

System Dynamics Approach to IT/IS Outsourcing in the context of the Perspective of Knowledge Management

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Abstract

In recent years, due to a lack of expertise, many organizations have been devoting large portions of their budget to outsourcing. Outsourcing is now often regarded as a solution for all problems. However, the lack of clear understanding of the effectiveness of outsourcing could lead to many problems in organizations even though outsourcing is known to provide advantages to some organizations. Moreover, outsourcing could have a negative effect on knowledge management in some aspects. There have been and continue to be numerous studies into outsourcing; however, their findings primarily relate to cost reduction in short-term. Regardless of increasing demands on outsourcing and the importance of knowledge management, little research has focused on decision-making structure from knowledge management perspective. This paper attempted to quickly identify promising movements with potentially significant effects on IT/IS outsourcing.

Keywords: outsourcing, knowledge management, decision-making

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I . Introduction

In order to meet rapidly changing technology trends with low costs and high quality, companies tend to rely on external vendors and contractors to manage and maintain their information technologies (IT) and information systems (IS). In recent years, due to changes in IT/IS and a concomitant lack of expertise, many organizations have been devoting large portions of their budget to IT/IS outsourcing (Park & Kim, 2005). According to IDC, a market research firm, spending on IS outsourcing was expected to \$100 billion by 2005 (Florin, Bradford, & Pagach, 2005). With such increasing emphasis, outsourcing is now often regarded as a solution for all IS-related problems. While a major driver for outsourcing until 1990 was cost-effective access to specialized computing power or system development skill, the growth of IT/IS outsourcing in the 1990s results from the acceptance of strategic alliance (Grover, Cheon and Teng, 1996; McFarlan and Nolan, 1995). Accordingly, increasing attention has been paid to building a successful partnership between the customer and the provider of IT/IS outsourcing services (Lee, 2001) However, the lack of clear understanding of the effectiveness of outsourcing could lead to many problems in organizations even though outsourcing is known to provide advantages to some organizations. Moreover, outsourcing could have a negative effect on knowledge management in some aspects. There have been and continue to be numerous studies into outsourcing; however, their findings primarily relate to cost reduction in short-term. Regardless of increasing demands on outsourcing and the importance of knowledge management, little research has focused on decision-making structure from knowledge management perspective. This paper attempted to quickly identify promising movements with potentially significant effects on IT/IS outsourcing from knowledge management perspective.

II . Theoretical Foundation

1. Outsourcing

IT/IS outsourcing has been described as the process of turning over part or all of an organization's technology/systems-related functions to an external services provider(s) (Loh &

Venkatraman, 1992). Although the practice of IT/IS outsourcing has been around since 1954 when General Electric Corporation contracted with Arthur Anderson, its popularity as a tactical and strategic corporate move has exponentially increase (Florin, Bradford, & Pagach, 2005).

Companies may have diverse reasons for outsourcing such as simplifying their management agenda, striving to focus on core business, and meeting the need for flexibility (Park & Kim, 2005). IT/IS outsourcing encompasses not only functions such as help desks, data centers, network management, and application development, but also business process enabled with IS and technology such as human resources or accounting and finance. In practice this latter type of outsourcing is known as business process outsourcing (BPO) and involves the delegation of certain non-core business processes to an external provider for ownership and management (The Outsourcing Institute, 2005).

2. Various Perspectives on Outsourcing

Two related streams, transaction costs economics (TCE) and agency theory, have been used while investigating the buyer-supplier relationship (Shi, Kunnathur, Ragu-Nathan, 2005). TCE is focused on the organizational boundary, while agency theory has been focused on the contract between the two involved parties (Eisenhardt, 1989). Factors in the transaction cost model (TCM), such as demand and technological uncertainty and asset specificity (Williamson, 1985), and those in agency theory, such as non-separability of performance among team members (Alchian and Demsetz, 1972) and task programmability (i.e., knowledge of a production process), are influential in choosing the inter-organizational relationship (IOR) structure and process (Mahoney, 1992).

An IS buyer-supplier relationship will certainly be impacted by the transaction costs and these factors. Grover et al. found that asset specificity of transactions needed to be considered for a high level of IS outsourcing effectiveness (Grover, Cheon, and Teng, 1994). Lacity and Hirschheim (1993; 1996) pointed out that the measurement uncertainty may generate opportunistic behaviors on the part of an IS vendor. Aubert et al. (2004) applied a TCM including both asset specificity and uncertainty to analyze the level of IS outsourcing.

Traditionally, companies made outsourcing decisions for tactical, rather than strategic, reasons (Florin, Bradford, & Pagach, 2005). They limited their IT/IS outsourcing initiatives to

cost-reducing objectives, namely off-loading non-critical, back-office functions. Strategic functions (that is, core competencies that supposedly engendered a competitive advantage in the market-place) were typically beyond this decision-making purview (Craumer, 2002). Over the last few years, however, observers claim that the intent underlying many IT/IS outsourcing decisions has moved from tactical (cost reduction) to strategic (competitive advantage and leveraging providers' knowledge) (Teng, Cheon, & Grover, 1995). They explain this trend by pointing to firms' increasing recognition that greater IS expertise can be obtained externally, rather than internally, and that, moreover, this expertise is a key driver of economic competitive advantage (Yang & Huang, 2000).

While a major driver for outsourcing until 1990 was cost-effective access to specialized computing power of system development skill, the growth of IS outsourcing in the 1990s results from the acceptance of strategic alliance (Grover, Cheon and Teng, 1996; McFarlan and Nolan, 1995). Accordingly, increasing attention has been paid to building a successful partnership between the customer and the provider of IS outsourcing services (Lee, 2001). In recent studies, there has been much interest in knowledge sharing through outsourcing partnership and its effect on outsourcing success (Gallivan and Oh, 1999; Willcocks and Kern, 1998).

[Table 1] Summary of Outsourcing Decision-Making

Strategic Dimensions	Criteria	Classification	Theories	Typical Studies
Degree of outsourcing	Decision scope (Percentage of total IT budget)	Total insourcing; Selective outsourcing; Total outsourcing	None	Lacity and Willcocks (1998); Lacity, Willcocks and Feeny (1996); Willcocks, Lacity, and Fitzgerald (1995)
	Core vs. non-core function	Core function outsourcing; Commodity function outsourcing	Core competencies theory	Quinn and Hilmer (1994); Slaughter and Ang (1996)
	Extent of outsourcing	Systems planning and management; System development and maintenance; Systems (data center) operations; Telecommunications	Transaction cost theory; Resource dependence theory	Ang and Straub (1998); Grover, Cheon and Teng (1996)

		management; End-user support		
	Type of outsourcing	Service outsourcing; Asset outsourcing	Transaction Theory	Bunker (1989); Loh and Venkatraman (1991, 1992)
Relationship type	Contract type	Buy-in contract; Fee-for-service contract; Partnership	None	Lacity and Willcocks (1998, 2001)
	Contracting relationship	Contractual relationship; Partnership relationship	Social exchange theory	Klepper (1995)
	Type of contracts	Time and materials; Fixed fee; Fixed fee plus variable element; Cost plus management fee; Fee plus incentive scheme; Share of risk and reward	None	Fitzgerald and Willcocks (1994); Loeff (1995)
	Type of relationship	Support; Alignment; Reliance; Alliance	Transaction cost theory	Nam, Rajaogpalan, Rao and Chaudhury (1996)
Period of outsourcing	Contract duration	Short-term, Medium-term, Long-term	Transaction cost theory; Social exchange theory	Chalos (1995); Klepper (1994)
Number of vendors	Number of service providers	Single-vendor; Multi-vendor	Transaction cost theory	Lacity and Willcocks (2001); Ngwenyama and Bryson (1999); Pinnington and Woolcocks (1995); Saunders, Gebelt and Hu (1997)

3. Knowledge Management based Perspective on Outsourcing

Knowledge, which is information whose validity has been established through tests of proof, has emerged as a strategically significant resource of the firm. There is little doubt that effective leverage of knowledge will be the key to business success in the future. Particular economic concepts have been argued to have become increasingly central to business and national competitiveness (Sparrow, 2001). These include the economics of knowledge (Machlup, 1984), core capability (Prahalad and Hamel, 1990), co-production of value (Wikstrom and

Normann, 1994) and adaptability/innovation (Bolwijn and Kumpe, 1990). In addition, there is an increasing contribution of digital technologies to decision making in terms of their knowledge-processing characteristics and support for collaborative effort through enhanced communication (Hougaard and Duus, 1999).

Many companies, knowledge-intensive in particular, recognize that the competition largely depends on their ability to create, collect and manage organizational knowledge. Accordingly, knowledge management becomes a key factor to gain and sustain a competitive advantage (Davenport and Prusak, 1998; Spender and Grant, 1996). Knowledge management is the process of capturing, storing, sharing, and using knowledge (Lee, 2001). Yet, managing organizational knowledge as such is a challenging task, considering the variety of factors that affect it over time, including organizational structure; informal social processes; interactions among people, activities, and incentives, and market changes (Hansen, Nohira & Tierney, 1999). In this, a major management issue is how to change individual into organizational knowledge, since organizational knowledge is inherently created and resides with individuals (McFarlan and Nolan, 1995). Another issue is how to integrate and manage organizational knowledge so that it results in successful performance. Since organizational knowledge is usually distributed within an organization and organizational products or services generally require multiple knowledge, organizations need to integrate this knowledge to produce new products or services, or to improve business performances (Brown and Duguid, 1998).

Organizational knowledge is not only created within an organization but can also be acquired externally. Therefore, the knowledge sharing between the service receiver and provider is considered as one of major issues on outsourcing. Regardless of increasing demands on outsourcing and the importance of knowledge management, little research has focused on decision-making structure from knowledge management perspective.

III. System Dynamics Approach to IT/IS Outsourcing at the Perspective of Knowledge Management

1. Outsourcing Effect at the Perspective of Knowledge Management like a puzzle pieces missing

Personal knowledge contributes to the increase in organizational knowledge (Nonaka, 1991; Nonaka and Takeuchi, 1995). The increase in organizational knowledge in turn increases personal knowledge over time. This reciprocal feedback structure leads to closed loops. The behavior represented by these single loops, however, is not a good representation of reality as anything in the real world does not continually increase over time without the loss. The loss of organizational knowledge rises in proportion to quantity of knowledge by obsolescence. In this paper, however, the obsolescence of knowledge is omitted for the simplification of the causal loop diagram.

Outsourcing is a part of the way that firms assemble knowledge from suppliers (Quinn, 1999). Thus, IS outsourcing can be seen as a mechanism to integrate IS knowledge from IS vendors (Lee, 2001). Further, IS outsourcing may encourage the generation of new ways to use IS for better organizational performance through positive interaction, with some chaos between the buyer and the vendor (Nonaka, 1994). Finally, some academics have concerns regarding the potential loss of internal know-how through IS outsourcing (Willcocks, Feeny, and Lacity, 2004). A knowledge management based perspective of IS outsourcing can help determine ways of avoiding loss of important knowledge and nurturing an organizational learning capability (Shi, Kunnathur, Ragu-Nathan, 2005). However, more serious problem is getting into the “Shifting the Burden” situation.

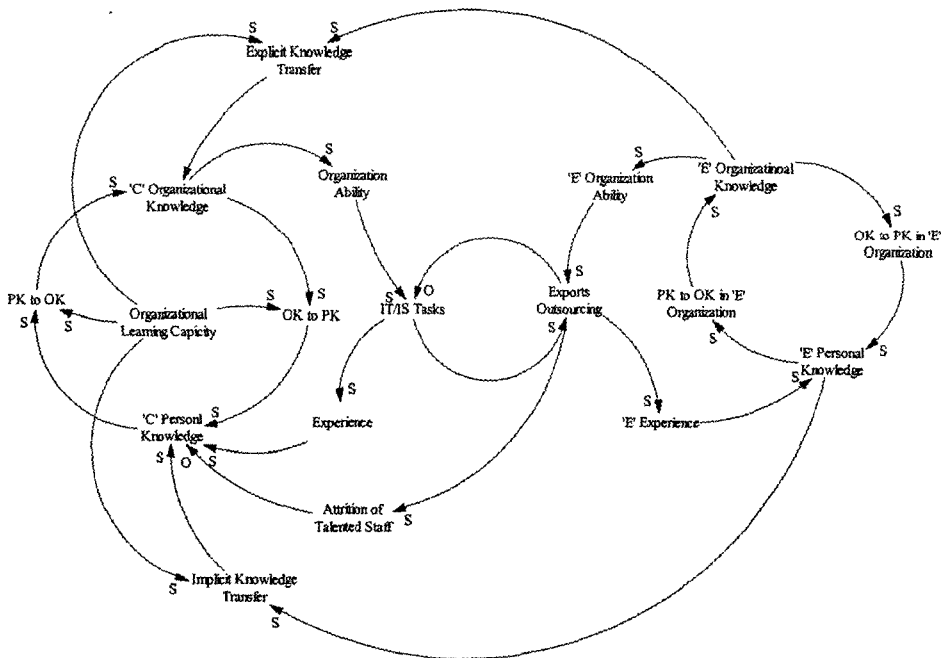
2. Shifting the Burden

In a “Shifting the Burden” situation, a problem symptom can be addressed by applying a symptomatic solution or a more fundamental solution. When a symptomatic solution is implemented, the problem symptom is reduced or disappears, which lessens the pressure for implementing a more fundamental solution. Over time, the symptom resurfaces, and another round of symptomatic solutions is implemented in a vicious reinforcing cycle. The symptom

solutions often produce side-effects that further divert attention away from more fundamental solutions. “Shifting the Burden” is about how the pressure of a worsening problem can lead us to institute a quick fix.

“Shifting the Burden” highlights an all-too-common human tendency to eliminate feelings of discomfort or pain as quickly as possible. This tendency usually leads us down the path of focusing on symptoms rather than more fundamental causes. This archetype also reveals how easy it is to become addicted to such symptomatic solutions, even as we become less and less willing or able to invest in a more fundamental solution.

3. Outsourcing at the Perspective of Knowledge Management



[Figure 1] Outsourcing at the Perspective of Knowledge Management

In the beginning, let's take a look at the highly simplified feedback structure transferring knowledge in organization. The first is the increase in the employee's personal knowledge usually gained in various channels (or routes) such as experience from previous projects (experience), education including self-study, reading etc. (education), knowledge diffusion through networks among members (PK to PK), transformation from organizational knowledge

into personal knowledge (OK to PK) and the inflow of personal knowledge occurred by employing new workers from the outside. From system dynamics perspective, the employee's personal knowledge usually increases the organizational knowledge, and vice versa. The organizational knowledge makes organization ability carry IT/IS tasks.

At the initial stage which the organization doesn't retain the organization ability to treat the IT/IS tasks, decision-makers choose outsourcing to solve the problem by services providers as experts. The experts take care of the situation while the client staffs go about their more core business. Everyone agrees that the company cannot justify having teams of experts, given the cost. It begins to rely more and more on the support of the expertise, which results from avoiding complex IT/IS tasks. In fact, as the expert grows increasingly efficient at handling IT/IS tasks, the client seeks their help more and more often as the number of tasks that cannot be handled increases.

Moreover, the situation makes talented staffs leave and personal knowledge decrease naturally in the organization. Secessions among the members result in diminishing the personal knowledge, which will in turn decrease the organizational knowledge. As the organizational knowledge decreases, personal knowledge also diminishes over time. Staff members are one of the most important sources of generating and transforming knowledge in firms. Particularly, when the knowledge resources of the firm are largely tacit, the turnover ratio of employees is critical in that it affects the amount of know-how and know-who available in the firm.

When staffs leave a firm, they take their personal knowledge with them including the knowledge gained from work experience while at that firm. To the extent that the firm relied on them as a source of knowledge, personal knowledge decreases and in turn organizational knowledge diminishes. Their departure also gives a negative impact on the firm's interpersonal network, eliminating the links they provided to others in the firm.

To avoid this dependency, the organization learn the provider's knowledge whether it is the organizational knowledge or personal knowledge and accommodate in their organizational knowledge. As with "Fixes That Fail," "Shifting the Burden" is about how the pressure of a problem can lead decision-makers to institute a quick fix. The dynamic behavior of this simple system depends on which of these loops dominates over time. If the generation of organizational knowledge is bigger than its loss, the organizational knowledge rises.

IV. Implications and Discussions

Decision-makers fall into a dilemma whether they choose outsourcing or not. In a “Shifting the Burden” situation, it’s important not to frame the fundamental solution as the “right” solution, because “rightness” often depends on one’s perspective. Instead, when trying to distinguish between symptomatic and fundamental solutions, ask whose perspective is under consideration, and examine the problem from multiple viewpoints so as to get a better understanding of the structure and a potential solution. Side-effects in “Shifting the Burden” can also be hard to detect or acknowledge in an organization. The best way to manage a “Shifting the Burden” situation is to avoid it completely, or, if that’s not possible, to prevent it from becoming entrenched.

The dynamic behavior of organizational knowledge is influenced by the change of the balancing point between the acquisition and the loss. Acquisition of organizational knowledge is accumulated in the transformation process by KM. The loss of organizational knowledge rises in proportion to quantity of knowledge by obsolescence. There are two dominant perspectives on knowledge management, with the ‘people’ perspective emerging as a critique of the ‘technology’ perspective. Both perspectives assert that knowledge is a critical asset for innovation (Currie, 2003). To a large extent, a false dichotomy has emerged within the knowledge management literature, since both perspectives are valid for our understanding of how firms create and exploit knowledge assets, whether they are explicit, tacit, or concerned with technology or human capital.

Key source of successful knowledge sharing in IT/IS outsourcing is an organizational ability to learn or acquire the needed knowledge from other organizations at the perspective of knowledge management as people. To evaluate and utilize outside knowledge, an organization should have the ability to exploit external knowledge that is largely a function of the level of prior related knowledge (Badaracco, 1991; Grant, 1996). Cohen and Levinthal (1990) described an absorptive capability as an organization’s ability to recognize the value of new, internal information, assimilate it, and apply it to commercial ends for an organization’s innovative capability. Without the ability to assimilate outside knowledge, outsourcing can only perpetuate the vicious circle of burden-shifting. To be able to accelerate transfer of knowledge through outsourcing, it is therefore imperative that an organization takes into consideration knowledge management-related factors from the outset, in other words, at the

decision-making stage.

Few if any studies have thus far approached the question from the perspective of knowledge management in outsourcing decision-making model. As a variable with a potentially major impact on the outcome of an outsourcing project and an organization's competitiveness, knowledge deserves full consideration in any meaningful discussion of outsourcing decision-making. To successfully reap the benefits of outsourcing and avoid its negative ramifications, an organization must conduct an in-depth review of related processes. It is recommended that internal staff retain the initiative in processes within an organization's internal core competency areas, or directly perform them. The review must further ascertain that all aspects of the operation including reporting, conferencing between itself and the outsourcing partner, knowledge transfer and knowledge-sharing are carried out in such a way as to fulfill their intended functions. It is also important to establish terms and conditions related to knowledge transfer as exhaustively as possible by developing manuals and drawing up service level agreements which include details related to compensation, and consequences of noncompliance. Knowledge sharing among different organizations is not an easy task. Nonaka and Takeuchi (1995) said that knowledge sharing is based on organizational context, and thus that knowledge cannot easily be transferred among organizations with different cultures, structures, and goals. Therefore, for successful knowledge sharing in an outsourcing partnership, both the service receiver and provider should have a clear common vision and goals for partnership as well as a belief that their partners will not act opportunistically; this may be termed partnership quality (Lee and Kim, 1999).

V. Conclusions

This paper attempts first to brief the substance of IT/IS outsourcing on knowledge management based perspective and examine the nature of its complexity by using system dynamics simulation technique, followed by current problems of IT/IS outsourcing decision-making model and the future directions to move. Rather than providing a detailed and specific research, this paper attempted to quickly identify promising movements with potentially significant effects on IT/IS outsourcing. The findings presented in the paper would perhaps provide some ideas and directions for further study. Hopefully the information

provided in this paper could be a useful initial clue. This paper is perhaps too simple to deal with IT/IS outsourcing in rapidly-changing environments and it will be refined and further developed, but it serves as a good starting point to clarify key relationships and issues. However, it has to be admitted that the problems mentioned before are yet to be refined and the solutions are expanded in greater detail in more rational manner.

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