Research Article   **Open Access**

Towards a More Connected Approach to Knowledge Management Strategy

Jamie O'Brien[*] and **Donald J. Schneider**

School of Business and Economics, St. Norbert College, 100 Grant Street, De Pere, WI 54115, USA

*Corresponding author: Jamie O'Brien, School of Business and Economics, St. Norbert College, 100 Grant Street, De Pere, WI 54115, USA, Tel: + 920-403-2942; E-mail: jamie.obrien@snc.edu

Abstract

This research offers a strategic knowledge-positioning framework that allows for incorporation and recognition of the many forms of knowledge at work in organizations. Schultze and Stabell's framework aimed at representing and unifying organizational knowledge research is used as a basis for a more connected knowledge framework. From an academic perspective the research builds on established theoretical work in the area of organizational knowledge, which calls for a more integrated and all-encompassing view to be taken of both organizational knowledge and organizational knowing. Case material on the knowledge management activity at two medical device organizations (referred to as Medi-Case A and Medi-Case B hereafter) is used to illustrate various points within the conceptual design.

Introduction

Organizations are structured around many understandings of knowledge; whether that be power, knowledge as meaning, knowledge as an asset or knowledge as process, these knowledges co-exist through the many informal networks that make up an organization. However, Schultze and Stabell's [1] review of knowledge management literature and their resulting framework shows a different story emanating from knowledge-based research. The framework reviews knowledge based research's gravitation toward contradictions, opposites, poles and dualisms, citing how organizational knowledge elements are often represented in an "either/or" language. This leads to the potential benefits from mutuality's being overlooked and in many cases, a trading of broad perspectives for myopia.

Knowledge strategy theorists, just as in knowledge research in general, regard knowledge as either objectively or subjectively based; this in turn has led to an over emphasis on either the process or asset aspects of knowledge strategy [2-4].

Secondly, Schultze and Stabell [1] investigate the role knowledge and knowing play in the organization and propose a unification of the literature under the term duality. A more connected perspective of knowledge strategy, presented in this paper, enhances Schultze and Stabell's framework by incorporating the knowledge elements specific to knowledge strategy and in doing so proposes a novel way of representing knowledge strategy that recognizes the differing views on knowledge and the management of knowledge that are present in an organization at any one time.

Knowledge strategy, as shown in Figure 1, is comprised of three main components; firstly, organizational knowledge; secondly, the knowledge-based view of the firm, which is the contextual setting in which knowledge strategy occurs; and lastly, the actual knowledge strategy pursued in terms of how organizations close their knowledge absences and gaps. Knowledge strategy is a continual tradeoff between

managing and allocating subjective and objective knowledge, people and technology, and the knowledge-based assets and processes of the organization [5-7].
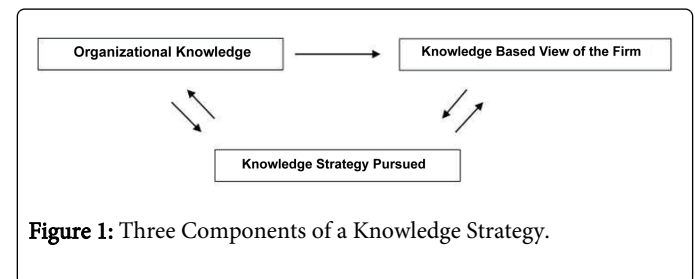
Figure 1: Three Components of a Knowledge Strategy.

Within management theory, organizations are seen to focus on either the knowing activity [3,4,8,9] or the possession of knowledge [10-12]. The knowledge-based view of the firm is divided along the same dualism lines, with the majority of theorists viewing organizations as operating within a neo-functionalist or constructivist perspective [1]. An organization's dominant position in relation to how it views itself as a knowledge-based firm and how it views its own organizational knowledge dictates the knowledge strategy pursued. Here the dichotomies within knowledge strategies are an organization-level choice; with organizations choosing to divide their attention between exploitation and exploration [5].

This paper is divided into nine sections. Following an introduction section, Schultze and Stabell's [1] framework, which is the founding principle for this paper, is presented. Sections three and four discuss the first two elements of knowledge strategy, organizational knowledge and the knowledge-based view of the firm, and the dichotomies that exist in the extant literature. Section five draws on O'Brien [13,14] case studies, which look at knowledge activity at two medical device companies, to discuss the existence of multiple knowledges within an organization. Section six discusses the final element of knowledge strategy, that being the actual knowledge strategy pursued; this is also discussed in light of exploitation and exploration activity being conducted at Medi-Case A and B. Section seven proposes a more

connected framework for positioning multiple knowledge strategies within an organization. Section eight returns to Medi-Case A and B and a mapping of various organizational groups on the knowledge strategy-positioning framework. Section nine features a brief conclusion.

Introducing the schultze and stabell framework

Within Schultze and Stabell's [1] framework, in Table 1 below, knowledge-based research is presented as existing in one of four quadrants: the diaglogic discourse, the critical discourse, the constructivist discourse or the neo-functionalist discourse. A level of socially based consensus controls all four quadrants. Both the critical and neo-functionalist discourses are representations of the dualisms and objectified language found in the literature. Conversely the dialogic and constructivist discourses are depictions of the increasingly subjective views of knowledge research. Each quadrant represents a different metaphor of organizational knowledge, this is expanded further within the framework to encompass the role knowledge is perceived to play in the organization as well as existing theories which subscribe to these views.

The framework proposes a connectedness of the varying perspectives on organizational knowledge under the term duality, which the authors cite as applying "both knowing/and thinking", however, the term duality also refers to "opposing forces that act simultaneously on the same phenomenon" (Robey and Boudreat, 1999, cited in Schultze and Stabell, 2004). Schultze and Stabell's (2004) framework also contends that knowledge-based research cannot transcend across quadrants, thus implicitly limiting the framework's ability to represent literary unification and therefore truly connected approach to knowledge strategy. Thus it is not apparent that the term duality represents connectedness in the true sense of the word, prompting this paper's re-interpretation of knowledge strategy under a more all-encompassing term: "connected" (p. 556).

Perspectives on Organizational Knowledge

As stated, how an organization regards its organizational knowledge is an important element in the creation of an overall knowledge strategy. Organizational knowledge and knowing literatures center on the objective and subjective divide. Essentially the objective and the subjective divide can be understood as the difference in grammatical terms between the verb to know (verb: action, doing and practice) and the noun knowledge (noun: things, facts). Authors within knowledge strategy are seen to adopt one stance or another [2,4]; recently, however, the trend has moved toward commentary on the debate [8,9] and attempts at reconciliation [1].

Discussions on Objective Knowledge

Objective organizational knowledge is a cognitive possession and commodity; it is static, taxonomic and positivistic. Knowledge types are categorized according to these asset-based characteristics, while the unit of knowledge is emphasized over the knowing action [2,15-17]. Organizational knowledge is objectified most succinctly through the categorization of knowledge. In addition to tacit, implicit and explicit [18], other ways to categorize knowledge types include declarative, procedural and causal; conditional and relational [17,19]; know-about, know-how, know-why, know-when and know-with [15]. Chiva and Alegre [20] refer to objective knowledge in terms of representation and cognitive possession. The empirical qualities of knowledge are the

main focus of this objective view that knowledge is emphasized as something that can be possessed by both people and organizations [2,14,21,22]. The perceived ease of transfer, representation and measurement [20] afforded by the objective view has fuelled in many respects knowledge strategy literature's fixation with the externalization of knowledge and a subsequent focus on knowledge management systems [23].

Blacker [24] summarizes the traditional or objective approaches to organizational knowledge as offering, "a compartmentalized and static approach to the subject" (p. l02l). In their critique of contemporary approaches to knowledge management, Alvesson and Karreman [25] refer to knowledge management literature's prevailing view of knowledge as "objective (justified true belief) and thing-like" (p. 999). Likewise Sawhney and Prandelli [26] view the objective epistemology of knowledge as being overly concerned with understandings of the validity of knowledge. Polanyi's [18] tacit, implicit and explicit characterizations of knowledge remain the most cited in organizational and knowledge management literatures. His work, however, has been somewhat misrepresented by proponents of the objective view; for example Nonaka and Takeuchi's [22] SECI model regards knowledge as having the ability to pass from tacit to explicit devoid of context.

	Duality	Dualism
	Dialogic discourse:	Critical discourse:
	Metaphor of knowledge: Discipline	Metaphor of knowledge: Power
Dissensus	Role of knowledge in organizations: Deconstruction of totalising knowledge claims, creation of multiple knowledges	Role of knowledge in organizational underclass: Reformation of social order
	Theories: Post structuralist, feminist theories, post-modern theories	Theories: Labour process
	Constructive Discourse:	Neo-functionist discourse:
	Metaphor of knowledge: Mind	Metaphor of knowledge: Asset
Consensus	Role of knowledge in organizations: Recovery of integrative values, generation of understanding	Role of knowledge in organizations: Progressive enlightenment, prediction, optimal allocation of resources
	Theories: Structuration theories, theories of practice, sense making, actor network theory.	Theories: resource-based view of firm, transaction cost theory, information processing theory, contingency theory.

Table 1: Dualism and Duality in Knowledge-Based Research [1].

While Polanyi himself states, "all knowing is personal knowing – participation through indwelling" [18], pointing to the tacit and personal component inherent in all knowledge, even that considered explicit (p. 44). This trend toward the objective in knowledge management strategy literature emphasizes knowledge as something "explicit that is quite distinct from philosophy or values" [27].

Subjective knowledge

Within the subjective view of knowledge, the act or practice of knowing takes precedence, a constructivist perspective is adopted where knowledge is seen to be both dynamic and emergent in nature, while the social aspects of the knowing process are emphasized [4,28]. This subjective view of knowledge focuses on the emergent and latent qualities of knowledge, such as "the traditional conceptions of knowledge as abstract, disembodied, individual and formal are unrealistic" [29]. Thus, knowledge is understood to be a creating act, not solely a representation. This creating act is referred to as knowing or practice, where "practice refers to the co-ordinated activities of individuals and groups in doing their real work as it is informed by a particular organizational group or context" [8]. The subjective view of knowledge reflects the personal element of knowledge inherent in the original intentions of Polanyi's [30] work, namely that "the ideal of a strictly explicit knowledge is indeed self-contradictory; deprived of their tacit coefficients (personal to the individual) all spoken words, all formulae, all maps and graphs, are strictly meaningless" (p. 195).

The subjective viewpoint sees knowledge as situated in practice. Research in this area includes the study of communities of practice [31], activity systems [4,24] and network and relational effects [32,33]. This social process perspective views knowledge as a socially constructed phenomenon that is created through participation in communities of practice [31,34]. Within the subjective view social relations are viewed as the building blocks of knowledge, which in turn lead to a focus on knowledge processes as opposed to the knowledge object [3]. Organizational knowledge or knowing is no longer viewed as a passive process but an active one, where both the knower and the knowledge become the inputs and constitutes of an action. These active social processes are in turn the basis for a dynamic knowledge-based theory of the firm [3,4]. Cook and Brown [8] call for the introduction of an epistemology of practice, within which knowledge is framed in the interaction between knowers and the importance of the practice or process of knowing. The network or relational view holds that knowledge and knowing are devoid of the individual context entirely and thus exist solely in distributed networks with emergent, dynamic knowledge existing in the relationship between various entities [32,33]. Thus knowledge creation from this viewpoint begins first with the creation of new relationships. To externalize knowledge in any sense one must engage in the act of knowing. This points to the importance of community or social membership as a context for knowledge generation and combination.

Researchers have called for a move away from the dominant-objective focus on organizational knowledge literature and to move toward a focus on organizational subjective knowing include McDermott [23], Orlikowski [9], Moffett and Hinds [35], and Moffett and McAdam [36]. Spender [3,4] among others argues that knowledge should be regarded as neither an "observable" nor "transferable" commodity, and therefore cannot be discussed in objective terms.

Dualism perspectives of the knowledge-based view of the firm

Strategy debates concerning knowledge increasingly center on whether the knowledge-based view (KBV) of the firm represents a new theory of the organization [37]. If knowledge is to be the basis for a theory of the firm, it stands to reason that a consensus on the nature of this knowledge should be reached. It is here, however, that distinctions can be drawn among knowledge-based approaches.

The Neo-functionalist view of the firm

Certain researchers argue that the knowledge-based view of the firm results from the development of the resource-based view by extending our understanding of the term resource to include intangible assets such as knowledge [2,10,38].

The Neo-functionalist focus is on tacit elements of knowledge resources due to the problems of imitability and transferability conferred by the specific characteristics of tacit knowledge. These characteristics, therefore, give the organization a knowledge-based advantage above what could be achieved by the market. Emphasis is also placed on the importance of the co-ordination aspects of these knowledge resources. A balance is thus required between the need to co-ordinate knowledge specialists through integration, while also protecting the valuable tacit components of their knowledge [39]. The view taken of knowledge by these theorists reflects the objective view of organizational knowledge where knowledge is discussed in terms of being an asset, a stock and a resource, and is capable once externalised and codified of being transferred with little importance placed on contextual issues. Thus the problem of a knowledge strategy for those coming from the resource perspective becomes the protection of individually held tacit knowledge and the hierarchical integration or co-ordination of knowledge specialities.

Proponents of the knowledge as a resource perspective argue that viewing organizational knowledge as an asset is a pragmatic stance and therefore is aligned with the organizational goal of achieving competitive advantage [2,28].

The constructivist view of the firm

The constructivist perspective contends that the knowledge-based view of the firm should be inherently different from the resource perspective [4,28,40]. From the constructivist viewpoint, organizations exist because they exhibit a greater efficiency than the market at generating and transferring knowledge through relational systems; thus organizations are regarded as "repositories of social knowledge" [40]. The view taken of the organization is that of an open system, co-evolving with its environment and engaging in knowledge creation through links between autonomous knowledge-creating systems, be they individuals, teams or organizations [3,4].

The focus of the constructivist perspective lies in social systems. Researchers align closely with the organizational learning perspective [37,41,42] and their work can be likened to the more subjectively based community-of-practice approach [31,34,43] and evolutionary or capabilities approach [44].

From an evolutionary approach, Kogut and Zander [44] regard knowledge creation within the organization as a path-dependent phenomenon and thus the result of the exploitation and imitation of existing organizational capabilities. Spender [3,4] coming from the strategy perspective, emphasizes the importance of incorporating the dynamic relational aspects of knowledge into a knowledge-based view of the firm. Both Spender and Kogut and Zander echo Nelson and Winter's [21] early evolutionary theory by citing the importance of collective organizational knowledge, whereby the organization has a role independent of individual organizational members of knowledge creation, capture and storage or memory [5]. The problem of a knowledge strategy for those from the constructivist stance is the facilitation of boundary-spanning communities of knowing while maintaining knowledge-based organizational advantage.

Methodology

In this study, the conceptual framework was developed using in-depth interviews, document analysis, non-participant observation, and computer-aided analysis using QSRN Vivo. The interviews devised in this study resembled a series of probes. This ensured that all topics of concern were covered. The recognition that other aspects may emerge also was a key concern and was allowed for in the interview. This allowed the interview guides to be modified over time to focus attention on areas of particular importance. The interview questions were mixed, in that some were open and phenomenological and were used to ease the respondent into the interview, while also allowing the respondent and author to begin a "conversation with purpose." Other questions were more focused in that they asked about a specific phenomenon, but only if this had not been addressed previously in the generic phase of the interview. A list of the respondents and their roles is presented in Table 2 below.

Methods in detail

Observation data were used for the purpose of descriptions of settings, activities, people and meanings of what is observed from the participants'

Job Description	Case
1. Shift Lead	A
2. Senior Manager	A
3. Shift Lead	A
4. IT lead	A
5. Experienced Engineer	A
6. HR lead	A
7. Design Services Lead	A
8. Shift Lead	A
9. Experienced Engineer	A
10. Frontline IT	A
11. Novice Frontline Engineer	A
12. HR/knowledge champion	A
13. Experienced Engineer	B
14. Middle Manager	B
15. Experienced Engineer	B
16. Experienced Engineer	B
17. Middle Manager	B
18. Experienced Engineer	B
19. Senior Manager	B
20. Experienced Engineer	B
21. Experienced Engineer	B
22. IT lead	B
23. Experienced Engineer/knowledge champion	B
24. Manufacturing Lead	B
25. Frontline Engineer	B
26. Supply Chain	B
27. Supply Chain	B
28. Novice frontline Engineer	B
29. Experienced Engineer	B
30. Novice frontline Engineer	A
31. Experienced Engineer	A
32. Experienced Engineer	B

Table 2: List of Respondents.

perspectives [45]. This is done by enabling the author to see things participants themselves are not aware of or those they are unwilling to discuss [46]. The in-depth interview and observation phases were aided by the collection and analysis of documents. Attewell and Rule [47] openly advocate interviewing both managers and employees because this will provide a richer perspective on the phenomena under investigation. For this reason, the author interviewed employees from a variety of organizational levels. Prior to conducting the interviews, respondents were provided with an outline detailing the purpose and nature of the study. In addition, since many respondents requested some indication of the types of questions that were going to be asked, the author, following Faison [48], provided preliminary copies of the interview schedule in advance. This placed many interviewees at ease and the author is convinced that this procedure contributed greatly to the willingness of many to participate, and also did not generate scripted answers. As each interview progressed, responses to individual questions were carefully probed to elicit further details on specific issues [49]. In an effort to triangulate the data being gathered from the interviews, the author requested access to company documentation on KM. A qualitative content-analysis technique [50-52] was employed in order to extract key themes as well as similarities and differences between responses. Having transcribed the interviews, respondents were given the opportunity to proof read the transcript of their interview to ensure that it was indeed an accurate representation of their views and opinions [53]. Following each interview, a "Contact Summary Sheet" was filled in by the interviewer – this permits the interviewer to "develop an overall summary of the main points in the contact" [52]. Transcripts of the interviews were coded. The coding scheme used in this analysis is a mixture of an inductive approach and "start list" approach [52]. An initial coding scheme for the data was suggested by previous examination of literature, but as interviews took place the scheme was permitted to inductively evolve from the data. First-level coding was descriptive with a second-level focusing on the development of patterns from the data.

Generalizability

A major question relating to any research project is the ability to generalize the findings. Walsham [54] asserts that "...a critical issue for authors concerns the generalizability of the results from their work" (p. 79). In discussing the generalizability of qualitative studies,

Walsham suggests that authors should not underestimate the generalizability of their findings. Firestone [55] also proposes that when it comes to generalizability, qualitative methods are "...not at any great disadvantage" (p. 16). While statistical analysis seeks statistical generalizability, qualitative analysis seeks analytic generalizability [55]. The former involves sample-to-population extrapolation and necessitates probability sampling. The latter does not rely on probability sampling and involves generalizing to a theory. Furthermore, Bryman (cited in [56]) states that it is the very fact that qualitative studies can be in-depth that adds to their potential generalizability. Having conducted an in-depth qualitative study, an author can acquire a level of knowledge that may generate increased understanding when applied to a variety of other situations, thus increasing generalizability.

Access to documents

Access to documents was provided early in the research; this continued to inform the research and acted as a buffer against interviewer bias and gaps in perception versus reality.

Documents first were received regarding an "Inventory Management" project, but also included documentation about the history of the company, which was most useful. The documentation allowed for the factual and chronological elements of the case to be detailed, which overcame the challenge of respondents confusing the timeline by merging events. Coffey and Atkinson acknowledge this phenomenon and view it as the past being shaped by narrative. The use of the qualitative data analysis program QSR nVivo greatly facilitated analysis. NVivo is a key tool for contemporary qualitative data analysis. The program assists the author in the coding process by creating containers for categorized text. These containers, or nodes as referred to in the program, can be grouped hierarchically to form sub-categories of broader concepts (tree-nodes). In addition, QSR nVivo does not take any control over the analytical process from the author. NVivo was useful in this respect as it concisely displayed all developed nodes and allowed further arrangement into sets and parent-child categories.

Interpretation

Finally, drawing conclusions and verification involved the interpretation of data and the drawing of meaning in the form of a report or case. Ideally, the research case is a rich, tightly woven account that "closely approximates the reality it represents" [57]. Here, these processes appear linear in nature and description, but in reality, they occurred almost simultaneously and repeatedly throughout the lifetime of the study. The sample was opportunistic in nature, selected on the basis of perceived relevance and access, with no attempt being made to ensure statistical representativeness. Attewell and Rule [47], along with Babbie [58], claim that statistical sampling is often abandoned in field work due to practical constraints. Therefore, following Eisenhardt [59], the author decided to select the sample based on the principle that participants would likely be significantly and directly interested in and/or involved in the phenomenon under investigation. Hence, the sample was selected to provide breath of coverage rather than depth.

The existence of multiple knowledge at medi-case A and B

The knowledge-based literature is divided in relation to the view of knowledge held by various theorists; the same is not true of organizations themselves. Within organizations, multiple types of knowledge and knowing exist, which in turn leads us to believe that multiple types of knowledge based co-ordination also exist, differing across groups, communities and networks, within any one organization. O'Brien's [13] case on knowledge activity at Medi-Case A and Medi-Case B offers significant examples of multiple knowledges and perceptions of knowledge at work in an organization. Upon investigation the author cites these organizations as developing "multiple knowledge sharing processes and systems within its network" [13].

Objective knowledge and the neo-functionalist viewpoint at Medi-Case A and B

As an affront to the threats of globalisation and the increasing need for technical support, Medi-Case A and Medi-Case B recognize the importance of explicit knowledge management [13,14]. One of the main aims of Medi-Case A and Medi-Case B's knowledge management strategies are to make tacit knowledge more explicit, and thus into an enterprise-wide knowledge; to this end all knowledge related procedures and rules are available to employees in explicit form through organization-wide knowledge repositories. Technology systems play a large role in Medi-Case A and Medi-Case B's objective and asset-based view of knowledge. Link is a database of problem reports intended to document and distribute knowledge throughout the organization. Medi-Case A and Medi-Case B have also invested in an employee suggestion system, which receives thousands of ideas per year; approximately 75% of which are successfully implemented. The organizations also recognized the importance of communities of practice as networks within which skill and practice-based knowledge sharing can occur.

Medi-Case A and Medi-Case B also seek to exploit community-of-practice knowledge through Web-based facilitation techniques, pointing to a belief in the ability to transfer and represent knowledge successfully. Training is also conducted through technology, namely the training of hundreds of Medi-Case A and Medi-Case B contractors through an integrated management solution. Since 2002 both companies have increasingly made their sales and marketing knowledge more centralized through codification. This codified knowledge is available to Medi-Case A and Medi-Case B employees and partners worldwide. The empirical qualities of knowledge at Medi-Case A and Medi-Case B are represented as part of the organizations' annual reports, in which knowledge is characterized and measured by elements such as human and intellectual capital.

Subjective knowledge and the constructivist viewpoint at Medi-Case A and B

Medi-Case A and Medi-Case B view their knowledge practices as embedded in culture and not implemented as a separate and independent effort; this is achieved through continual learning in the Kaizen and lean approaches. The Kaizen system supports practice-based learning by viewing "mistakes as occasions to learn" [60]. Employees are encouraged to generate ideas and aid in Medi-Case A and Medi-Case B's evolution. To this end, emphasis is placed on the personal approach to knowledge creation and the development of hands-on experience through action learning (learning-by-doing). One-on-one training takes place through an apprentice program, known as the mentoring system. This practice-based training continues to the group level, where new groups are joined by extremely skilled, older worker groups. Medi-Case A and Medi-Case B

recognize the importance of facilitating communities of practice for the sharing of knowledge processes and practice- and skill-based dissemination; this is achieved by identifying the role played by self-organized human interactions [13]. Medi-Case A and Medi-Case B also practice knowledge openness within its value chain, by viewing production and quality knowledge as non-proprietary; for example, free-of-charge problem-solving consultation is offered to suppliers, who then showcase the results of the process to any other interested suppliers. This openness allows for knowledge dissemination and proliferation. This also facilitates the building of long-term knowledge-sharing relationships with value-chain members, allowing for the sharing of skill and practice-based knowledge. Skill- and process-based knowledge acts as part of Medi-Case A and Medi-Case B's knowledge base through the Medi-Case A and Medi-Case B education system, namely the learning management philosophies "70/20/10" and "Link" systems, respectively.

The organizational-level knowledge strategy choice

All knowledge strategy is in essence a search process, be that a search for new technical knowledge or new organizational forms [61]. Knowledge search activity allows for organizational self-adaptation, which in turn closes knowledge and thus strategic gaps [6,7]. Knowledge strategy therefore aligns with March's [5] discussion on the constant trade off that exists between exploitation and exploration. Organizations face the choice of dividing attention and resources between two alternative strategies, these being the path-development exploration of new possibilities or the path-dependent exploitation of old certainties [5,61]. Importantly, when knowledge strategy tendencies are investigated, exploration and exploitation activity are shown to be influenced by knowledge co-ordination mechanisms [62] and dominant knowledge perspectives [63]. These links are discussed in Figure 2. Exploitation and exploration result in changes to organizational forms, optimal production methods and innovation implementation methods among other things. Within innovation literature authors have cited knowledge as at risk of suffering from obsolescence due to ever- changing environments [59]. Conversely, knowledge is more valuable as shown in other research, the older the innovative process [64].

Exploitation as a knowledge strategy

Exploitation refers to a concentration of search activity on technologies similar to the searching organizations' own core knowledge and is seen to include the re-use of technology already internal to the organization through experiential refinement and the selection of existing routines. Added to the exploitation search domain is the dimension of search depth [65], which refers to how deeply an organization re-uses its existing knowledge. Exploitation facilitates competence building through a recurrent concentration on areas of established organizational competence [66]. It benefits from increasing returns, to scale, in that local search in one area renders all other local searches in that area more efficient [63], relative certainty, in that inventors learn from past mistakes [67] and it also facilitates the development of absorptive capacity [68]. Exploitation results predominantly in incremental innovation [21] with examples including incremental organizational change [69], mergers and acquisitions [70], technological choices [71] and strategic alliances [72,73]. An organization focus that is biased toward exploitation risks an inability to develop new capabilities, new opportunities, an over reliance on subjectively framed outdated experience and therefore

obsolescence [61]. In effect, success can lead to a situation where exploitation drives out exploration. Despite this, however, Kahneman and Tversky [74] found that even when the perceived value from exploration is greater than exploitation, organizations might take a loss rather than invest in exploration. Cohen and Levinthal [75] also exert that R&D results are greater the closer R&D activity is to the organizations' existing competencies. However, successful exploitation requires high proficiency levels in knowledge transfer across both space and time. Organizations that regard knowledge as an object have high-use levels of knowledge management systems (KMS) [13,14,23]. These systems of knowledge re-use evidently lend themselves a greater level of path-dependent activity and exploitation. Centralization of R&D activity also leads to a greater level of exploitation [62] due to the geographical and technical barriers that accompany limited knowledge dissemination. Increased hierarchy also leads to increased reporting measures, which in turn leads to increased quantifying of both tangible and intangible elements [76] (Figure 2).

Exploration as a knowledge strategy

Exploration search takes place in technological domains far removed from its own core technologies, through planned experimentation [5,41,66,77,78]. Added to exploration dimension is the facet of search scope [78], which refers to how widely an organization explores technologically distant landscapes. Exploration is the main driver when achieving competitive advantage [42] and has been shown to aid in the creation of architectural competence [79] and dynamic capabilities [16], due to its ability to result in radical innovations. Examples of exploration include, university-industry partnerships [80], partnerships with government agencies and independent inventors [78]. Levinthal and March [42] recommend an exploration strategy whereby organizations explore the successful explorations of others; however, as they state exploration is a system-wide phenomenon and such a strategy would result ultimately in a decrease in the amount of technologies available for exploration. Appropriability regimes, such as patent systems, however encourage exploration activity, due to them guaranteeing some level of private return. Katila and Ahuja [78] found that the optimal time to engage in explorative activity is when the technological knowledge in question is not "new" allowing time for articulation and industry-wide diffusion. Henderson and Cockburn [79] also demonstrate organizations that look beyond their core competence and place more emphasis on being part of a larger scientific community generate more patents, while recent results show that consistent exploration achieves better results than internal exploitation [77]. An organization focus biased toward exploration incurs many of the costs associated with search and experimentation without gaining proportionate benefits due to the public-goods nature of the results of exploration [42,61]. Exploration requires a certain level of risk aversion, which is linked to time and cost barriers; however, this also implies increased rewards [61]. Organizational groups that regard knowledge in the subjective sense, and thus focus on the facilitation of community and network-based conditions, are likely to find their ability to conduct exploration enhanced [23] through increased boundary spanning activity [81]. Under regimes of decentralization with regards to R&D activity, organizations also show increased ability to engage in exploration [62], as demonstrated by Figure 2.
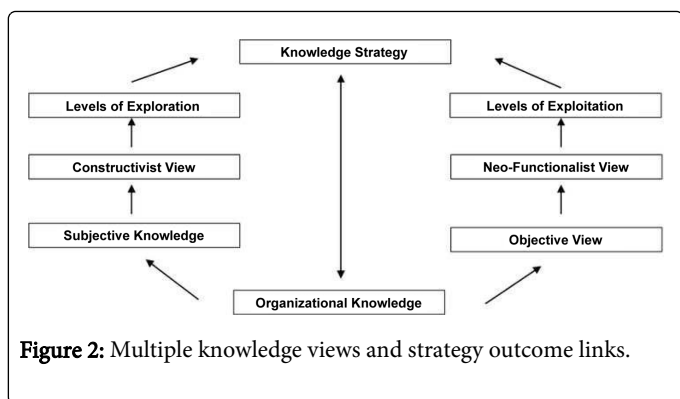
Figure 2: Multiple knowledge views and strategy outcome links.

Exploration and exploitation at Medi-Case A and B

O'Brien's [13] casework on Medi-Case A and Medi-Case B highlights a combination of both exploration and exploitation activity at the organization. Medi-Case A and Medi-Case B also demonstrate many of the characteristics of ambidextrous organizations [82], in that organization-level centralisation and decentralization is practised depending on the activity in question. This explains in part how exploitation and exploration co-exist harmoniously in Medi-Case A and Medi-Case B, as decentralized innovation has been shown to enhance exploration levels and centralisation has been shown to aid exploitation activity [62]. Centralized production at Medi-Case A and Medi-Case B has enhanced the organizations' abilities to exploit and re-use organizational knowledge. While exploration at Medi-Case A and Medi-Case B resulted in, among other things, the creation of the world's most innovative medical devices, this development was also achieved through one the fastest development processes worldwide. Decentralized exploration is encouraged annually through the "Innovation Series Lectures", a series of seminars and lectures open to and provided by all Medi-Case A and Medi-Case B employees. Exploitation activity at Medi-Case A and Medi-Case B is more centralized, using organizational learning. Medi-Case A and Medi-Case B exploitation also focuses on organizational learning through quality circles; refinement therefore leads to fewer problems over time. Customer knowledge management also is held in high regard as a source of external knowledge similar to each organization's own core knowledge.

Multiple knowledge strategy-positioning framework

Any entity composed of many individual units, as organizations are, cannot be understood by invoking simplistic singular categorizations [4,8,13,14] thus a more connected knowledge-based strategy must look at organizations at the community, group and department level. Dominant strategy positions in relation to knowledge can be mapping, but these must bear in mind the fact that organizations at any one time have multiple knowledge discourses at work. At any one time, both exploitation and exploration are competing within the organization for resources with individual organizational groups championing the case of one strategy over the other. This strategy preference is framed in the main part by the group's position in relation to knowledge [42]. Drawing on the three elements of knowledge strategy discussed in the preceding sections, four possible knowledge strategy positions can be mapped in a more connected Knowledge Strategy Position Framework in Figure 3; these are Process Explorers, Knowledge Disregarders, Asset Exploiters and Knowledge Learners. All four strategy positions

are mapped in relation to level of regard for knowledge subjectivity and objectivity within the organizational group in question (Figure 3).

Those organizational groups exhibiting a high regard for both subjective and objective knowledge should enjoy a sustainable knowledge and innovative advantage based on organizational learning premises and a balanced approach to exploitation and exploration [42] that incorporates the process and asset elements of organizational knowledge (knowledge learners). Those lagging in regard for both knowledge positions are at risk of knowledge stagnation (knowledge disregarders), as well as low levels of both exploitation and exploration activity and innovation in general. Those groups with a superior regard for objectively based knowledge should exhibit a greater propensity toward an exploitation-based knowledge strategy focusing on the codification of knowledge and re-use through knowledge-based systems; activity within these groups will predominantly result in incremental innovation (Asset Exploiters).

Those organizational groups with a higher regard for subjectively based knowledge should exhibit a greater tendency toward the exploration of technologically distant knowledge through a process-and-practice based approach, such as the facilitation of boundary-spanning communities of practice. The activity of organizational groups focused in this way will result mainly in radical innovation (Process Explorers). It is important to note that organizational groups can change their knowledge strategy position by adopting a new regard for knowledge; for example, knowledge disregarders can move to an asset exploiter's position through the increased recognition of the importance of knowledge as a group asset and the implementation of a knowledge management system aimed at the codification, capture and re-use of group knowledge. This framework can also be used to represent the dominant position of an organization, bearing in mind that multiple alternate knowledges will still exist throughout the organization.
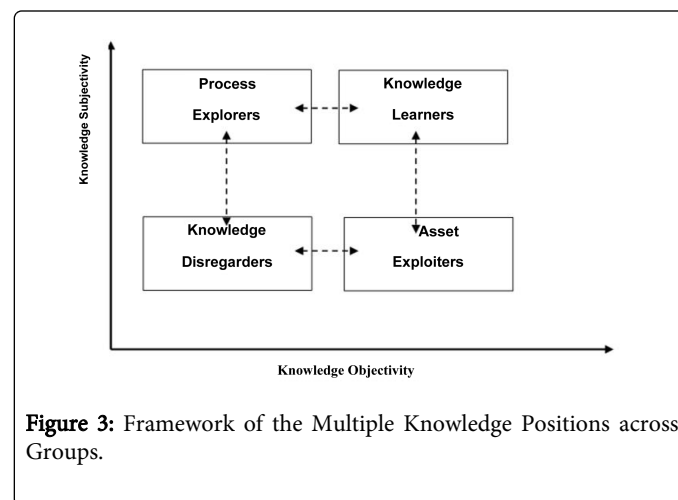

Figure 3: Framework of the Multiple Knowledge Positions across Groups.

Positioning medical case A and B's multiple knowledge on the knowledge strategy framework

Returning to O'Brien's [13] case studies A and B, multiple knowledge have already been shown to exist within various organizational groups. These can be mapped on the Knowledge Strategy Framework. Asset Exploiters at Medi-Case A and Medi-Case B include the quality circle groups; these groups place a high regard on the codification of operational and production knowledge and the

exploitation, dissemination and re-use of this knowledge throughout the organization. Training groups within Medi-Case A and Medi-Case B represent Knowledgeable Learners; these groups exhibit a high regard for the advantages of both subjective and objective knowledge. Training involves participation in a practice-based Sensei system and exploration activity for those being trained; however the "70/20/10" and "Link" problem databases, and the re-use of the codified knowledge contained within, also represents an essential element of training at Medi-Case A and Medi-Case B. Development teams at Medi-Case A and Medi-Case B operate predominantly as Process Explorers incorporating the Kaizen or practice-based learning approach, or the hands-on experience approach, and the personal approach to knowledge creation, all of which facilitate exploration activity. The results of these development teams include such radical innovations as the world's least invasive heart stint. Knowledge disregarders are more difficult to come across at Medi-Case A and Medi-Case B; however, new contractors and the difficulties they have in first implementing Medi-Case A and Medi-Case B's approaches to knowledge learning act as examples. These contractors, while they are members of Medi-Case A and Medi-Case B's knowledge network, have a disregard for subjective and objective knowledge when compared to the knowledge culture that exists in the more established parts of Medi-Case A and Medi-Case B's knowledge network. Thus, contractors must adopt, among other things, a new approach to engineering leadership, knowledge management, design variations, the development process, and organizational design. Once this is achieved, the contractor groups can migrate to another position on the connected knowledge strategy framework based on a shift in their regard for organizational knowledge. It is important to remember that all teams within Medi-Case A and Medi-Case B interact with each other throughout the training, product or service development, and marketing and selling initiatives.

Conclusion

Most organizations have some regard for their own knowledge and contain belief in their knowledge networks; this regard varies, however, at the group level in terms of a knowledge focus. This focus changes across groups in terms of the level of regard for subjective and objective knowledge. This paper offers an alternative way of looking at knowledge strategy positioning – one that recognizes the varied nature of the knowledges that exist within any system and potentially acts as a building block for future knowledge strategy positioning empirical work.

References

1. Schultze U, Stabell C (2004) Knowing What You Don't Know? Discourses and Contradictions in Knowledge Management Research. J Manage Studies 41: 549- 573.

2. Grant R (1996) Towards a knowledge based theory of the firm. Strategic Management Journal 17: 109- 122.

3. Spender JC (1996a) Organizational knowledge, learning and memory: Three concepts in search of a theory. J Org Change Manage 9: 63-78.

4. Spender JC (1996b) Making knowledge the basis of a dynamic theory of the firm. Strategic Management Journal, 17: 45-62.

5. March J (1991) Exploration and exploitation in organizational learning. Organization Science 2: 71-87.

6. Zack M (1999) Developing a knowledge strategy. California Management Review 41: I25-145.

7. Zack MH (2005) The Strategic Advantage of Knowledge and Learning. International Journal of Intellectual Capital and Learning 2: 1-20.

8. Cook S, Brown J (1999) Bridging epistemologies: The generative dance between organizational knowledge and organizational knowing. Organization science 10: 381-400.

9. Orlikowski W (2002) Knowing in Practice: Enacting a Collective Capability in Distributed Organizing. Organization Science 13: 249- 273.

10. Grant R (1997) The Knowledge-based view of the Firm: Implications for Management Practice. Long Range Planning 30: 450- 454.

11. Grant RM (2002) Contemporary Strategic Analysis: Concepts, Techniques, Applications. Oxford, Blackwell.

12. Teece D (2001) Strategies for managing knowledge assets: The role of firm structure and industrial context. In I. Nonaka & D. Teece (eds), Managing Industrial Knowledge, Creation, Transfer and Utilization, Sage Publications, Thousand Oaks.

13. O'Brien J (2013a) The Need for a Robust Knowledge Assessment Framework: Discussion and Findings from an Exploratory Case Study. The Electronic Journal of Knowledge Management 11: 93-106.

14. O'Brien J (2013b) Lessons from the Private Sector: A Framework to be Adopted in the Public Sector. In "Building a Competitive Public Sector with Knowledge Management Strategy, Al-Bastaki, Y., and Shajera, A., (Eds), IGI Global

15. Sveiby K (1997) The New Organizational Wealth... Managing and Measuring Knowledge Based Assets. 1st ed, Berrett-Koehler Publisher Inc, San Francisco.

16. Teece D, Pisano G, Sheun A (1997) Dynamic capabilities and strategic management. Strategic Management Journal 18: 509- 533.

17. Lloria MB (2008) A Review of the main approaches to knowledge management. Knowledge Management Research & Practice 6: 77-89.

18. Polanyi M (1962) Personal Knowledge. Towards a port critical philosophy. Routledge and Kegall Paul, London.

19. Hislop D, Newell S, Scarbrough H, Swan J (2000) Networks, knowledge and Power: Decision Making, Politics and the Process of Innovation. Technology Analysis and Strategic Management 12: 399- 411.

20. Chiva R, Alegre J (2005) Organizational Learning and Organizational knowledge: Towards and Integration of two approaches. Management Learning 36: 49- 68.

21. Nelson R, Winter S (1982) An evolutional theory of economic change. Harvard University Press, Cambridge, MA.

22. Nonaka I, Takeuchi T (1995) The Knowledge-creating Company. How Japanese Companies Create the Dynamics of Innovation. Oxford University Press Inc, New York.

23. McDermott R (1999) Why information technology inspired but cannot deliver knowledge management. California Management Review, 41(4): 103-117.

24. Blacker F (1995) Knowledge, Knowledge Work and Organizations: An Overview and Interpretation. Organization Studies, 16(6):1021-1046.

25. Alvesson M, Karreman D (2001) Odd couple: making sense of the curious concept of knowledge Management, Journal of Management Studies, 38(7).

26. Sawhney M, Prandelli E (2004) Communities of Creation: Managing Distributed Innovation in Turbulent Markets. In K. Starkey, S. Tempest and A. McKinlay (eds), How Organizations Learn, Thompson, London.

27. Proffer J, Sutton R (1999) Knowing what to do is not enough: Turning knowledge into action. California Management Review 42: 83-108.

28. Spender JC, Scherer AG (2007) The Philosophical Foundations of Knowledge Management. Organisation 14: 5-28.

29. Blacker F (2004) Knowledge, knowledge work and organizations: an overview and interpretation. In K. Starkey, S. Tempest and A. MCInlay (eds), How Organizations Learn.' Managing the search for knowledge, Thompson Learning, London, p. 339.

30. Polanyi M (1969) Knowing and Being. Routledge and Regan Paul, London p.195.

31. Brown J, Duguid P (1991) Organizational learning and communities of practice: Toward a unified view of working, learning and innovation. Journal of the Institute of Management Sciences 2: 40-58.

32. Dyer J, Singh H (1998) The relational view: Cooperative strategy and sources of Inter-organizational competitive advantage. Academy of Management Review 23(4): 660-679.

33. Lane H, Lubatkin (1998) Relative absorptive capacity and inter-organizational learning. Strategic Management Journal 19: 461-477.

34. Wenger E (1998) Communities of Practice. Cambridge University Press, Cambridge.

35. Moffett S, Hinds A (2010) Analysing the impact of KM on organisational practice: applying the MeCTIP model to UK organizations. Electronic Journal of Knowledge Management 8: 103-118.

36. Moffett SM, McAdam R (2006) The Effects of Organizational Size on Knowledge Management Implementation: Opportunities for Small Firms? Total Quality Management 17: 221-241.

37. Eisenhardt K, Santos F (2001) Knowledge-Based View: A New Theory of Strategy? in Pettigrew H, Thomas and R. Whittington (eds), Handbook of Strategy and Management, Sage Publications Ltd., London.

38. Conner K, Prahalad CK (1996) A Resource-based Theory of the Firm: Knowledge versus Opportunism. Organization Science 7: 477-501.

39. Grant R (2001) Knowledge and Organization. In I. Nonaka and D. Teece (eds), Managing Industrial Knowledge. Creation, Transfer and Utilization, Sage Publications, Thousand Oaks, pp. 145- 169.

40. Kogut B, Zander U (1995) Knowledge and the speed of the transfer and imitation of organizational capabilities; An empirical test. Organization Science 6: 76- 92.

41. Levitt B, March J (1988) Organizational Learning. Annual Review of Sociology 14: 319-340.

42. Levinthal D, March J (1993) The myopia of learning. Strategic Management Journal 14: 95-112.

43. Wenger E, Snyder WM (2000) Communities of Practice: The Organizational Frontier. Harvard Business Review, 78: 139-146.

44. Kogut B, Zander U (1992) Knowledge of the Firm, Combinative Capabilities and the Replication of Technology. Organization Science 3: 383-397.

45. Guba EG, Lincoln YS (1985) Naturalistic Inquiry. New York, Sage Publications.

46. Patton M (1990) Qualitative Evaluation and Research Methods. Newbury Park CA, Sage Publications.

47. Attewell P, Rule JB (1991) Survey and other methodologies applied to IT impact research: Experiences from a comparative study of business computing. Kraemer (Ed.), The Information Systems Research Challenge. Survey Research Methods Volume 3, Boston, Massachusetts: Harvard Business School Press

48. Faison Smith B (1996) 'Graphic Designers in Transition', Interactions, 39-57.

49. Fearon C, Philip G (1998) 'Self-Assessment as a means of measuring strategic and operational benefits from EDI: The development of a conceptual framework', European Journal of Information Systems 7: 5-16.

50. Carney TF (1972) Content Analysis: a technique for systematic inference from communications, Winnipeg: University of Manitoba Press.

51. Agar MH (1980) The Professional Stranger: An informal introduction to ethnography, London: Academic Press.

52. Miles MB, Huberman AM (1994) Qualitative Data Analysis; an Expanded Sourcebook, London: Sage Publications.

53. Tuunainen VK, Saarinen T (1997) 'EDI and Internet-EDI: Opportunities of effective integration for small businesses', in proceedings of the Fifth European Conference on Information Systems, June 19th - 21st, University College Cork: 164177.

54. Walsham G (1995) 'Interpretive Case Studies in IS Research: nature and method', European Journal of Information Systems 4: 74-81.

55. Firestone WA (1993) 'Alternative arguments for generalizing from data as applied to qualitative research', Educational researcher 22: 16-23.

56. Saunders M, Lewis P, Thornhill A (1997) Research Methods for Business Students, London: FT Pitman Publishing

57. Strauss A, Corbin J (1990) Basics of Qualitative Research: Techniques & Procedures for Developing Grounded Theory. Thousand Oaks, CA, Sage Publications.

58. Babbie E (1995) The Practice of Social Research, Seventh Edition, Washington, USA: Wadsworth Publishing Company.

59. Eisenhardt K (1989) Making fast strategic decisions in high velocity environments. Academy of Management Journal 32: 543- 576.

60. Dutta S, Chaturvedi R (2005) Knowledge Management Practices at Toyota Motors. Centre for Management Research, vol. Case Study, no. Reference no 905-031-1.

61. March J (1994) A primer on decision making. The free press, New York.

62. Tushman M (2003) Exploitation, Exploration and process management: The productivity dilemma revisited. Academy of management review 28(2): 238- 256.

63. Levinthal D, March J (1981) A model of adaptive organizational search. Journal of economic behaviour and organization 2: 307-333.

64. March J, Sproull S, Tamuz M (1991) Learning from samples of one and fewer. Organization Science 2: 1-13.

65. Katila R, Abuja G (2002) Something old, something new: A longitudinal study of search behaviour and new product introduction. Academy of Management Journal 45: 1183-1194.

66. Baum J, Xiao-Li S, Usher J (2000) Making the next move: How experiential and vicarious learning shape the locations of chains acquisitions. Administrative Science Quarterly 45: 766- 801.

67. Fleming L (2001) Recombinant Uncertainty in Technological Search. Management Science 47: 117- 132

68. Cohen W, Levinthal D (1990) Absorptive capacity: A new perspective on learning and innovation.

69. Kelly D, Amburgey TL (1991) Organizational inertia and momentum. A dynamic model of strategic change. Academy of Management Journal 34: 591-612.

70. Ginsberg A, Baum JC (1994) Evolutionary processes and patterns of core business change. In JC Baum, J Singh (eds), Evolution dynamics of organizations, Oxford University Press, New York.

71. Stuart T, Podolny J (1996) Local search and the evolution of technological capabilities. Strategic Management Journal 17: 21-38.

72. Simonin B (1997) The importance of collaborative know-how: An empirical test of the learning organization. Academy of Management Journal 40(5): 1150-1174.

73. Gulati R, Gargiulo M (1999) Where do inter organizational networks come from? American Journal of Sociology 104: 1439-1493.

74. Kahneman D, Tversky A (1979) Prospect theory: An analysis of decision under risk. Econometrica 47: 263-291.

75. Cohen W, Levinthal D (1989) Innovation and learning: The two faces of R&D. Economic Journal 99: 569-586.

76. Ouchi WG, Jaeger AM (1978) Type Z organization: Stability in the midst of mobility. Academy of Management Review 3: 305-314.

77. Rosenkopf L, Nerker A (2001) Beyond local search: Boundary- spanning, exploration and impact in the optical disk industry. Strategic Management Journal 22: 287-306.

78. Katila R, Ahuja (2002) New product search over time: past ideas in their prime? Academy of Management Journal, 45: 995-1010.

79. Henderson R, Cockbum I (1994) Measuring competence? Exploring effects in pharmaceutical research. Strategic Management Journal 15: 63-84.

80. Laursen K, Salter A (2006) Open for Innovation: The role of openness in explaining innovation performance among UK manufacturing firms. Strategic Management Journal 27: 131-150.

81. Leonard-Barton D(1995) Core capabilities and core rigidities: a paradox in managing new product development. Strategic Management Journal 13: 111-126.

82. Tushman M, O'Reilly (2004) Ambidextrous Organizations. Harvard Business Review 82: 74-81.