledge of different individuals – if two people have identical knowledge there is no gain from integration – yet, if the individuals have entirely separate knowledge bases, then integration cannot occur beyond the most primitive level.” [25, p. 116]

1. Introduction

This paper highlights one particularly salient issue in the knowledge exchange process—comparing knowledge bases of the actors involved in the event. Knowledge exchange is taken to be voluntary conveyance (sharing) of information or know-how from one individual or group (source) to another individual or group (recipient). Our focus is on the impact that the knowledge base of the source and the knowledge base of the recipient have on the sharing of information between actors within a firm, where these actors are embedded in a social context, may work in different locations, may be separated by organizational boundaries (e.g., departments and divisions), and work in different disciplines (e.g., peptide chemistry vs. delivery of analgesics).

2. Knowledge, knowledge base, and knowledge exchange

Studies that take a knowledge-based view of the firm [25, p. 110] assert that knowledge is the “most strategically important” resource of the firm. Extending this view, knowledge is described as central to understanding the management of technology and innovation. Zander and Kogut [64] suggest, technology is often: (1) firm-specific, differentiated knowledge about specific applications (largely cumulative within a firm); (2) arrived at through experience (a multiunit firm develops a set of rules or higher order organizing principles by which new capabilities are created, improved and transferred); and (3) based on capabilities which are idiosyncratic to individuals and small groups. Owen-Smith and Powell [47] observe that technology is context-specific (based on the firm and location in which it was created or adapted). This requires the need to access technology that is dispersed worldwide both outside the firm and throughout the firm [27]. In the case of a multidivisional multinational firm, technologies or knowledge may be even more specialized and context-specific. As Grant [25] posits, (1) specialized knowledge is necessary; and (2) some way must exist (through organization or management) to integrate this specialized knowledge.

2.1. Specialization in knowledge

From a resource-based perspective, there can be significant differences in the knowledge, skills, and capabilities of actors within an enterprise. These differences are often the direct result of specialization and expertise. Metcalfe and Gibbons [39, p. 167] observe “specialization becomes a way of coping with the bounds of rationality.”

In the context of a technology or knowledge intensive enterprise, the need for novel sophisticated knowledge can also result in specialized project groups. Firms may even design the organization of technology around centers of excellence [10]. Specialization results in wide differences in the accumulation of technologies, knowledge, and
capabilities between project groups [45]. In the case of the multivisional multinational firm, with geographically and technologically dispersed actors, knowledge and capabilities may differ greatly [19, 35]. Wherever located, these stocks of valuable resources can provide sustainable competitive advantage [5, 8, 57, 59].

2.2. Characteristics of knowledge base for participants (source and recipient)

Knowledge base is a collective term that includes specific domains [31], regimes [39], or competence in a given area – that is, an organized stock of knowledge, skills, and capabilities. For an individual or group, competences are the result of knowledge generating activities previously undertaken. A knowledge base is the result of both experience in a technology and firm capabilities [36]. Iansiti and Clark [34, p. 557] suggest, “the capacity to integrate diverse knowledge bases through problem solving is the basic foundation of knowledge building in an organization.” In this paper, a knowledge base is specified for each of the participants–source and recipient–in the exchange. Knowledge base refers to areas and levels of the participant’s stock of knowledge (what they know) and is defined in terms of the technology, know-how, skills, and capabilities they have at their disposal.

Given that knowledge is specialized and dispersed, there can be significant differences (and commonalities) in the knowledge bases of actors in an organization. Differences in the expertise characteristics between knowledge bases can be beneficial in knowledge exchange [54, 60]. Studies that examine external strategic technology partnerships [28, 29, 48] suggest that partners are often chosen for diversity in specialized technological knowledge. In studies on innovation, diversity is generally found to be important in the creation of knowledge [23, 64].

Alternatively, commonalities in knowledge bases can also be important in an exchange. There is a general consensus in the literature that common knowledge is important in knowledge integration [11, 37, 59]. As Demsetz [17, p. 172] states, “common knowledge … is useful because its possession allows greater specialization.” It can be an efficient means of communicating between specialists. Common knowledge includes knowledge at the “intersection of their individual knowledge sets” and “permits individuals to share and integrate aspects of knowledge which are not common between them” [25, p. 115–116]. It can include language, shared meaning, as well as commonality of specialized knowledge. A review of the literature indicates that terms often used to describe commonality are homogeneity, overlap, and complementarity.1

From a firm learning perspective, the literature points to the role of common cognitive schema and frameworks in facilitating the knowledge transaction [55, 62]. Cohen and Levinthal [14] record that “absorptive capacity” increases the likelihood of a productive exchange. But even though common knowledge may enhance the exchange process, these ideas do not describe commonality in knowledge base specifically for problem solving. In general, most studies do not examine whether commonalities in knowledge base contribute to problem solving. The emphasis is instead on the role that common knowledge has in facilitating an exchange (in essence a communication perspective).

2.3. Impact of knowledge base characteristics on knowledge exchange

In this paper, the major assertion is that the attributes of the knowledge base of the participants (source and recipient) in an exchange will have an impact on the transaction. This is based on the premise that individuals and groups/teams in a multiunit organization: (1) develop specialized knowledge, skills, and capabilities; (2) this specialized knowledge results in commonalities and differences in knowledge bases; and (3) these commonalities and differences in knowledge bases have a significant effect on a knowledge transaction. Drawing on these ideas, the following general assertion is reached.

Proposition 1: The knowledge base of the source and the knowledge base of the recipient will have an impact on the knowledge exchange.

The perspective or lens put forth in this paper is that commonalities and differences in the knowledge bases of the participants (source and recipient) will have an impact on an exchange involving knowledge. This impact will be evident in the occurrence of a fruitful exchange. An examination of commonalities and differences will be overlaid on competing reasons for knowledge sharing. A portion of this paper is devoted to alternative explanations (economic, technological, organizational/strategic, and sociological) for sharing knowledge. The template (commonalities and differences in knowledge base) will be applied to the knowledge exchange model and helps to illustrate the relationship between various explanations for

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1 Complementarity has been used to describe commonalities [3, 51, 63]. At other times it has been used to describe differences [6, 32, 49].
knowledge exchange and the characteristics of the knowledge base of source and recipient.

3. Knowledge bases and knowledge exchange

3.1. Comparison between knowledge base of source and knowledge base of recipient

In order to examine the impact of the knowledge base on a knowledge exchange, an assessment of the knowledge base or domain of the participants in a transaction is needed. The knowledge base of the source and the knowledge base of the recipient must be judged against one another. In looking at an exchange, attributes of the source’s resident knowledge must be compared with those of the recipient.

This comparison of knowledge bases can be conceptualized in two different though related manners. In the first conceptualization, characteristics or competences of the two knowledge bases are evaluated on a single continuum (Figure 1). Various methods for arriving at a single measure have been demonstrated in the literature. These methods have been muddled and misapplied. One method relies on examining the number of commonalities and differences and drawing conclusions from a resulting composite value. A related method is to evaluate the significance or importance of commonalities relative to differences (e.g., a ratio). Still another method is to evaluate the nature or magnitude of differences.

Using the single-value continuum, a score is arrived at ranging from full overlap (identical knowledge bases; complete commonality in knowledge bases) to full diversity (complete divergence in knowledge bases; no commonality in knowledge bases). In this paper—when a single value assessment (comparison between two knowledge bases) is made—we describe overlap as greater commonalities than differences and diversity as greater differences than commonalities. For the time being, only the first method—whereby a ratio of commonalities and differences is arrived at—will be considered. The single-value continuum widely employed in the literature, “similarities,” will be visited in the final section. Suffice it to say that the meaning for the moniker “similarities”—although widely believed to be understood and useful—in management vernacular often proves to be ambiguous.

A second conceptualization—like the single-dimension conceptualization—calls for an evaluation of the knowledge base of the source, an evaluation of the knowledge base of the recipient, and then a comparison between the two knowledge bases (see Figure 1). A complete inventory is made of source competences and recipient competences. An assessment is made of the commonalities (competences found in both knowledge bases) and then the differences (competences found in only one of the two knowledge bases). This comparison of knowledge bases could result in a simple frequency count for the number of commonalities and the number of differences between the two knowledge bases or a more elaborate comparison whereby competences are weighted based on criteria such as relevance or value. The distinction between this two-dimension conceptualization and the single-value conceptualization is in the retention of information useful for analysis (whereas a score in the single continuum discards much information). Under the two-dimension conceptualization, commonalities and differences may be examined independently as well as together.

This second conceptualization—with separate dimensions for assessing commonalities and

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**Figure 1**

**Commonalities and differences between knowledge bases**

For these diagrams: Where the rectangular boxes (knowledge bases) touch there are commonalities between the two knowledge bases. Where the rectangular boxes do not touch there are differences between the two knowledge bases.

In the following diagram the commonalities (represented by an arrow) are equal in both knowledge exchanges, but the differences are greater in the first exchange (Knowledge bases A and B) than in the second exchange (Knowledge bases X and Y).

In the following diagram the differences (represented by an arrow) are equal in both exchanges, but the commonalities are greater in the first exchange (Knowledge bases I and J) than in the second exchange (Knowledge bases P and Q).
differences between the two knowledge bases–leads to markedly different implications than the single-dimension continuum. These distinctions will be brought out in the conclusions. It is worth pointing out that technological distance often termed relatedness can be used in both the single-measurement continuum and the two-dimension conceptualization.

4. Relationship between knowledge bases and knowledge exchange

4.1. The single-dimension continuum

The first conceptualization, the single-value continuum, can be used to understand the relationship between the knowledge base of the source and the knowledge base of the recipient in a knowledge exchange. Given that there are different explanations for a knowledge exchange, we conclude that either overlap or diversity in the knowledge bases of the participants will have an impact on an exchange involving information. There is an interplay between the reasons for knowledge exchange (economic, technological, organizational/strategic, and sociological factors) and the overlap or diversity exhibited between the knowledge bases of the participants.

4.1.1. Economic. Some knowledge exchanges are undertaken for economic purposes [4, 13, 38, 41, 43, 52, 58, 61]–taken here as minimizing costs and efforts. For these transactions the impetus for knowledge sharing is to achieve greater efficiency, such as in an R&D task. In such a setting, the emphasis is on completing the R&D task on time or within budget. We propose that the best source of technological knowledge for an exchange dictated by financial constraints may be another R&D worker or team that has had or is currently undertaking problem solving activities requiring the same technological competences. As a result, we predict that redundancy in specialized knowledge is desirable. Some differences in knowledge will exist because of differences in personnel, problem-solving experiences, history, and even geographic location. Overall, however, there will be more commonalities than differences in the attributes of the knowledge bases of the source and recipient for a knowledge exchange undertaken with an eye toward efficiency.

It is anticipated that a knowledge exchange undertaken for economic motives will exhibit overlap rather than diversity between the knowledge base of the source and the knowledge base of the recipient. The following relationship is proposed for knowledge exchanges carried out for economic reasons. This proposition is depicted in Figure 2.

Proposition 2: In a knowledge exchange for economic motives, overlap between the two knowledge bases (source and recipient) will be positively related to occurrence up to a point and then become negative.

4.1.2. Technological. Knowledge exchanges may also be driven by technological aspirations [1, 12, 22, 44, 52, 53, 56]. Here, the emphasis is on knowledge creation and innovation (creativity and novelty) rather than on cost and time savings (efficiency). The importance of sharing information is to advance or improve technology. Increasing the technological value of the output (product or process) is critical. The sharing of scientific information within the enterprise will contribute to meeting current needs or capitalizing on opportunities that can translate into new technologies/innovations.

Owen-Smith and Powell [47] affirm that new ideas and new approaches to problem solving will have a positive impact on knowledge creation and innovation. A knowledge exchange undertaken for technological progress will require that the recipient seeking knowledge will access knowledge from a source that has a knowledge base quite different from its own. Although some degree of commonalities may help to facilitate the transmission, we predict that diversity in specialized knowledge is far more desirable. The following relationship is proposed for knowledge exchanges undertaken for strictly technological advancement (Figure 2).

Proposition 3: In a knowledge exchange for technological motives, diversity between the two knowledge bases (source and recipient) will be positively related to occurrence up to a point and then become negative.

4.1.3. Organizational/Strategic. Knowledge exchanges may also take place for organizational/strategic purposes [16, 20, 21, 33, 38, 42, 55]. In these incidents the emphasis is on building a coordinated or integrated network to utilize or leverage dispersed or distributed resources [2]. The aim is to build a context characterized by interdependence, cooperation, and collaboration between groups. For example, expanding the horizons and global reach of an individual or team can help to accomplish strategic goals. To achieve a strategic objective, we expect that knowledge sharing will be undertaken between source and recipient in an enterprise with diversity in knowledge bases. The following relationship is proposed for knowledge exchanges undertaken for organizational/strategic gain.
Proposition 4: In a knowledge exchange for organizational/strategic motives, diversity between the two knowledge bases (source and recipient) will be positively related to occurrence.

4.1.4. Sociological. Finally, knowledge exchanges can be undertaken for sociological benefit [7, 11, 15, 26, 30, 38, 60]. In these transactions the focus is on information being shared to build or improve social relationships. Ultimately, resource sharing may lead to better communication and interactions between geographically and technologically dispersed individuals or groups. Based on the role that strength, trust, and reciprocity play in social relationships, we expect that many knowledge exchanges will occur to foster new and existing relationships. Based on Granovetter’s [24] argument that “strong ties” will provide redundant information, we propose that sharing of information to maintain existing relationships will occur between participants characterized by overlap in knowledge bases (see Figure 2).

Proposition 5: In a knowledge exchange to maintain existing relationships, overlap between the two knowledge bases (source and recipient) will be positively related to occurrence.

Taking an alternate view, some knowledge exchanges will be undertaken to build new relationships. Based on Granovetter’s [24] ideas that “weak ties” are most likely to provide non-redundant information, we expect that knowledge sharing will occur between participants that have diversity in knowledge bases to foster new relationships (see Figure 2).

Proposition 6: In a knowledge exchange to build new relationships, diversity between the two knowledge bases (source and recipient) will be positively related to occurrence.

Figure 2
Relationships proposed using the single-value continuum

4.2. The two-dimension assessment

The second conceptualization, the two-dimension comparison, can also be used to understand the relationship between the knowledge base of the source and the knowledge base of the recipient in a knowledge exchange. Explanations for resource sharing have largely focused on a single-value continuum for contrasting the knowledge bases of knowledge sharing participants. In the analysis presented in this section,
commonalities and differences are explored independently (see Figure 1). The impact that the commonalities between the knowledge base of the source and the knowledge base of the recipient have on a knowledge exchange will be inspected. Likewise, analysis will be made of the impact of the differences between exchange participants’ knowledge bases on the transaction.

4.2.1. Economic. It is hypothesized that the greater the commonalities the more likely a knowledge exchange for economic motives will occur and succeed. That is, it can be expected that commonalities should be positively related to exchanges motivated by efficiency. From this, the following proposition is suggested. This proposition is depicted in Figure 3.

Proposition 7: In a knowledge exchange for economic motives, commonalities between the two knowledge bases (source and recipient) will be positively related to occurrence.

Ceteris paribus, a recipient is less likely to have an exchange to save time and money with a source that has more competences (number of competences) or greater competence (nature or level of competence). It also follows that, among two exchanges, the exchange in which there is a higher number of differences or greater differences will be more costly and time consuming (inefficient). From this, the following proposition is put forth (see Figure 3).

Proposition 8: In a knowledge exchange for economic motives, differences between the two knowledge bases (source and recipient) will be negatively related to occurrence.

4.2.2. Technological. While there is agreement that an increase in differences should improve the likelihood of a technologically motivated knowledge exchange (resulting in creative sparks and collisions), it appears that, all things equal, commonality between knowledge bases (although promoting efficiency and lowering communications barriers) should have a negative impact on exchange outcome, producing results that are trite, pedestrian, stale.

Proposition 9: In a knowledge exchange for technological motives, commonalities between the two knowledge bases (source and recipient) will be negatively related to occurrence.

Proposition 10: In a knowledge exchange for technological motives, differences between the two knowledge bases (source and recipient) will be positively related to occurrence.

4.2.3. Organizational/Strategic. To strengthen an organizational network requires assimilation of new elements [9]. Additional differences can also provide valuable options in a strategic sense. While commonalities may be desirable from the perspective of efficiency, an organizational/strategic perspective does not place a priority on such a value. We conclude, therefore, that it is differences alone that have bearing on whether sharing information for organizational/strategic purposes—takes place and the outcome of the exchange. From this, the following propositions are suggested.

Proposition 11: In a knowledge exchange for organizational/strategic motives, commonalities between the two knowledge bases (source and recipient) will not be related to occurrence.

Proposition 12: In a knowledge exchange for organizational/strategic motives, differences between the two knowledge bases (source and recipient) will be positively related to occurrence.

4.2.4. Sociological. From a sociological vantage point, both theory and research provide indication to believe that greater commonalities [differences] between the knowledge base of the source and the knowledge base of the recipient, the greater the likelihood of an exchange to maintain existing [build new] relationships. The impact of the number of differences [commonalities] between two knowledge bases on a knowledge exchange for sociological motives that involve maintaining existing [building new] relationships is unclear.

Proposition 13: In a knowledge exchange to maintain existing relationships, commonalities between the two knowledge bases (source and recipient) will not be related to occurrence.

Proposition 14: In a knowledge exchange to maintain existing relationships, differences between the two knowledge bases (source and recipient) will not be related to occurrence.

Proposition 15: In a knowledge exchange to build new relationships, commonalities between the two knowledge bases (source and recipient) will not be related to occurrence.

Proposition 16: In a knowledge exchange to build new relationships, differences between the two knowledge bases (source and recipient) will be positively related to occurrence.
5. Conclusions

The single-value continuum directs efforts to developing commonalities and differences at the expense of one another. The single-value conceptualization points to the importance of one over the other. This conclusion is arrived either through a ratio, which emphasizes an increase in the level of one and/or a decrease in the level of the other—or through a comparison, which emphasizes an increase or decrease in differences without consideration of commonalities.
The extant literature is replete with prior studies that argue for pursuit of one end, all the while failing to recognize—or at least consider—that both are important. Edwards [18, p. 40] critiques the congruence literature for “collapsing two or more measures into a single index.”

The dual pursuits of commonalities and differences are not in conflict with each other using the two-dimension assessment. The single-dimension continuum, in contrast, asserts that a given value of commonality implicitly represents either a ratio of commonalities and differences or some calculus to arrive at an assessment of likeness. It specifies the level for neither commonalities nor differences. Instead, it falsely promotes pursuit of one at the expense of the other. For scholarship this is a shame, for the management practitioner there could be real harm done by this inaccuracy. Our brief note suggests that, depending on motive, fostering commonalities and differences in unison may be the prudent course. At a minimum, it is necessary to allow for this possibility.

It must be pointed out (admitted) that knowledge exchange infrequently takes place for a singular purpose [46]—such as the motives isolated individually in this paper (economic, technological, organizational/strategic, or sociological). Social factors invariably blend with concerns for an innovative result and within budget. These competing factors go into the calculus imposed by the firm and the actors involved in knowledge sharing. We also must draw attention to our simplification for expository purposes in framing this as a dyad (source to recipient) but as the ‘group’ hints at, there may be any number of actors including mediaries that bridge diversity in knowledge bases (e.g., providing translation or interpretation). Additionally, a recipient may pick and choose elements of knowledge from many individuals and groups [50].

We recognize our own shortsightedness—such as in propositions 3, 9, and 10 regarding technological motives—where we draw attention to placing priority on diversity and conclude that more and bigger differences are all that matter for a knowledge exchange concerned with technological output. While strictly speaking this is true, clearly, for communication to occur, some commonality would be necessary for these disparate worlds (source and recipient) to collide.\(^1\) We do not retreat from the assertion that for purely technological gain, (turning a blind eye toward efficiency) differences are to be emphasized. But a balance of economic, technological, organizational/strategic, and social factors likely all have bearing on most instances of knowledge exchange.

For management practitioner and scholar alike, implications are intuitively drawn from the two-dimension model. Future attention is properly directed at exploring the nature/number of commonalities and differences between the knowledge base of the source and the knowledge base of the recipient in a knowledge exchange. Clearly additional work is called for, indeed we may find that an n-dimensional model is called for in examining knowledge bases of various actors and the networks in which they belong. Ultimately a head-to-head empirical analysis is called for in order to sort out the benefits of various classification schema.

6. References


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\(^1\) Though Postrel (2002: 303) asks “what circumstances determine whether it makes sense for adjacent stages in the value chain to invest in the development of common understanding, and when does it make sense for them to operate in mutual ignorance?”


