THE APPLICABILITY OF THE SECI MODEL TO MULTI-ORGANISATIONAL ENDEAVOURS: AN INTEGRATIVE REVIEW

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ABSTRACT

This paper outlines an investigation of the literature on organisational learning within inter-organisational project-based alliances, with a focus on the systemic processes of knowledge sharing, externalisation and internalisation inherent in the SECI model as proposed by Nonaka and Takeuchi (1995). The SECI model proposes a process by which organisations spiral their knowledge within and outside their organisations, with the aim of refining and adding value to the stock of knowledge that exists in the organisation.

The novel contribution of this paper is the application of the SECI model to multi-organisational projects. It has often been noted that while there is a rich literature on project management and, to a lesser extent, project-based firms, literature on how project-based knowledge is collected and re-utilised by participant firms is less common (Gann & Salter 1998, Prencipe & Tell 2001). This paper looks to address this paucity of research by applying the intuitively attractive SECI model to knowledge accumulation and learning processes in multi-organisational projects.

Key words: SECI Model, project based knowledge management, alliances, multi-organisational endeavours.

INTRODUCTION

Ikujurio Nonaka, with his various co-authors Hirotaka Takeuchi, Georg von Krogh and others, created a dynamic model to illustrate organisational knowledge creation in a series of books and articles that began appearing in the early 1990s. The SECI model (the acronym stands for *Socialization, Externalization, Combination, Internalization*) was first proposed in 1991 (Nonaka 1991), though was refined and expanded for a broader audience in the popular book *The Knowledge Creating Company* (Nonaka & Takeuchi 1995).

The SECI model met with broad acceptance, especially among management practitioners, due to its intuitive logic and clear delineation of knowledge types between tacit and explicit knowledge—utilising this knowledge delineation first espoused in management theory by Polanyi (1958). The model also embodied an interaction dynamic by which knowledge is transferred in a spiral process, allowing the knowledge value to be enhanced through exchange between individuals and groups within the organisation.

The core behavioural assumption in the model is that knowledge creating companies continually encourage the flow of knowledge between individuals and staff groups to improve both tacit and explicit knowledge stocks. The critical knowledge management assumption of the SECI process is that knowledge is created and improved as it flows through different

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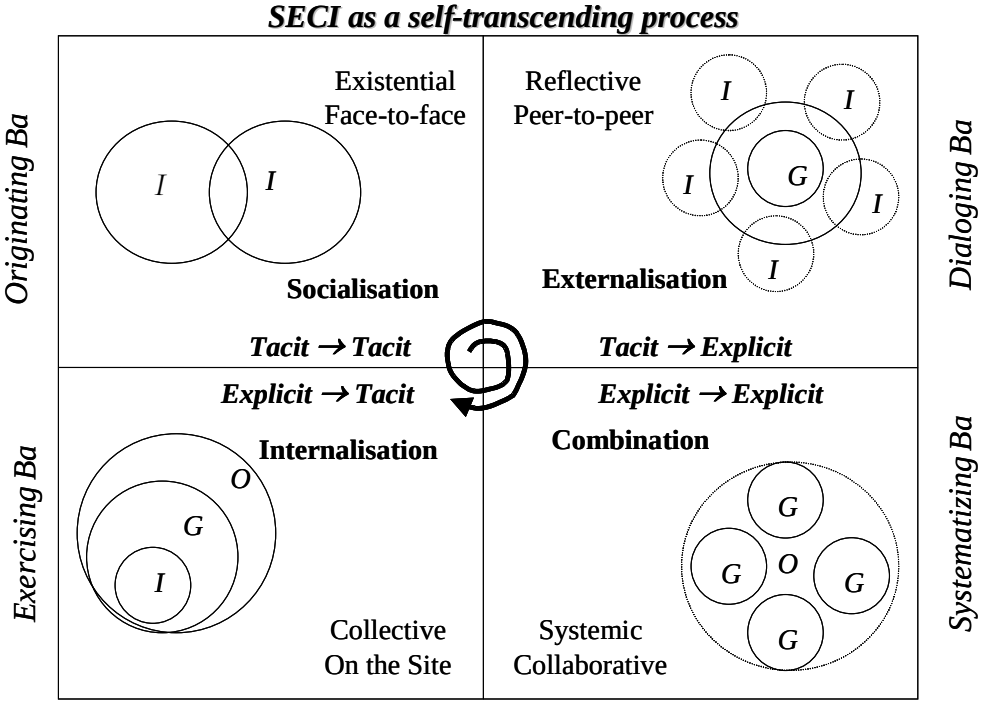
levels of the organisation and between individuals and groups. Thus, knowledge value is created through synergies between knowledge holders (both individual and group) within a supportive and developmental organisational context.

Figure 1: The Key Elements of the SECI Model



Adapted from Nonaka, Reinmoeller and Senoo, 2001

In the above diagram, the *I*, *G*, and *O* symbols represent individuals, group and organization aggregates. The transmission mechanisms are not prescribed, though there is an assumption that tacit knowledge (especially) requires a degree of proximity for knowledge transfer and exchange. Thus, while their work on knowledge transfer contended knowledge can flow through remote processes (telecommunications and information networks), issues relating to proximity and local exchange are of primary importance for the transfer of tacit knowledge.

In 1998 a third, more challenging, cultural assumption was added to the SECI discussion. Nonaka and Konno (1998) introduced the Japanese concept of *Ba*, a philosophical construct rooted in Japanese society that relates to the physical, relational and spiritual elements of 'place', or perhaps more expansively 'context'. Four different notions of *Ba* are defined in relation to each of the four quadrants of the SECI model (in Figure 1 above the relevant types of *Ba* are noted adjacent to the respective quadrant), which together make up the 'knowledge spiral'. These are as follows:

1. The Originating *Ba*: a locale where individuals can share feelings, emotions, experiences and perceptual models.

2. The Dialoguing *Ba*: a space where tacit knowledge is transferred and documented to explicit form. Two key methods factors are through dialogue and metaphor creation.
3. The Systematizing *Ba*: a virtual space, where information technology facilitates the recombination of existing explicit knowledge to form new explicit knowledge and;
4. The Exercising *Ba*: a space where explicit knowledge is converted into tacit knowledge.

Inherent in much of the SECI work is an incorporation of Michael Polanyi's distinction between tacit and explicit forms of knowledge though, as has been noted, the model and its derivatives also incorporate elements of information systems, organizational learning and micro-level organizational behavior. Nonaka and Konno (1998) emphasized both the task-specific and the cognitive dimensions of tacit knowledge, but in a departure from previous work, they also provided emphasis on the emotional and even spiritual aspects of knowledge and its located space. Knowledge learning and cognition, they emphasized, emerges from both direct experience and also mental and physical experience.

The implications for management of the above assumptions are manifold. Clearly, the creation of a climate of learning and innovation within an organization requires the facilitation of new experiences by workers, creating a blurring of traditional task and job boundaries. The spiraling of knowledge types between employee groupings requires the facilitation of processes that allow story telling and experience sharing—practices that tend not to be a component of many organizational training regimes.

They (Nonaka & Takeuchi 1995, p. 12) argue that uncertain knowledge boundaries and a degree of task ambiguity (a context that may at first seem confusing for workers) may be seen to facilitate collaborative learning and task sharing. Such an approach runs counter to some traditional approaches to management and offers an interesting issue for further potential empirical exploration.

Thus, the implementation of SECI processes within an organisation creates a structural challenge to traditional Tayloristic and/or Weberian management systems. The inherent challenge goes beyond an Eastern-Western management typology, and far extends other previous 'inclusive' management systems like McGregor's Theory X, Theory Y motivation approaches, and indeed Ouchi's Theory Z. The SECI model has implications both for managerial style and organisational structure, and for the first time emphasised the whole human process of communication as an essential component of organisational knowledge management and learning.

APPLICATIONS OF THE SECI FRAMEWORK

The heavy employment of philosophical elements in the SECI Framework makes empirical research in the area inherently difficult. Furthermore, the fact that explicit and tacit knowledge boundaries are often indistinct, and that this dichotomy is such an important one in the SECI framework, make the statistical testing of SECI-derived propositions difficult. Nonetheless, there have been some notable research publications since SECI's introduction that have sought to better understand the associations and causalities among the different elements of the system.
Kusonaki et al. (1998) investigated the presence of SECI type systems in organisations as an antecedent to successful product innovation. They found some support for their propositions

that elements of SECI systems—that had formed the basis for case discussions in *The Knowledge Creating Company* (1995)—did support positive product development and innovation outcomes at the firm level within Japanese firms.

Recent work by Chou and Te (2004) and Chou and Tsai (2004) has sought to empirically test the roles of knowledge assets in the promotion of SECI outcomes (Socialization, Externalization, Combination, Internalization), finding some support for hypotheses that assert that the presence of knowledge assets like organisational routines can have a strong impact on certain SECI outcomes. The research instruments employed in this research tends to draw heavily on psychometrics—the empirical study of human characteristics in psychology.

Certain testable propositions are present in the SECI framework, though these tend to be related to the presence or absence of organisational structures to facilitate the knowledge transformation between levels and type (explicit and tacit). Little empirical research has delved into the operational aspects of *Ba*, and one suspects that the philosophical elements of the concept could only be explored through the used of a qualitative investigation of both knowledge development processes and organisational context.

Empirical research regarding tacit knowledge

Research in the field of tacit knowledge management is very diverse. Empirical research in the field is challenging for, as Polanyi (1958) has noted, the development of a skill tends to be accompanied by the development of a deeper understanding of the skill that defies articulation. While the key theoretical principles are ascribed to Polanyi (1958) and Ryle (1949), thinking on tacit knowledge tended to be philosophical in nature for many decades.

Empirical problems emerge due to the definition and operationalisation of variables that are impossible to articulate. Indeed, there is disagreement about whether tacit knowledge is entirely personal (Ambrosini & Bowman 2001) or can be organisational in nature (Nelson & Winter 1981). While it is clear that tacit knowledge is heavily embedded (both in the knower and in the organisation) and influenced by organisational cultures, little research has analysed how this relationship exists.

Some recent work has investigated the relationship between tacit knowledge and competitive advantage (Spender 1996; Baumard 1999; Dierickx & Cool 1989), finding a positive correlation between the presence of both task and process specific tacit knowledge and organisational success and competitive advantage. More recently, empirical work has emerged from a research group at Stanford University, most notably researchers connected with Robert Sternberg. Sternberg and Wagner's (1991) *Tacit Knowledge Inventory for Managers* (TKIM), has been widely utilised in a variety of contexts as the basis for tacit knowledge empirical data gathering. Sternberg (1999), in developing metrics for the evaluation of tacit knowledge, noted that tacit knowledge is based on practical intelligence, rather than intellectual or academic knowledge. Tacit knowledge emerges from experiential training, and organisational learning tends to be focused on how things are done rather than why, and is practically (rather than conceptually) useful.

Sternberg (1999) has defined tacit knowledge as being procedural knowledge in form and content—guiding behaviour while not being the basis for introspection or deep analysis. Wagner et al. (1999) noted that the knowledge generally takes the form of 'if x, then y' rules for action. In an empirical sense, Wagner and Sternberg (1985) found that tacit knowledge is

an important element of managerial coping and enabling behaviour in dealing with the complexities of their leadership role.

It has been noted (Middel et al. 2004) that while intuitively attractive, there has been limited empirical investigation of the SECI model in practice, with this being especially true within the context of multi-organisational projects. Research into project based learning and tacit knowledge accumulation has been more common, for example, Gann and Salter's (2000) case study of the construction sector, Grabher's (2001) case study of the British advertising sector and Prencipe and Tell's (2001) multiple-case analysis of the defence and aerospace industries.

SECI APPLICATION IN MULTI-ORGANISATIONAL PROJECTS

In the strategic management and organisational theory literatures, organisations are increasingly conceptualised in terms of their knowledge and capabilities (Poppo & Zenger 1998), and less in terms of their physical and financial assets. Further, organisational alliances that draw together firms are being viewed as conduits for information and knowledge flows between organisations (Grant & Baden-Fuller 2004).

Ayas and Zeniuk (2001) echo other authors who note that the key challenge of managing the knowledge-side of projects is the capture of the knowledge created for later use. These authors propose a key role for 'communities of practice' to facilitate knowledge exchange. De Fillippi (2001) notes that the development of such shared practitioner reflection is a necessary precondition for knowledge accumulation—though the temporal and other resource constraints that often define projects often precludes such processes and outcomes.

While originally postulated as an internal (single organisation) model, the most famous case study utilising SECI in fact describes a multi-organisational project. The development by Matsushita Electric Industrial Company of the 'Home Bakery' involved company engineers travelling to the Osaka International Hotel to apprentice themselves to the hotel's head baker. Similarly, the development of NEC's first personal computer was facilitated by better communication with retailers in the Akihabara electronics district of Tokyo (Nonaka & Takeuchi 1995, pp. 63-4).

As has been noted, however, Nonaka and Takeuchi postulated the SECI framework as an endogenous (firm-internal) process, with knowledge cycling not between organisations, but rather between teams within the same organisation. Much of the empirical research employing the model has followed this lead. This research provides a point of departure to this literature by investigating the potential for the SECI model to create a shared multi-organisational context to facilitate knowledge capture, sharing and value creation.

In many respects, there are some notable parallels between the challenges of managing knowledge within firms, with firm specific projects and within multi-firm projects. Project management and project-based learning literature has increased markedly in both quantitative and coverage terms in recent years. Recent review articles on project-based learning by Ayas and Zeniuk (2001) and Grabher (2004) emphasise the potential importance of knowledge capture at the point of knowledge creation, and the problems associated with this capture due to the *virtualness* and *temporariness* of the individual projects involved.

There have been some recent efforts to apply the concept of *Ba* to multi-organizational arrangements (Brännback 2003), though the problems of knowledge capture in project management more generally are reflected and accentuated in the literature on knowledge capture in multi-organisational projects.

For example, Gann and Salter (2000) note the dense ties that often define successful project based interactions between firms in the construction industry. These ties, they argue, provide project-level resources including expertise (deep knowledge), reputation and legitimization. The latter two elements exchanged provide focus to the often complex reasons that projects are created that extend beyond straightforward resource exchange (be they physical or knowledge resources). Projects are often complex in terms of both the resource interactions involved, and also the reputational and political elements inherent in their histories. Similarly, Prencipe and Tell (2001) employ Zollo and Winter's (2001) trichotomy of three learning processes present within organisational knowledge accumulation, namely *experience accumulation, knowledge articulation* and *knowledge codification*. This alternative model to the SECI framework also employs a spiralling of knowledge forms and locales within the organisation, and can also provide some guidance with regards to the best management of knowledge within project-based alliances.

These authors note the need and importance of contingency-based approach to project-based learning, with a focus on the implications of 'size, strategy, task complexity, uncertainty, rate of technological change, market conditions, etc.' on the processes of knowledge management and learning in inter-organisational projects. They reinforce the importance of considering proximity effects on knowledge exchange and development on integrating a strong understanding of the nature of the technology and knowledge involved in projects into knowledge management planning and development.

IMPLEMENTING SECI IN MULTI-ORGANISATIONAL PROJECTS

The SECI model is quite prescriptive in its presentation of the types of processes required for the successful implementation of organisational learning, in terms of both process (Socialization, Externalization, Combination, Internalization) and also the social and relational context necessary to facilitate knowledge exchange (Originating *Ba*, Dialoguing *Ba*, Systematizing *Ba* and Exercising *Ba*). As such, the presence or absence of these processes and contexts may be respectively viewed as potential antecedents or barriers to the successful creation of knowledge within an organisation.

Applying the SECI model to the challenges of multi-organisational project provides some key imperatives for consideration by managers.

Socialisation and Originating Ba

Gann and Salter (2000) have noted the importance of dense ties in multi-organisational projects. In terms of the socialisation processes involved in the sharing of tacit knowledge through shared experiences, there is a clear role for breaking inter-organisational barriers that may be a product of proximity, language, culture or a variety of other barriers.

Emerging technology is facilitating better methods of remote communication, though the provision such technology, or the use of attendance-based meetings, is often viewed as an avoidable expense. The SECI model challenges this idea and argues for the importance of

face-to-face meetings to establish the basic sharing of tacit knowledge, which is the primary building block of the SECI process.

The concept of *Originating Ba* captures the importance of presence in knowledge transfer. It emphasises the need to communicate more than the specific and the technical, with a focus on establishing communicating norms and exchanging emotions and developing shared mental models and experiences. In the multi-organisational context, this will require the creation of strong personal relationships across organisational boundaries.

Externalisation and Dialoguing Ba

The externalisation process involves the conversion of tacit knowledge into documented explicit knowledge. Here is perhaps the greatest challenge in the multi-organisational context, as tacit knowledge is generally seen as contextually and culturally constrained and embedded within individuals and small groups.

Within the multi-organisational project situation, the use of creative reporting and compilation systems are vital. The use of graphical representations of knowledge challenges the authors to avoid hyperbole and jargon. The use of open compilation systems and non-verbal communications processes allows for the generation of shared understandings, and not just the 'cut and paste' of textual contributions from various contributors.

Here, the use of presence (either real or virtual) is important. The explicit knowledge created should be a strong reflection of best practice within the alliance group, should exhibit shared ownership, and should be able to be easily understood outside its linguistic, organisational and cultural context.

Dialoguing Ba is the creative development of systems to facilitate the transfer of this newly categorised knowledge into a form that will be of use to groups beyond the creators of the knowledge and, through these groups, the organisations involved in the multi-organisational projects or endeavours.

Combination and Systematizing Ba

Combination, in terms of the SECI model, involves the aggregation of complex explicit knowledge into a usable and valuable whole. Such aggregated knowledge can be seen as a source of value creation. In terms of multi-organisational projects, the key challenge is to do this in such as way that the combined knowledge takes into account the knowledge of all participant organisations, and becomes a shared resource for all participants.

Ayas and Zeniuk (2001) and Grabher (2004) have both emphasised the importance of knowledge capture at the point of knowledge creation. This paper would extend this, and suggests that the capture and compilation of knowledge must be a vertically and horizontally open and integrated process. The combined knowledge should be a reflection of the best and most creative knowledge within the alliance, and should be a reflection of the best available knowledge and practice known to the participant group.

The development of a context for a *Systematising Ba* emphasises collaborative efforts to develop and share the newly aggregated learning across an organisational setting. This phase often employs information technology to facilitate asynchronous learning and the contribution

of various groups and constituencies in the development of an organisational knowledge asset.

Internalisation and Exercising Ba

The literature on communities of practice (Ayas & Zeniuk 2001) and shared practitioner expertise provides some clear pointers as to the means by which the explicit knowledge created in multi-organisational projects can become valuable internal tacit knowledge and/or creative organisational routines. The accumulation of such knowledge resources becomes valuable both in its own right, and as a font for further process and project innovation. If shared across organisational boundaries, it can also facilitate the processes of socialisation in later projects.

Exercising Ba focuses on the transfer and internalisation of the shared organisational knowledge back to individual workers knowledge and routines. Mentoring by colleagues and managers and the use of team building to create a level of personal commitment to shared aims is valuable in this phase. In the multi-organisational context, the use of shared teams and the development of new shared routines and systems are valuable steps to take.

The following Table 1 brings these themes together as a reference for managers and academics seeking to facilitate knowledge exchange across organisations.

Table 1: Summary of SECI Implementation across Organisations

SECI Element	***Key Elements***
Socialisation and Originating Ba	Focus on potential barriers to personal knowledge exchanges Employ face-to-face systems across organisations.
Externalisation and Dialoguing Ba	Creative development of systems to aggregate tacit knowledge
Combination and Systematising Ba	Develop multi-organisational routines Solidify shared commitments and mental models
Internalisation and Exercising Ba	Creation of shared expertise and routines Mentoring across organisational boundaries

CONCLUSIONS

Multi-organisational projects and alliance arrangements can be seen as a contingent response to the absence of certain capabilities, competencies or resources within individual firms. Knowledge sharing, as opposed to the sharing of physical capital, is a key driver of alliance formation (Gulati et al. 2000). While there has been some recent debate as to whether alliances and cross-organisational projects provide the basis for simple knowledge access (Grant & Baden-Fuller 2004) or full knowledge acquisition (Brusoni et al. 2001), there is little debate that project based alliances do have a strong knowledge-based rationale.

As such, practitioners and academics alike need to look at what type of knowledge is required for the successful completion of multi-organisational projects and the health of ongoing multi-organisational alliances. Empirical research that notes the importance of shared values and routines (for example, communities of practice, boundary spanning capabilities of firms) all

illustrate the need to look beyond the exchange of codified knowledge to the development of deeper and more complex capabilities.

As such, it is vital that organisations give due regard to the means by which this knowledge created by and required for multi-organisational endeavours will be managed. This research argues that the transfer of SECI principles to multi-organisational projects and alliance arrangements will allow for better and more effective knowledge management across organisational boundaries.

While first proposed and generally investigated as an internal process, the increasing use of inter- and multi-organisational arrangements for the development of complex projects creates an important dynamic that requires many of the same desirable outcomes that SECI aspires to. While internal knowledge management, in the traditional sense of the words, may have been seen to emerge from a combination of physical and knowledge factors within the firm, capabilities that are based upon knowledge find most of their value within complex networks that include relations within design and distribution chains. Relationships with competitors become desirable where positive externalities emerge.

Within network-based industries, knowledge resources need to be defined in both absolute and relative terms. Organisations need to be both distinct and coherent in their internal makeup to function effectively and must also be able to play a constructive role in broader inter-organisational networks or value chains. Knowledge synergies tend to exist as a function of the potential for an organisation to contribute to the activities of a greater whole (be it an industry, a technology, or a project).

Gann and Salter's research on the importance of dense and complex ties between firms shows the importance of SECI elements relating both to combination and internalisation of knowledge resources across firms. The system to facilitate and enhance this knowledge sharing needs to take into account this research, which supports the key elements of the SECI model and its emphasis on the creation of the effective context for knowledge exchange (or *Ba*).

Knowledge-based capabilities may exist within an organisation's network of alliances and its broader relationships with stakeholders. A specific example may be a firm's participation in a strongly supportive network of firms based within a science-park. Even if much of the value derived by firms is beyond their immediate locus of control, the firm's role within the network both creates value and serves as an organisational capability (Gulati & Singh, 1998).

This research emphasises the need for a firm to have the capability of exchanging knowledge as a means to enhance the value of its own internal knowledge stock. Applying the key elements of the SECI model across organisational boundaries, and thinking in creative ways as to how the implementation of SECI principles across organisations will create benefits for multi-organisational endeavours, will provide a potentially rich area of research and managerial development in future.

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