

IMPEDIMENTS TO INTER-FIRM TRANSFER OF BEST PRACTICE IN AN ENTERPRISE SYSTEMS CONTEXT

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Abstract

A survey of major issues with Enterprise Systems was administered within the State Government of Queensland, Australia and a subset of these issues mapped against Szulanski's model of inter-firm best practice transfer stickiness (Szulanski, G. 1996. Exploring internal stickiness: Impediments to the transfer of best practice within the firm. Strategic Management Journal, 17, 27-43). The paper discusses impediments to knowledge transfer within this context, presents findings from the a posteriori application of Szulanski's model to the survey responses, and suggests future research directions.

Keywords: ERP, enterprise systems, knowledge management, knowledge yransfer, consulting

Introduction

A parent study, "Cooperative enterprise system life-cycle knowledge management" explores means of better managing knowledge across the three key players involved in Enterprise Systems life-cycle support - the client, vendor and implementation partner. Herein we explore knowledge transfer issues in the Enterprise Systems (ES) context.

An early stage of the parent study entailed a study of major issues within the Queensland State Government in Australia. Through a modified Delphi approach, personnel that had been involved in implementation and management of the common ES - SAP R/3, were surveyed to determine what major issues they had experienced with the system. Implementation partners were also asked to furnish major client-issues.

The survey was piloted in five agencies (for discussion of methodological issues related to the pilot study see Chang et al, 2000), then extended to the rest of the Queensland Government. From the extension study 101 knowledge transfer related survey responses were identified, then mapped against Szulanski's model of Intra-Firm Transfer Of Best Practice (Szulanski, 1996) in order to explore barriers to knowledge transfer on ES implementations.

This paper firstly describes why knowledge transfer in an ES context is important. We then provide a literary overview of knowledge transfer, including a description of Szulanski's model. After briefly recounting the pilot mapping exercise to Szulanski's model and some preliminary results we lastly suggest future research directions.

Knowledge Transfer in the Enterprise Systems Context

Enterprise Systems

A new class of packaged application software has emerged over the past decade, ostensibly consolidating under a single banner, a multi-billion dollar industry that includes SAP AG, the world's fourth largest software vendor, several other of the largest software firms and the world's largest management consulting organisations. Variously called enterprise resource planning systems (ERP), enterprise-wide systems, or simply enterprise systems (ES), these comprehensive, packaged software solutions

seek to integrate the complete range of a business's processes and functions in order to present a holistic view of the business from a single information and IT architecture (Gable et al, 1998; Klaus et al, 2000).

According to Chan (1999), ES implementations require a wide range of knowledge including project knowledge (how to implement ES, business process engineering, change management, training and education), technical knowledge (such as programming, system and database administration), product knowledge (specifics of the ES) and business knowledge (... of the business, its culture and people). Where an organisation does not have the requisite expertise, it will seek this implementation expertise from third-party providers. Implementation resources are predominantly knowledge based. This knowledge may be sourced from a (typically large) consulting firm (knowledge vendor), which acts in the capacity of implementation partner. Sharing the joint objective of successful implementation and ongoing management, an alliance is formed between the client organisation, ES software vendor and this third-party.

Having engaged a suitable implementation partner, the client completes the implementation process, goes live with the ES and moves into the post-implementation maintenance and upgrade cycle. At the end of the implementation phase, the consultant usually withdraws from the organization. Responsibility for managing the ES falls back to the client. Continuing success of the ES becomes reliant on the client's skill and knowledge in running, supporting, maintaining and upgrading the ES. In order to keep the ES 'live' and relevant, the client must either draw from their ES capabilities transferred-in during the implementation period or seek expert support (knowledge) externally. Such external support is usually available from the vendor, the implementation partner and other third parties and is often expensive.

Organisations considering implementing ES face the issue of attraction and retention of staff within a marketplace where demand for such expertise outstrips supply (Gable et al, 1998). Where the client plans to outsource its ES to an Application Service Provider (ASP), post-implementation ES knowledge self-sufficiency may not be necessary. ASP vendors cite this alleviation of 'future skills risk' as one of their competitive advantages (Bennett and Timbrell, 2000). On the other hand, should the organisation follow an insourcing strategy, then it will often aspire to post-implementation ES knowledge self-sufficiency, in order to reduce reliance on third-party support and the associated high costs of that support. Knowledge management, and knowledge sharing in particular, is considered to offer significant commercial and practical benefits throughout the ES life-cycle (Gable et al, 1998). It can be argued, therefore, that knowledge transfer from vendor and implementation partner is a critical success factor in ES life-cycle management.

According to Davenport (2000), client organisations often experience poor ES implementations because they regard the project as a one-time exercise and so fail to attend to ES knowledge management issues, such as requesting (contracting for) knowledge transfers from consultants, or adequately maintaining the transferred knowledge. While the current literature falls short of empirically demonstrating causal links between effective knowledge transfer and successful ES implementations, the expectation is that knowledge transfers leave the client organisation better positioned to maintain and evolve their system, and to generate returns from the ES investment (Davenport, 2000). This project and its umbrella research program attempt to bridge this gap in the literature.

However the mere possession of transferred knowledge is unlikely to be sufficient to meet a client's independence objectives. Effective knowledge transfer requires not only transmission, but also its absorption and use (Davenport and Prusak, 1998). Developing the capability to effectively maintain and leverage knowledge will depend on the client's ability to either *integrate* it with knowledge of the business or combine it with existing capabilities. This knowledge must then be *used to create* appropriate routines and capabilities in support of business objectives (Andreu and Ciborra, 1996; Kogut and Zander, 1993; Inkpen and Dinur, 1998). Organisational capability emerges over time through a process of organisational learning (Levitt and March, 1988). It is informative then, to examine the literature regarding the transfer of knowledge into and within the firm for purposes of organisational learning.

Knowledge Transfer

According to Nonaka (1994), organisational learning depends fundamentally on the internalisation of knowledge where explicit (formalised, explicated) knowledge is converted into tacit forms such as individual know-how and organisational routines. The knowledge is literally absorbed through action or experience.

Inkpen (1996) extends this notion by arguing that capability development in an alliance-context is therefore dependent on the integration of internalised knowledge from external sources into organisational routines. Thus, in an ES implementation,

knowledge sourced from the implementation partner must be translated, adapted and combined with knowledge of the organisation’s business processes, then internalised into new organisational routines specific to the organisation’s context.

The resource-based view of the firm emphasizes the leveraging of the firm’s resources in the development of organisational capabilities, and exploiting these to the firm’s advantage. Andreu and Ciborra (1996) discuss the importance of situated learning and knowledge accumulation in the capability development process. Their work is notable for its focus on the role of context in organisational learning loops - the more path-dependent the learning process to develop work practices, routines and capabilities, the more idiosyncratic they are to the firm, and therefore, the less generalisable and transferable to different organisational contexts. Over time, business environments and their apposite legacy or ES develop firm specific peculiarities.

Constantly faced with implementing ES in unique and distinctive business environments, consultants sieve their experiences in a systematic way to extract idiosyncrasies from their ES client encounters thereby providing broad methodologies for general application to future ES clients. Consulting firms go to great lengths and expense to externalise ES knowledge in order to achieve a comparative advantage and to leverage their costly people (Timbrell and Gable, 2001). Vendors also are adopting this approach incorporating industry templates and functional process models into their product offerings. Both consultant and vendor are looking to explicate their past experience in order to better realise the benefits of knowledge transfer associated with ES implementations.

Szulanski’s Model

A different approach to knowledge transfer underpins research by Szulanski (1995) who uses a (Shannon and Weaver, 1949) communications metaphor to analyse intra-firm transfer of best practice in a manner analogous to the transmission of a message from a source to a recipient within a given media or context. Szulanski argues however that while knowledge transfer is a distinct experience rather than diffusion, best practice transfer should be regarded primarily as a process, rather than a transaction or event. Best practice transfer thus unfolds over four stages through which organisational routines are replicated. *Initiation* is defined as comprising “...all events that lead to the decision to transfer”; *Implementation* “...begins with the decision to proceed”; *Ramp-up* “...begins when the recipient starts using transferred knowledge”; and *Integration* “...begins after the recipient achieves satisfactory results with the transferred knowledge” (Szulanski, 1996, pp.28-29). Note that the four stages in Szulanski’s model are similar to stages in the ES life-cycle as described by Chan (1999).

The significance of Szulanski’s work is his analysis of the effects of certain characteristics of the context, the source, the recipient, and the message itself (ie. the knowledge or practice) in generating “noise” at various stages of the transfer process. Szulanski argues that the successful transfer of best practices should begin by assessing the sources of transfer difficulty and then incorporating selective interventions aimed at the most significant barriers.

An understanding of the types of mechanisms that have been empirically and theoretically demonstrated as potential barriers and facilitators of knowledge transfer may thus prove instructive when identifying the key issues at play in the particular case of ES knowledge transfers. To provide structure to this analysis, we draw from knowledge management and other literature, using Szulanski’s model as a framework against which four categories of knowledge transfer mechanisms are examined.

Beginning from the premise that the transfer of best practices inside the firm can be “sticky” or difficult, Szulanski explored the origins of internal stickiness in the context of barriers to appropriating rents from scarce and valuable knowledge (1995, 1996, 2000). His model is illustrated in the following diagram.

Table 1. Szulanski’s Model

Characteristics of the Transfer Context – Barren Organisational Context – Arduous Relationship		
Characteristics of Knowledge Source – Lack of Source Motivation – Lack of perceived reliability of source	Characteristics of Knowledge – Unproven Knowledge – Causal Ambiguity	Characteristics of Knowledge Recipient – Lack of recipient motivation – Lack of recipient absorptive capacity – Lack of recipient retentive capacity

Characteristics of the Knowledge Itself

Causal ambiguity signals the absence of know-why: why something is done, and why a given action results in a given outcome (Szulanski, 1995). Szulanski found *causal ambiguity* to be a significant source of stickiness through all phases of the transfer process and particularly important during the first three stages. Lippman and Rumelt (1982) argued in their theory of uncertain imitability that causal ambiguity may impede the precise replication of knowledge in a different setting by obscuring effects of idiosyncratic features of the new context in which the knowledge is used. Difficulty in replicating a capability can arise from ambiguity about the elements of success or failure and how they interact. As Szulanski (1995, p.35) explains: “...more than absence of know-how, causal ambiguity signals the absence of know-why: why something is done and why a given action results in a given outcome”.

Szulanski (1995) also found that proof of the usefulness of the source’s knowledge is most important during the first two stages of the knowledge transfer process. The less substantiated the knowledge or the greater the speculation about claims it will solve the recipient’s problem (“*Unproven knowledge*”), the more difficult it will be to induce the recipient to engage in the transfer.

Characteristics of the Source of Knowledge

Szulanski’s research also supported the notion that stickiness may derive from *lack of source motivation* to engage in knowledge transfer. The source may be reluctant to share for fear of losing ownership or privilege, they may perceive inadequate rewards for sharing, or they may be unwilling to commit time and resources to the transfer.

Confirming Arrow’s (1971) view, Szulanski also found *lack of perceived reliability of the source* to be an important source of stickiness early in the initiation stage. Szulanski draws on persuasion theory in associating reliability with expertise and trustworthiness and notes that where these are perceived as lacking, transfer may be sticky and the source’s advice challenged and resisted. Davenport and Prusak (1998) support this argument, noting that people judge knowledge according to the status and reputation of its source.

Characteristics of the Recipient of Knowledge

Szulanski’s research confirmed the popular notion that a *lack of recipient motivation* to accept knowledge from an external source and engage in particular activities that require its use will present stickiness. Interestingly, he found not only that knowledge-related variables were more important barriers than motivation, but also that a motivated recipient may add to transfer difficulty. This is because impatiently enthusiastic recipients embraced transfers without meticulous planning resulting in cost and time overruns.

Lack of absorptive capacity of the recipient was strongly supported in Szulanski’s research as a major barrier to knowledge transfer, particularly during the implementation phase. Cohen and Levinthal (1990) found that a recipient’s stock of prior related knowledge determines their absorptive capacity for new knowledge and can render the recipient unable to successfully exploit new knowledge. Aside from basic skills, important prior knowledge may include a shared language, previous relevant experience and knowing where to find complementary expertise.

The recipient’s ability to retain transferred knowledge through institutionalizing its use, reflects *retentive capacity*. If this ability is lacking then difficulties in integrating knowledge may result in failure to persist in using it and even reversion to the status quo (Zaltman et al, 1973). Szulanski (1995, p.122) confirmed *lack of recipient retentive capacity* as a cause of stickiness and argued that overcoming this barrier may require unlearning routinised use of prior knowledge.

Characteristics of the Transfer Context

Recognising the importance of organisational context to the gestation and evolution of a transfer initiative, Szulanski described as ‘fertile’ or ‘barren’ those contexts that either facilitate or impede the number and fate of knowledge transfer attempts. His research confirmed *barren organisational context* as an important origin of stickiness during the ramp-up and integration phases. Davenport and Prusak (1998) discuss several cultural factors that may inhibit knowledge transfer, such as lack of trust; different cultures, vocabularies and frames of reference; lack of time and meeting places; a narrow idea of productive work; status and rewards accruing to knowledge “owners”; “not-invented-here” syndrome; and, intolerance of mistakes or need for help. Above all else, they emphasize the importance of trust and common ground in facilitating knowledge transfer. “The closer people are to the culture of the knowledge being transferred, the easier it is to share and exchange” (p. 100). Szulanski’s research found that

an *arduous relationship* - “laborious and distant” (1996, p.32) between source and recipient increases difficulty during the implementation phase of knowledge transfer, when interaction is at its most intense. This has notable implications for tacit knowledge transfer, which may necessitate numerous individual exchanges (Nonaka, 1994).

Overall, Szulanski’s (1995) empirical results from study of the origins of internal stickiness suggest that the major barriers to intra-firm knowledge transfer were *lack of absorptive capacity* on the part of the recipient, *causal ambiguity* with regard to the knowledge itself and an *arduous relationship* between the source and the recipient.

Data Collection and Methodology

A survey was conducted of staff in Queensland Government Agencies who were involved in the implementation of SAP R/3, the government-wide standard ES. Staff were asked “*What do you consider have been the major issues in implementing, managing and/or supporting the SAP Financials in ... (your Government) Agency?*”

A rules-based method of classifying the survey responses was used, whereby individual responses were coded to Szulanski’s stickiness and transfer phase constructs. A classification and coding instrument was developed based on measurement items used in Szulanski’s (1995) empirical research.

As Szulanski’s measurement items were developed to reflect the intra-firm context of his research the instrument was amended to establish its relevance to an inter-firm transfer context, by removing phrases or measurement items purely relevant to internal transfers. To assure this process, Szulanski’s original literature review was systematically revisited in order to confirm the theoretical basis for each specific measurement item. For example, “*Compared to external benchmarks, <<source>> has obtained best-in-class results with <<practice>>*” was changed to “*source has achieved superior results with the practice or knowledge*”.

To further illustrate the types of issues that could be classified against each construct, Szulanski’s examples of responses to an open-ended question about the most important difficulty experienced in transfer were examined (1995, pp.127-128). Some of these examples were then included in the instrument. For instance, “nobody fully understood the concept” was included under Causal Ambiguity; and “language problems” was included under Arduous Relationship.

Finally, since Szulanski’s research employed a questionnaire where respondents could rate the extent to which an item had a positive or negative effect on transfer, the study instrument was modified so that all measurement items were expressed as barriers. Consequently, survey responses could only be coded to transfer phases or stickiness origins if they conveyed elements of difficulty or stickiness in transfer. For example, “*source has achieved superior results with the practice or knowledge*” was changed to “*lack of consensus that source has achieved superior results with the practice or knowledge*”.

Findings

Survey responses were assigned codes representing potential stickiness origins using the rules-based classification method. Many of the survey responses contained multiple issues as well as issues that could be assigned multiple codes: 66 issues were assigned 1 potential stickiness origin, 28 issues were assigned 2 potential stickiness origins and 7 issues were assigned 3 potential stickiness origins. The issues were also assigned codes representing the associated transfer phase: 58 issues were assigned to 1 transfer phase and 43 issues were assigned to 2 transfer phases.

Stickiness instances were then mapped against their associated transfer phases. Table 2 compares Szulanski’s findings with findings from this study and suggests the order of importance of the stickiness origin within each transfer phase based on counts. Following we discuss only extreme cases of either accord or discord between Szulanski ranks and our study counts.

From Szulanski’s ranks (1=most important) in Table 2 we see that *Causal Ambiguity* was found to be a highly important source of stickiness across all transfer phases (3rd, 2nd, 3rd and 4th most important of the 9 sources). Our counts however do not support this finding. In an ES setting it could be suggested that why something is done and why a given action results in a given outcome is explainable in most cases. In the absence of such rationale the ES processes would be highly questionable in an organisational setting.

Unproven knowledge was found by Szulanski to be important in the first two transfer phases (2nd and 4th). While 2 out of 5 instances may support this in the current study counts more work is required to examine this phenomenon. A fully mature product such as SAP would generally not be regarded as unproven knowledge.

Source not perceived as reliable was found by Szulanski to be 1st and 4th most important in the Initiation and Ramp-up phases respectively, whereas our study counts suggest this to be the most important source of stickiness during Implementation and relatively unimportant during other phases. A suggested explanation for this is that users did not regard some junior consultants as sufficiently expert to implement or support SAP in a complex organisational context.

We note strong correspondence between the Szulanski findings and our study counts on *Recipient lacks absorptive capacity* which on Szulanski’s data ranks 1st in each of the latter 3 transfer phases, and ranks 2nd, 1st and 3rd (counts of 17, 12 and 10) based on our study counts. This might be explained by the relative complexity of the product, a continual theme in the study to date. Szulanski ranks *recipient lacks retentive capacity* high (2nd) in Ramp-up only, which our data suggest is most important during Integration as well. The users were finding it difficult to unlearn the old processes. Finally, Szulanski ranks Arduous relationship 2nd during Implementation, whereas our counts are low on this source, for all transfer phases.

**Table 2. Incidence of Stickiness, by Source, by Transfer Phase:
Szulanski’s Ranked Determinants Compared to this Study’s Counts**

Stickiness sources	Transfer Phases							
	Initiation Stickiness		Implementation Stickiness		Ramp-up Stickiness		Integration Stickiness	
	T ¹	S ²	T ¹	S ²	T ¹	S ²	T ¹	S ²
Causal ambiguity	<u>0</u>	3	<u>2</u>	2	<u>1</u>	3	<u>2</u>	4
Unproven knowledge	2	2	3	4	0	0	0	0
Source lacks motivation	0	0	7	3	0	3	0	0
Source not perceived as reliable	<u>1</u>	1	<u>18</u>		<u>2</u>	4	<u>0</u>	
Recipient lacks motivation	0	0	6		6	5	11	3
Recipient lacks absorptive capacity	<u>1</u>		<u>17</u>	1	<u>12</u>	1	<u>10</u>	1
Recipient lacks retentive capacity	0	0	6		21	2	21	0
Barren organisational context	0	0	9		6	4	12	2
Arduous relationship	<u>1</u>		<u>1</u>	2	<u>0</u>		<u>0</u>	
Hash total	5	0	69	0	48	0	56	0

¹Timbrell counts, ²Szulanski ranks

A common indication from both studies is the problem of deficient absorptive capacity of knowledge recipients across the phases of implementation, ramp-up and integration. This suggests we concentrate our further analytical efforts on the recipients of knowledge, and specifically their preparedness and ability to accept and absorb ES knowledge.

Sources of stickiness frequently cited in the current study (high counts), but not ranked highly by Szulanski include *source not perceived as reliable* (Implementation) and *recipient lacks retentive capacity* (Integration). The former may reflect the serious dearth of ES expertise at the time of most Queensland Government implementations and the concurrent general insufficiency of product knowledge across all involved (including vendor and implementation partner staff). It would appear that both studies identify *lack of retentive capacity* as a major problem in Ramp-up and Integration. This problem would not be as apparent in the earlier transfer phases, we speculate may be endemic to the Enterprise System life-cycle. Again the findings suggest a research focus on the recipients of ES knowledge and their ability to retain that knowledge as well as unlearn legacy system behaviors.

Conclusion

While Szulanski’s research empirically tested the constructs, the data collection and analysis methods followed in the present study diverged markedly from Szulanski’s approaches, with uncertain effect on the validity of the findings as they are presented above. Szulanski’s method was based on a detailed questionnaire with a multi-item ordinal scale limiting the responses particular to each construct. In contrast the present study generated qualitative data from a single open-ended question. Szulanski’s measurement items for each construct were modified for applicability to the present study’s context and data collection approaches. No explicit testing of the internal or external validity of the modified scale used in the present data analysis method was undertaken.

The effects, if any, that these factors may have had on the validity of the coding instrument for classifying the open-ended qualitative responses from the survey are unknown. Because of the care taken in making the modifications described in Part 4

the effect is expected to be minimal. It is acknowledged that the Delphi approach was deliberately chosen to generate issues important from the participants' perspectives.

Further aspects of the analysis method raise uncertainty regarding reliability. Classification of the issues raised in the responses was inherently a subjective process open to analyst bias, since it involved the interpretation of qualitative data. To enable review by other analysts, raw data was coded to a level of detail that depicts the particular measurement items considered relevant in identifying each construct chosen for an issue. Re-coding of the data set by a range of other analysts would reveal the degree to which the results are consistent when the process is repeated. There was no comparative method for rating stickiness strength or weakness, nor the degree of a particular stickiness origin's influence.

In summary, further analysis of validity and reliability of the analysis methods would be appropriate before generalising to other ES knowledge transfer situations. Nonetheless, the findings as presented are interesting in two respects. Firstly, they reveal important insights into the variables that may have directly or indirectly presented barriers to knowledge transfer in the ES implementations responsible for the source data. Secondly, the pattern of apparently significant barriers at each transfer stage suggests interesting similarities and differences when compared with Szulanski's findings of intra-firm transfer stickiness.

The study reported herein is currently compiling weights from respondents in relation to issues identified. Alternative means of analysing both the study counts and weights are being considered. Further evidence will be available by mid-year.

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