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Kay, John (Born 1948)

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John Kay is a globally recognized strategic and policy thinker who is also a leading British economist, business consultant and strategic management scholar. Born and educated in Scotland, he studied at Edinburgh University. He is a visiting Professor of Economics at the London School of Economics, a fellow of St John's College, Oxford, a Fellow of the British Academy and a Fellow of the Royal Society of Edinburgh. From 1986 to 1996 he was a chair professor at London Business School and the founding director of Oxford University's Saïd Business School. He was the first professor of management to receive the academic distinction of Fellowship of the British Academy. Kay was appointed Commander of the Order of the British Empire in the 2014 New Year Honours for services to economics (ESRC 2014). He is an acclaimed columnist and has contributed a weekly column to the *Financial Times* for 9 years.

He began his academic career as a Fellow of St John's College at Oxford in 1970 and worked under James Mirrlees, who won the Nobel Prize for his

contributions to economic theory. Having started as a microeconomics economist, his work has evolved from public finance to business economics, dealing with the application of economics to issues in ► [industrial organization](#) and a firm's competitive advantage. His scholarship covers a very broad canvas. His earlier books include *Foundations of Corporate Success* (1993) and *Why Firms Succeed* (1995). A prevailing theme is that the success of a business relies on its strong and distinctive relationships with a wide range of stakeholders, which is essential for social justice and also to make an organization flexible and responsive to change.

His more recent books include *The Truth about Markets* (2003), *The Long and the Short of It: Finance and Investment for Normally Intelligent People Who Are Not in the Industry* (2009), and *Obliquity* (2010). In these books, Kay takes serious ideas in economics such as the utility and limitations of market processes and makes them accessible to a general audience. The central themes in recent work are the negative consequences of the mistaken over emphasis of rationality in finance and modern economics. In *Obliquity*, Kay uses a range of examples to argue that complex goals are more likely to be achieved when they are pursued indirectly. Kay has been an adviser to companies and governments around the world. In 1979, he became the founding director of the Institute for Fiscal Studies, an independent think tank where he worked with James Meade, a Nobel Prize laureate. In 1978, Kay co-authored *The British Tax System* with Mervyn King, former

governor of the Bank of England, which was published in five editions. In 1986 he founded his own consulting firm, London Economics, which grew into Britain's largest independent economic consultancy, with annual revenues of \$15 million and offices in London, Boston and Melbourne. Kay has also chaired the Review of UK Equity Markets and Long-Term Decision-Making which reported to the Secretary of State for Business, Innovation and Skills in 2012. He recommends improving the incentives and quality of engagement of market participants and restoring relationships of trust and confidence in the investment chain (BIS 2013). He has been the director of several investment companies including Halifax, one of the largest retail financial services businesses in Europe, and the Scottish Mortgage Investment Trust.

See Also

- ▶ [Industrial Organization](#)
- ▶ [Public Policy: Strategy in the Public Interest](#)
- ▶ [Teece, David J. \(Born 1948\)](#)

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Knowledge Articulation

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Abstract

Knowledge articulation involves the conversion or extraction of tacit knowledge from individuals into explicit and more generic knowledge through collective efforts. We identify three properties of knowledge articulation: (1) it eases diffusion and replication in and between organizations; (2) it is conducive to complex problem-solving; (3) it involves the creation of new knowledge. We posit four challenges for research and practice concerning knowledge articulation: (1) understanding the relation between individual and collective processes; (2) distinguishing between knowledge articulation and knowledge codification; (3) delineating the content and processes of knowledge articulation; (4) explicating the limits of knowledge articulation.

Definition Knowledge articulation involves the conversion or extraction of tacit knowledge from individuals into explicit and more generic knowledge that aims at explicating causal relationships. As expressed by Mason and Leek (2008: 778): 'Knowledge articulation is concerned with how individuals and groups figure out what does and what does not work.' The process of knowledge articulation is a social process that occurs in organizational communities, involving the interplay between cognitive frames expressed in theories, coding schemes such as language and pictorial representations, and technologically embedded tools.

A Brief Survey of the Knowledge Articulation Literature

The importance and relevance of knowledge articulation for strategic management can be found in the expansion of the resource-based view and its

focus on value capture through rare and difficult to imitate resources, such as tacit, or inarticulate, knowledge in organizations. Tacit knowledge has been conceptualized as organizational routines that make up organizational capabilities and could explain the relative sustained competitive performance of firms. At the same time, drawing exclusively upon tacit knowledge and routines may be fraught with difficulty, both conceptually and practically. First, tacit knowledge may not be conducive to rapid replication and expansion in firms, due to the need for interpersonal knowledge transfer (Winter and Szulanski 2001). It has therefore been argued that knowledge articulation and codification facilitates the diffusion of knowledge by relying on depersonalized knowledge transfer mechanisms, such as language and other symbols. Second, a one-sided focus on tacit knowledge may result in myopic and pathdependent behaviour (Levinthal and March 1993). Routines applied without reflection may lead to skilled incompetence (Argyris 1986), superstitious learning (Levitt and March 1988) and core rigidities (Leonard-Barton 1992). Knowledge articulation in this context may serve as an important mechanism for reflection that allows for creativity, recombination and innovation.

Based on an argument on ‘the primacy of tacit knowledge’, most analyses of knowledge articulation commence with a baseline assumption that there is tacit knowledge to be articulated. The general argument regarding tacit knowledge recognizes that an important function of subsidiary awareness (‘indwelling’ as Michael Polanyi called it) is that it allows the executor of a specific task to direct his/her attention to something focal (which, consequently, is not subsumed). The general arguments for the primacy of such tacit dimension of knowledge over explicit knowledge (captured in language) put forward by Polanyi (1958) are: (a) reality is too complex to be fully captured in a formalized (incomplete) language as there are more human distinctions made than possible in language (cf. Tsoukas and Vladimirou 2001; Tsoukas 2009); (b) there is an ontological ‘wedge’ between language and the knowing individual: language is an important resource in knowledge creation, but never fully utilized by

the individual, as no individual is fully competent in the use of language; (c) obeying the social rules of language will ultimately constrain creativity in knowledge generation, since such collective rules involve conformity to what is considered socially legitimate; (d) eventually, knowledge expressed explicitly must rely on some knowledge not expressed, as the ability to use language does not reside in the language (grammar) itself.

The articulation of tacit knowledge may be necessary for several important purposes in the strategic management of organizations. Knowledge articulation involves the utilization (and possibly creation) of some form of representations of what was previously subsumed. Representations can, for instance, be inscribed, as knowledge is articulated and expressed, for example in formal language, heuristics, analogies and metaphors (cf. Foray and Steinmueller 2003; Gavetti 2005). As strategic management practices often involve situations whereby decision makers need to ponder what actions to take, articulating into the foreground what has been subsumed constitutes one important process in their deliberations.

Nonaka (1991) and Hedlund (1994) introduced the concept of knowledge articulation to the field of strategic management in their early formulations of how knowledge conversion between tacit and explicit knowledge plays an important role in organizational knowledge creation. They denoted the process of converting tacit knowledge to explicit knowledge ‘articulation’ (in later publications – from 1994 and onwards – Nonaka replaced the concept of articulation with externalization). By far the most cited article on knowledge articulation in the management literature is Zollo and Winter (2002). In this conceptual piece, Zollo and Winter introduce a framework for analysing the evolution of dynamic capabilities in firms that hinges on three learning processes: experience accumulation (of tacit knowledge), knowledge articulation and knowledge codification. They suggest that firms need to invest in learning to accumulate capabilities, but that there are different cognitive efforts associated with different learning processes. Accordingly, they argue that deliberative learning primarily involves knowledge articulation and knowledge

codification, two processes that are more cognitively demanding than experience accumulation. Zollo and Winter further develop a contingency argument where they propose that the relative effectiveness of utilizing knowledge articulation and knowledge codification processes is moderated by the degree of task frequency, task heterogeneity and causal ambiguity. In essence, they suggest that knowledge articulation and knowledge codification will be more effective than experience accumulation in situations characterized by low frequency, high heterogeneity and high causal ambiguity (or complexity), respectively.

The framework of Zollo and Winter has, for instance, been used to analyse inter-project learning in project-based organizations (Prencipe and Tell 2001), inter-organizational knowledge transfer (Mason and Leek 2008), selection of technology best practices in industrial consolidation (Lazarcic et al. 2003) and knowledge integration in distributed new product development teams (Enberg et al. 2006). In general, these studies focus on contexts characterized by low frequency, high heterogeneity and high complexity, that is, where, according to Zollo and Winter, knowledge articulation is to be expected. In general, the findings are in line with the predictions, although the need for using several learning mechanisms is emphasized, in particular in situations that not are dichotomous with regard to the task dimensions identified by Zollo and Winter. Romme et al. (2010) simulate this model and test how knowledge articulation and knowledge codification are related to environmental dynamism and the ability to change operating routines. Their findings suggest that there are clear limitations to merely relying on knowledge codification, but that knowledge '[...] articulation can strike the appropriate balance between the need to penetrate causal ambiguity and the pressure to reduce the inertial effects of codification processes' (Romme et al. 2010: 1291).

Properties, Processes and Outcomes of Knowledge Articulation

There are at least four defining characteristics of knowledge articulation. First, there is recognition

of the primacy of tacit knowledge and general agreement that the knowledge articulation refers to the process of trying to articulate knowledge that involves tacit dimensions. Second, the means for, and outcomes of, knowledge articulation can be such as codes, symbols, words/language, metaphors and other generic representations. Third, knowledge articulation involves a cognitive effort towards the establishment of some causal inference, such as explanations, interpretations, models, rules, schemas and theories. Fourth, while some authors argue that knowledge articulation involves extraction of tacit knowledge held individually, and others propose that such knowledge is collective, most writers on the topic tend to agree that the very process of articulation often involves several organizational members and that the process of articulation is enhanced by collective efforts.

How does knowledge articulation happen? Drawing upon different literatures, several authors have argued the importance of dialogue among practitioners in knowledge articulation (Lindkvist 2005; Håkanson 2007; Nonaka and von Krogh 2009; Tsoukas 2009). This literature thus points to the Socratic element of knowledge articulation, as expressed, for instance, in the dialogues of Plato. Drawing upon the primacy of tacit knowledge, as discussed by Polanyi, the definition of knowledge articulation presented above contains the conversion of knowledge from one end-point towards the other in two central epistemological dimensions. First, it involves the explication of tacit knowledge into explicit knowledge (that thus can be scrutinized in dialogues). Second, knowledge-articulation efforts are collective endeavours, aiming at extracting individually held knowledge into a generic and thus collective form of knowledge. Accordingly, knowledge articulation involves a transition both from tacit knowledge towards explicit knowledge, as well as a transition from individual knowledge towards collective knowledge (Boisot 1993; Baumard 1999).

There are at least three specific economic properties of knowledge articulation that, in turn, lead to somewhat different outcomes (cf. Prencipe and Tell 2001; Foray and Steinmueller 2003). First,

articulated knowledge is arguably easier to diffuse in and between organizations and replicate than knowledge held tacitly by individuals. For instance, Lazaric et al. (2003) show how articulation of knowledge at French steel mills through the use of different expert reviewing techniques led to a subsequent diffusion of practices and automation. Second, knowledge-articulation processes are conducive for problem-solving. As discussed, for example, by Zahra et al. (1999) and Enberg et al. (2006), the ability to solve complex problems in teams with differentiated experience and skills is enhanced by an articulation of the knowledge of different individuals, which increases the ability to coordinate and combine this knowledge. Third, and related, knowledge articulation involves the creation of new knowledge and there is thus a creative element involved. This goes beyond the mere combination of what was previously known, but articulation may result in new concepts, metaphors, theories and artefacts. For instance, Nonaka and Takeuchi (1995) found that new concepts and visions like Honda's 'Tall Boy' car and theories of baking bread that could be used for baking machines were created through the articulation of tacit knowledge into explicit knowledge.

Some Conceptual and Practical Challenges Pertaining to Knowledge Articulation

On an ontological level, the concept of articulation seems to involve both individual and collective processes, and while the literature primarily has been discussing knowledge articulation as a collective process, questions still remain regarding how individuals' tacit knowledge gets articulated and seemingly obtains collective properties. Another concern is the distinction between knowledge articulation and knowledge codification. Articulation may be a necessary condition for codification, but not all articulation can be reduced to codification. Is then knowledge articulation a certain (process) point on a continuum or does it require a 'scale' in its own right? There is also a need for further clarification regarding the

specificities of the content and processes involved in knowledge articulation. Is knowledge articulation primarily a means towards deliberation and knowledge creation or, rather, towards replication through codification of this articulated knowledge?

Concerning the limits of knowledge articulation, three questions may be posed: (a) is knowledge articulation always possible? (b) is knowledge articulation always sufficient? (c) when is knowledge articulation appropriate/effective? Taking the stance of 'the primacy of tacit knowledge' (which is embraced by most writers on knowledge articulation) often implies the recognition that not all tacit knowledge may be 'articulable'. Such a stance may also indicate limits to articulation and the insufficiency of relying purely on knowledge articulation in knowledge creation and problem-solving (the causality could be the reverse: that the establishment of tacit knowledge actually constitutes knowledge creation). Finally, more work remains on understanding in what situations knowledge articulation is used and to what extent it is an appropriate and effective measure.

See Also

- ▶ [Knowledge-Based Strategy](#)
- ▶ [Knowledge Networks](#)
- ▶ [Knowledge Sourcing](#)
- ▶ [Knowledge Spillovers](#)

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Knowledge Brokering

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Abstract

In contrast to theories of ► [innovation](#), which assume creative ideas to be generated *ex nihilo*, a growing stream of literature argues that all innovations ultimately stem from knowledge brokering: ideas that are well established in one domain diffuse to domains where they are not yet known. Knowledge brokering has been recognized as the root cause of innovation in a variety of literatures, ranging from cognitive research on analogical reasoning to sociological studies on the innovativeness of groups, organizations and communities. As they facilitate the transfer of knowledge across domains, social networks have been identified as a prime source of knowledge brokering.

Definition Knowledge brokering is the process of ‘moving ideas from where they are known to where they are not’ (Hargadon 2002: 44).

Knowledge brokering is the process of ‘moving ideas from where they are known to where they are not’ (Hargadon 2002: 44).

A growing stream of literature argues that all innovations – in science, art, philosophy or technology – ultimately stem from a knowledge brokering process: ideas developed in one domain diffuse to domains where they are not yet known (Collins 1998; Hargadon 2002). The knowledge brokering perspective stands in contrast to theories of ► [innovation](#) that emphasize the role of *ex nihilo* creativity (Weisberg 2006: 57), resting on the opposite view that new ideas always result from the novel combination of old ideas (Schumpeter 1947; Hargadon 2002; for a discussion of *ex nihilo* versus combinatorial views of creativity see Perkins 1988). Similarly, it distances itself from ‘heroic’ views of innovation as born of exceptional genius, focusing instead on the processes by which knowledge diffuses across domains (Burt 2004:

387). The view of innovation as knowledge brokering spurred novel insights into the mechanisms that lead to the generation of innovations at the individual (Burt 2004), team (Hargadon and Beckhy 2006), organizational (Hargadon and Sutton 1997) and technological community level (Carnabuci and Bruggeman 2009).

Knowledge brokering provides opportunities for innovation because the social world is fragmented into pools of specialized and situated knowledge, or 'domains', such that it is 'difficult to disentangle and recombine the resources from one domain into another' (Hargadon 2002: 44; Felin and Hesterly 2007). While domains define *knowledge* boundaries, they are situated in social structure. Accordingly, domains are typically supported by thick pockets of densely interconnected actors, while structural holes separate such dense pockets across domains (Carnabuci and Bruggeman 2009). In line with this view, social network scholars have demonstrated that social actors bridging holes in the social structure have a 'vision advantage' that allows them to identify knowledge brokering opportunities invisible to others (Burt 2004; Fleming et al. 2007). While social networks are a key knowledge brokering channel, however, they are not the only one. In the knowledge-based economy a great deal of knowledge is codified and made public, for example through patents and technical literature, which often act as vectors through which knowledge can be brokered across domains. Thus, Operti and Carnabuci (forthcoming) showed that firms in the semiconductor industry broker technical knowledge by learning from the patented knowledge of their competitors. Similarly, Fleming and Sorenson (2004) showed that published scientific knowledge may help engineers broker technological knowledge from one domain to another.

The claim that the root cause of innovation is knowledge brokering received support from a wide range of studies at various levels of analyses. At the cognitive level, knowledge brokering has been argued to occur through 'a process of analogical reasoning, in which ideas from one domain are used to solve the problems of another' (Hargadon 2002: 45). In this literature, some

researchers have taken the position that analogical reasoning represents the most important cognitive mechanism behind the generation of innovative ideas, while others have adopted the stronger position that it is the only means. At the organizational level, a rich stream of studies brought evidence that the distinguishing trait of innovative teams and firms lies in their ability to systematically broker knowledge across disparate domains, for example by using technical solutions developed in one industry to address technical problems arising in other industries (Hargadon and Sutton 1997; Fleming 2002). Systematizing this insight, Hargadon (2002) developed a general process model linking knowledge brokering to organizational innovation. The author posited that, at the organizational level, 'knowledge brokering involves exploiting the preconditions for innovation that reside within the larger social structure by bridging multiple domains, learning about the resources within those domains, linking that knowledge to new situations, and finally building new networks around the innovations that emerge from the process' (Hargadon 2002: 41). At the level of technological communities, furthermore, Carnabuci and Bruggeman (2009) showed that knowledge brokering is a key mechanism for understanding why certain technology domains grow faster than others. Using a large-scale patent dataset, the authors showed that the growth rate of a technology domain depends on the extent to which knowledge is brokered into that domain from other technology domains. The larger the volume of knowledge brokered into a technology domain at any given time point, the higher the domain's growth rate in subsequent years.

While these varied works provide support to the argument that knowledge brokering is the engine of innovation, brokering knowledge across domains is rarely a smooth process (Carlile 2004). Burt identifies four levels of difficulty in knowledge brokering (Burt 2004: 355, n. 3). The simplest type is the mere communication of information about brokerage opportunities. A second, more difficult type involves transferring best practices across domains. A third type of knowledge brokering consists of making analogies between distant and apparently unrelated groups. The fourth

and most difficult type is what Burt calls ‘synthesis’, where ideas are integrated across domains. A window into the difficulties inherent in knowledge brokering is presented by Sverrisson (2001), who conducted a series of in-depth case studies to examine how environmental knowledge was brought into the domain of industrial firms in Sweden. The author concluded that knowledge brokering always requires a ‘translation’ process, whereby ‘abstract categories and quantification techniques’ are turned into ‘practical knowledge’, that is, knowledge framed to solve practical problems in the new domain (Sverrisson 2001: 318). A quote from one of his interviewees captures this point well:

If you talk to a forest person and say bioenergy, he means [that is, interprets this as] a heap of chipped wood. If you talk to a bacteriologist, he means bacteria that produce hydrogen. If you talk to a mechanical engineer, he means a steam turbine in which you burn wood to produce electricity, etc. . . . This is the hard part, when you are talking to your contacts, and all the time you must continuously interpret what is being said. (Sverrisson 2001: 318)

Generalizing this point, Carnabuci and Bruggeman (2009: 616–617) notice that domains develop idiosyncratic ‘*embedding circumstances*’ (for example, with regard to the technical jargon, instruments, and testing criteria used) and that ‘brokering knowledge means de-embedding knowledge from one domain and re-embedding it in another, which entails passing more arduous cognitive and cultural barriers (Brown and Duguid 2001), and it may trigger political intricacies and irrational factors whose effects are hard to predict (Latour 1987)’. Testifying to the many difficulties inherent in knowledge brokering, Hargadon (2002: 57) noted that ‘when Edison invented the light bulb, he was accused of “the most airy ignorance of the fundamental principles of electricity and dynamics”’.

Summing up, the knowledge brokering perspective spurred many novel insights into how innovations come about, as well as into the obstacles that might prevent individuals, teams, firms and even communities from developing them. Further, it allowed researchers to integrate – or perhaps one should say broker – knowledge

across literatures as diverse as sociology, organization theory and cognitive psychology. As such, knowledge brokering represents a bridging concept that promises to offer useful and innovative theoretical developments in the years to come.

See Also

- ▶ [Innovation](#)
- ▶ [Innovation Networks](#)
- ▶ [Knowledge Networks](#)
- ▶ [Recombination of Knowledge](#)

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Knowledge Management Theories

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Abstract

To understand the role, nature and content of knowledge management, this article traces the conceptual basis of knowledge management in terms of the emergence of the knowledge-based view of the firm and shows how, triggered by development of the knowledge-based economy, knowledge management has provided an umbrella for a range of management activities – all linked together by their central focus on knowledge within the organization.

Definition Knowledge management comprises a range of management practices to create, identify, store, diffuse, replicate and apply knowledge within organizations.

Knowledge management comprises a range of practices through which organizations generate and apply knowledge. The theoretical basis for knowledge management is provided by a set of concepts, principles and theories that have been collectively referred to as the knowledge-based

view of the firm. This knowledge-based view conceives the firm as an assembly of knowledge assets and identifies the primary purpose of the firm developing these knowledge assets and applying them to the production of goods and services. Knowledge management theories comprise the key principles of knowledge management derived from the knowledge-based view of the firm.

The Emergence of Knowledge Management

The management of knowledge by knowledge has long been central to management theory and management practice. At the beginning of the twentieth century, Frederick Taylor's 'scientific management' was concerned with how the organizational and decision-making knowledge of managers could be applied to the operational knowledge of workers in order to improve the latter's productivity (Taylor 1916). As the practice and principles of management developed throughout the twentieth century, managing knowledge became a central focus for several management areas, notably technology management, information systems management, human resource management and new product development.

During the last decade of the twentieth century, these previously distinct areas of management recognized a key commonality: all were engaged in managing knowledge within organizations. The result was the emergence of an apparently new field of management: *knowledge management*. In fact, knowledge management was neither new nor revolutionary; it comprised many of the activities that had been going on in other functional areas of the firm: the design of information systems, best practices transfer, artificial intelligence, management development and the management of intellectual property development. The novelty was in recognizing that all these activities involved common tasks of creating, storing, transferring and integrating knowledge; and the fact that, for all its diversity, knowledge possessed some common features.

Underlying the surging interest in knowledge management as an umbrella for previously distinct management activities were two key developments: first, the recognition of the so-called ‘knowledge economy’, in which information and communication technology (ICT) and human capital were seen as the key drivers of economic development (Powell and Snellman 2004); and second, the emergence of the *knowledge-based view of the firm* – a new theoretical framework for conceptualizing the firm and its management.

The Knowledge-Based View of the Firm

This knowledge-based view (KBV) exerted a powerful influence on academic thinking about the nature and functions of the firm and upon the role and content of management activity. This, in turn, had a profound influence on the processes and techniques for managing knowledge within organizations, and on how organizations should be designed in order to increase the effectiveness with which knowledge could be created and applied. Key contributions to the KBV included:

- Demsetz’s (1991) demonstration that the vertical boundaries of firms could be explained by the conditions under which knowledge was transferred between the firm and its customer (in contrast to the prevailing transaction cost explanations).
- Kogut and Zander’s view of the firm as an institution for integrating and transforming knowledge into goods and services.
- Nonaka’s (1994) analysis of the firm as a knowledge-creating organization.
- The organizational learning literature which emphasized the importance of knowledge acquisition, and explored the processes through which organizations build knowledge from internal experience and external transfer (Levitt and March 1988; Huber 1991).
- The synthesizing of ideas from epistemology, economics and organization theory into a systematic view of firms as institutions for managing knowledge (Grant 1996).

These approaches have yet to attain the status of a theory of the firm: they are lacking both in their integration and their capacity to generate testable predictions. Nevertheless, the KBV has been influential both in reframing our thinking about the nature of firms and guiding the practices of knowledge management. In the following section, I identify some of the most prominent knowledge management principles and ideas derived from the KBV.

The Theoretical Principles and Concepts That Underlie Knowledge Management

The distinction between tacit and explicit knowledge Different types of knowledge vary in their transferability: explicit knowledge can be articulated and therefore communicated between individuals and organizations; tacit knowledge (skills, know-how and contextual knowledge) is manifest only in its application – transfer is costly and slow (Kogut and Zander 1992; Nonaka 1994). The implications of this distinction for how knowledge is managed are far-reaching. Explicit knowledge is transferable at close to zero marginal cost. The digital revolution and new information and communication technologies (ICT) have vastly increased firms’ access to explicit knowledge and their capacity for storing, transferring and utilizing such knowledge. The paradox is that all these technological advances have decreased the strategic importance of explicit knowledge: unless protected by intellectual property rights, it is seldom a basis for sustainable competitive advantage.

Conversely, tacit knowledge that is embedded within individual skills and know-how and the routines and culture of organizations is difficult to transfer, but critically important as the foundation for competitive advantage. Yet exploiting tacit knowledge is fraught with difficulty: ‘best practices’ are remarkably difficult to transfer even within organizations (Szulanski 1996). *Communities of practice* offer one solution to the problems of sharing experiential knowledge (Brown and Duguid 1992; Wenger and Sneider 2001). The key strategic challenge for firms is how to

facilitate the internal replication of knowledge while combating its imitation by rivals ('external replication') (Winter 1995). Codification plays a key role in storing, facilitating and developing experiential knowledge (Cohendet and Meyer-Krahmer 2001).

Categories of Knowledge Management Activities: Exploration and Exploitation

Two major categories of knowledge management practices can be distinguished: those concerned with increasing the organization's stock of knowledge – what March (1991) refers to as 'exploration' and Spender (1992) calls 'knowledge generation' – and those concerned with deploying knowledge in order to produce goods and services – what March (1991) refers to as 'exploitation' and Spender (1992) calls 'knowledge application'. Applications of this distinction have had far-reaching implications for the principles of knowledge management. Most fundamentally, knowledge generation requires specialization; knowledge application requires integrating a diversity of knowledge (Grant 1996). The challenges of knowledge integration have attracted considerable attention (Berggren et al. 2011), particularly in relation to the design and management of cross-functional teams (Pisano 1994; Huang and Newell 2003).

Knowledge-Based Approaches to Coordination

Interest in knowledge integration (see above) has stimulated interest in the broader challenges of coordination that all organizations face. As a result, the KBV has rekindled interest in an area of organizational analysis that has been woefully neglected since Thompson (1967). Kogut and Zander (1992) established coordination as the primary rationale for the firm: 'organizations are social communities in which individual and social expertise is transferred into economically-useful products and services by the application of a set of higher-order organizing principles' (p. 384). Social identity was foremost among these 'higher organizing principles' (Kogut and Zander 1996).

The KBV identifies two primary coordination mechanisms: routines and rules. Organizational

routines are central vehicles of coordination because of their ability to support complex patterns of interactions between individuals without relying upon rules, directives or even significant verbal communication. Knowledge-based approaches to organizational routines have examined the origins of routines (Narduzzo et al. 2000) and the sources of their variability and versatility (Pentland 1995; Feldman and Pentland 2003).

Rules and other 'impersonal' approaches to coordination have long been recognized as key coordination mechanisms (Van De Ven et al. 1976). The KBV views rules as mechanisms for increasing the efficiency with which knowledge is integrated. Rules are standards that regulate the interactions between individuals, offering a low-cost mechanism for communicating knowledge from one set of specialists to specialists in other areas, and providing 'standardized interfaces' that link organizational modules.

Knowledge-Based Approaches to Designing Organizational Structure

Recognition of the conflicting organizational requirements for knowledge, in particular the need for knowledge integration to be reconciled with specialization to facilitate knowledge creation, has stimulated important advances in our understanding of organizational design. Most important has been work on modularity that has built upon Simon's (1962) original insights concerning the benefits of modular design in promoting innovation and adaptation. Key contributions include the articulation of design principles for modular organizations (Baldwin and Clark 2000), the relationship between product modularity and organizational modularity (Brusoni and Prencipe 2001; Hoetker 2006) and the potential for 'ambidextrous' organizations to reconcile the conflicting organizational requirements of generating and applying knowledge (Benner and Tushman 2003). While most knowledge-based approaches to organizational structure focus on the coordination requirements for knowledge integration, Nickerson and Zenger (2004) focus on the effectiveness of different organizational forms in generating new knowledge. Depending on the complexity and dynamism of the business environment, they

show when hierarchies outperform markets and when consensus-based hierarchies outperform authority-based hierarchies.

The Distribution of Decision-Making Authority

Closely related to the design of organizational structure is the distribution of decision-making authority within an organization. While organizational theory has traditionally viewed the delegation of hierarchical authority as a trade-off between the inefficiencies of centralized decision-making and the agency costs of decentralization, the knowledge-based view emphasizes the merits of co-locating decision authority with the knowledge needed to make those decisions (Jensen and Meckling 1998). Whether this means moving decision rights to the individuals who possess the relevant knowledge, or vice versa, critically depends upon whether the relevant knowledge is tacit or explicit (Grant 2001).

Industry Structure and Inter-firm Relations

From its capacity to analyse and predict firm boundaries, the KBV offers profound insights into industry structure – notably the extent of firm specialization. Studies in the automobile (Takeishi 2002), semiconductor (Macher 2006) and aircraft engine industries (Brusoni et al. 2001) point to the key role of ‘knowledge partitioning’ in determining both the degree of vertical integration within the industry and the relationships between firms. With regard to inter-firm relations – strategic alliances in particular – the KBV offers insight into the efficiency of alliances in developing capabilities, exploiting knowledge complementarities and permitting flexible knowledge integration. Alliances may be viewed as learning devices (Inkpen and Tsang 2007) or as mechanisms for accessing rather than acquiring other firms’ knowledge (Grant and Baden-Fuller 2004).

Outlook for the Future

Knowledge management was one of the most important ‘big ideas’ in management of the

previous two decades (1990–2009) both among managers and management scholars (not to mention an army of consultants). Yet, among both groups, enthusiasm for knowledge management appears to be waning. This is not because knowledge management is a fading fad but because it has increasingly been absorbed within the broader frameworks of management practice and management theory. In the realm of theory, the KBV is no longer a distinctive approach that challenges conventional analysis of the firm and its management. Rather, the concepts and insights of the KBV have become incorporated within the analysis of organization design, organizational capabilities, new product development, leadership, inter-firm networks and alliances, and a number of other areas of management theory.

See Also

- ▶ [Absorptive Capacity](#)
- ▶ [Aspiration Levels and Learning](#)
- ▶ [Capability Development](#)
- ▶ [Knowledge Sourcing](#)
- ▶ [Learning and Adaptation](#)
- ▶ [Management of Technology](#)

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Knowledge Networks

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Abstract

A knowledge network is a group of people, entities or organizations which capture, share existing and/or create new knowledge. This can be done, for example, by collecting relevant documents and summarizing them in order to extract new knowledge, by transferring implicit knowledge into new implicit knowledge, by storytelling or the use of metaphors, or by codifying know-how into documents in order to distribute them electronically. Knowledge networks are influenced by

their environment, such as the managerial system in which they are acting and the surrounding culture; they conduct knowledge processes such as capturing, sharing and creating knowledge; and they are supported by tools such as information and communication tools as well as meeting time and rooms.

Definition Knowledge networks are an organizational form with which to support knowledge-sharing and creation within and across company's boundaries. They are comprised of a group of key experts who are the custodians of a well-defined knowledge domain that is important for the achievement of the network goal and the attainment of business benefits.

Although networks have been analysed in a variety of ways and through different theoretical lenses in organizational studies (Nohria and Eccles 1992; Oliver and Ebers 1998), research has not as yet sufficiently distinguished between the various organizational forms called knowledge networks. Büchel and Raub (2002) use the term 'knowledge network' for a community of practice in which different companies are represented; Newell and Swan (2000) use the term when referring to informal networking between different companies; Brown and Duguid (1991) use it for networks that connect various communities of practice within an organization. Hansen (2001) uses it to describe the connection between project teams in multi-unit companies, whereas Collinson and Gregson (2003) use the term to describe the networks between entrepreneurs and venture capitalists in incubators.

In this article, the term 'knowledge networks' is used to describe the situation when a company or organization purposely sets up a formal network of experts, who are not otherwise hierarchically or structurally connected, to fulfil a specific goal. This goal can be attained by solving problems, discussing best practices or improving processes – thus through the sharing of tacit knowledge and creating new knowledge (Seufert et al. 1999). The network functions in a corporate environment and is influenced by the corporate culture and the management systems in place. It is

supported by tools such as frequent workshop meetings, databases to store documents, or other information technology with which to communicate in-between meetings. Because it is a formal structure, network members are requested by their management to fulfil a defined goal. The formalism of such a network is strongly reminiscent of a project team, but differs from the latter in that it is an ongoing process with an overall goal (Enkel et al. 2007: 10).

Networking is increasingly popular inside as well as outside organizational boundaries. Participation in bilateral or multilateral collaboration can present various advantages and be initiated for different reasons. Hagedoorn and van Kranenburg (2003) point out that the amount of cooperation increased by a factor of ten between 1970 and 1998. Miotti and Sachwald (2003) illustrate the correlation between a company's innovativeness (based on the number of patents) and its level of collaboration. On average, 34% of all companies in Europe work by means of a collaboration (Eurostat 2001), a trend that is led by the electronic, aerospace and pharmaceutical industries (OECD 2002). The propensity to cooperate on R&D projects has increased since the 1980s, but reached a new peak during the 1990s. The advantages of cooperation, especially in innovation networks as a form of multilateral cooperation, are increasing in the open innovation era. As the focus shifted from purely internal R&D activities, the academic community began to emphasize that the firm's boundary should be opened to outside innovation (e.g., Rigby and Zook 2002; Chesbrough 2003; Christensen et al. 2005; Laursen and Salter 2006; Enkel et al. 2009).

Inter-Organizational Knowledge Networks and Open Innovation

Knowledge networks that are aimed at innovation are of special interest to the open innovation approach. Duschek (2002) defines innovation networks as a form of economic cooperation between innovation activities in which legally independent, but financially dependent, organizations (in terms of their innovation-related business

relationships) link the market and hierarchies' coordination potentials in such a way that relatively stable social relations are established. The latter pursue the sourcing, development and commercialization of innovative products or processes through which (lasting) competitive advantages is achieved in a cooperative manner. Furthermore, innovation networks can be used to access additional technology and market knowledge, to co-develop standards, to create a minimum (critical) size for a project, and to share innovation costs and risks (Boehme 1986; Hagedoorn and Schakenraad 1989; Siebert 1999). Networks enhance knowledge sharing and innovation within and across companies (Tsai and Ghoshal 1998; Tsai 2001; Kilduff and Tsai 2003; Ritter and Gemünden 2003; Inkpen and Tsang 2005). The literature has already recognized the importance of inter-firm networks' structure, outcomes and variables linked to competitive success.

This networking imperative in many of the high-tech industries is described by Saint-Paul (2003: 3) with reference to an example provided by Baumol (1992): 'In an industry with, say, ten firms similar in output and investment in R&D, each member of a nine-firm technology cartel [or network] can expect to obtain immediate access to nine times the number of innovations that the remaining enterprise can anticipate on the average.' Once the thought of inter-organizational innovation collaboration has entered an industry, all those who do not participate will face serious competitive disadvantages. Even worse, Koschatzky (2001: 6) found that 'firms which do not cooperate and which do not exchange knowledge reduce their knowledge base on a long-term basis and lose the ability to enter into exchange relations with other firms and organizations'. In short, they will lose one of the key assets in the networked economy: their networkability or network competence.

Intra-Organizational Knowledge Networks

Besides this inter-organizational view on networking, knowledge networks that connect experts within the company across units are

highly valuable for the knowledge management and innovation activities of a company (Enkel 2005). Knowledge networks as an organizational structure within companies can transfer tacit knowledge efficiently, because experts can come together and share their tacit knowledge while solving crucial corporate problems, thus creating real value with actionable knowledge (Seufert et al. 1999; Hansen and Haas 2001). The downside is that knowledge networks need to be integrated into a system if they are to unfold their full corporate potential and return the investment made (Enkel 2005). While focusing on the structure and potential of single organizational forms, research has largely forgotten to examine the systems behind them – the systems that could be crucial for success (Prahalad and Doz 1987; Bartlett and Ghoshal 1989; Hedlund 1994).

Different Purposes: Innovation, Efficiency, Risk Reduction, Different Layers, Different Types

Back et al. (2007) describe three main business goals of knowledge networks: innovation, risk reduction and efficiency. According to the goal that the network chooses to prioritize, experts are selected and their working environment or management support and the knowledge work process within the network are set up (Back et al. 2005). According to Seufert et al. (1999: 185–186), the initial framework of knowledge networks consists of the following: actors as individuals, groups, organizations; relationships between actors, which can be categorized by form, content and intensity; the resources that may be used by actors to network with other individuals, groups or organizations; and organizational properties, including structural and cultural dimensions such as control mechanisms, standard operating procedures, norms and values, and communication patterns. Besides the business goal, the operative goal of the network is determine its type. Seufert et al. (1999) describe four different knowledge network types (from explicit to new explicit, from explicit to new implicit, from implicit to new implicit and from implicit to new explicit

knowledge), which are based on ► [Ikujiro Nonaka](#) and Takeuchi's basic work of the four different transformation processes to create new knowledge (Nonaka and Takeuchi 1995: 89).

Network Competence and Supportive Factors

Network competence is defined by Ritter and Gemünden (2003: 747f.) as the ability to execute the cross-relational tasks of planning, organizing, staffing and controlling network relationships. In order to ensure this networkability, Österle et al. (2001: 83) advise companies to adapt the design of their organizational structure (virtualization, modularization, distributed responsibilities (p. 84)) and the design of people's roles and company culture (openness, trust, autonomy, communicative competence, as well as establishing and maintaining personal networks). Ritter and Gemünden (2003: 753) also emphasize the development of an open culture as the main prerequisite and influencing factor regarding network competence. Enkel (2010) describes individual and organizational attributes based on a network study with 200 members from 52 European institutions in 31 countries. Not all members of the network profit equally but their personal openness and their possibility of contributing influence the value provided by the network in terms of an increase in innovativeness, a reduction in costs and a better fulfilment of tasks in the home organization.

See Also

- [Inter-Organizational Learning](#)
- [New Organizational Forms](#)
- [Nonaka, Ikujiro \(Born 1935\)](#)

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Knowledge Sourcing

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Abstract

Knowledge sourcing is a central activity of organizational learning and has important implications for firm innovation, competitiveness, and survival. We discuss the motivation for knowledge sourcing, the challenges associated with it, and the mechanisms that facilitate it. We suggest that knowledge sourcing is conducted at various levels of the organization and can involve multiple organizational mechanisms. Finally, we highlight its importance to research in international business.

Definition Knowledge sourcing is the process of identifying potentially useful knowledge that exists external to the unit or organization and absorbing this knowledge with the intention of applying it to useful ends. Though knowledge sourcing is often deliberate and directed toward innovative or productive activities, it can also encompass a wide range of actions that result in the informal or indirect absorption of knowledge. Knowledge sourcing is a multi-level construct, which can take place at various levels (e.g. individuals, groups, organizations) and is facilitated by a range of mechanisms (e.g. joint research, social relationships, mobility, alliances, and acquisitions).

Introduction and Motivation

For firms competing in modern economies, continuous access to new information, know-how, and ideas is essential to success and survival, and so knowledge has become the most strategic important resource for firms (Grant 1996). However, even large and highly innovative organizations cannot exclusively rely on their internal knowledge reservoirs. In dynamic and continuously evolving environments, useful knowledge is produced continuously by numerous entities, often, spread across industries and countries. Hence, it is imperative that organizations recognize the importance of external knowledge, and actively engage in the process of identification and acquisition of potentially useful knowledge and develop capabilities and mechanisms for its absorption (Cassiman and Veugelers 2006; Laursen and Salter 2006). Based on the significance of the concept of knowledge sourcing, it is relevant to research in innovation, collaboration, network absorptive capacity, organizational learning, and international business and open innovation.

The Knowledge Sourcing Challenge

Organizational Limitations. Though knowledge sourcing is important to the success of organizations in dynamic environments, acquiring and utilizing external knowledge is not easy. Many organizations are structured to develop and leverage their own knowledge rather than identify and absorb external knowledge effectively. Previous research suggests that organizations tend to be locally bounded in their search for new ideas and knowledge. Organizations are heavily influenced by their past practices and current capabilities in their search for new knowledge (Nelson and Winter 1982; Rosenkopf and Almeida 2003; Stuart and Podolny 1996). This characteristic of organizations makes it challenging for them to look to more distant or non-local inputs even as they try to acquire new and useful knowledge. This search challenge is amplified by the “not-invented-here” syndrome which leads groups and organizations to reject any knowledge not created internally

(Katz and Allen 1982). Hence, knowledge sourcing that includes learning from the experience of others requires the development of specific mechanisms of external knowledge sourcing and the building of capabilities that permit the exploitation of this acquired knowledge.

Characteristics of Knowledge. Another challenge in sourcing knowledge is based in the distinction between tacit and explicit knowledge. The fact that explicit knowledge is codifiable, makes it relatively easy to transfer and to exchange through market mechanisms. Thus, the possession or utilization of explicit knowledge might not be a key differentiator between organizations. On the other hand tacit knowledge is intuitive, unarticulated and revealed through its use (Becerra et al. 2008; Grant 1996). This makes the sourcing of tacit knowledge both difficult and costly and it, therefore, can be a differentiator between organizations and a source of sustained competitive advantage. There are other characteristics of knowledge that make it difficult to identify and acquire and previous research has highlighted these dimensions and their potential impact on knowledge flows and transfer. For example, Simonin (1999), relying strongly on the work of Reed and DeFillippi (1990), combines a number of these attributes and argues that knowledge ambiguity emerges from the simultaneous effects of tacitness, specificity and complexity. Given these characteristics of useful knowledge that impede its transfer, organizations need to deliberately develop the mechanisms to source knowledge. Similarly, potentially useful knowledge often has an emergent quality or is complex (i.e. it is drawn from multiple sources or fields), and may be therefore difficult to harness (Contractor and Ra 2002; Hohberger 2014).

Mechanisms of Knowledge Sourcing

Organizations use a variety of mechanisms – both formal and informal, or individual and organizational – to source external knowledge. For example, a large body of literature discusses knowledge sourcing as a main motivation for

alliances and joint ventures and how important they are in the process of external knowledge sourcing, particularly when this knowledge is distant and new to the firm (Grant and Baden-Fuller 1996; Hamel 1991; Rosenkopf and Almeida 2003). Acknowledging the important role of alliances in facilitating inter-firm knowledge flows, studies on alliances in high technology industries have suggested that the locus of learning and invention has moved from the firm to a *network* of external relationships (Liebeskind et al. 1996; Phelps 2010; Powell et al. 1996). Similarly, mergers and acquisitions are frequently conducted to access the knowledge of the acquired firms (Ahuja and Katila 2001; Hagedoorn and Duysters 2002; Phene et al. 2012; Vermeulen and Barkema 2001).

Though many studies have highlighted the importance of organizational mechanisms in facilitating the sourcing of knowledge, others have emphasized the important role of individual mechanisms in sourcing knowledge. A major area of much research has been on the role of mobility of engineers, scientists and other experts in moving knowledge across organizations. Several studies have shown that hiring and mobility of employees can be a successful mechanism for sourcing knowledge across firms and universities, especially in high-technology industries (Palomeras and Melero 2010; Rosenkopf and Almeida 2003; Song et al. 2003). In other work at the level of the individual, Almeida et al. (2011) show that individual, and often informal, collaborations between researchers in different organizations – usually firms and universities – positively influences innovation outcomes. Hohberger et al. (2015) looked at firms in the biotechnology industry that engage in both alliances (formal) and individual (less formal) collaborations. They show that the type of collaborative mode influences the direction of future firm innovation with respect to the emerging center of innovation in the industry. They suggest that individual collaborations are particularly suitable to break away from path dependent innovation directions.

While some previous studies focus on the mechanisms of external knowledge sourcing,

other studies have focused on the challenges and approaches to sourcing knowledge from other units within the organization. For example, several studies discuss how internal organizational collaborations and networks provide access to knowledge developed by other units within an organization and influence innovation outcomes (Carnabuci and Operti 2013; Paruchuri 2010; Tsai 2001). The focus on the use of external and internal knowledge flows for innovation is related to the concept of open innovation (Chesbrough et al. 2006; Chesbrough 2006). In this vein, several studies discuss how various knowledge sourcing mechanisms impact open innovation (Laursen and Salter 2006; Love et al. 2014). Other research has also explored the complementarity of inbound and outbound knowledge flows (Cassiman and Valentini 2015) and, more recently, the importance of external knowledge for open service innovation (Mina et al. 2014; Randhawa et al. 2016). Multiple studies show that important innovations are often inspired by user-generated knowledge inputs and even directly developed and improved by users (De Jong and von Hippel 2009; Van der Boor et al. 2014; Von Hippel 1988). Thus, this research suggests that users and user communities are one of the key sources of knowledge in the innovation process.

International Knowledge Sourcing

One of the reasons for foreign direct investment, and indeed the very existence of the multinational, is associated with the idea that a firm's knowledge assets are valuable and that exploiting firm knowledge internationally through external mechanisms is difficult (Buckley and Casson 1976; Kogut and Zander 1993; Teece 1977). Multinational firms are increasingly perceived as an internationally integrated network of units in which knowledge is created in multiple locations across the globe and transferred between units (Ghoshal and Bartlett 1990). Accordingly, various studies have been focused on international knowledge sourcing of firms – these include studies which have investigated location choices and the advantages of the knowledge sourcing of foreign-owned

subsidiaries (Almeida et al. 2002; Chung and Alcácer 2002; Florida 1997). For example Almeida (1996) found that U.S. subsidiaries of foreign firms source knowledge from the host country. Florida (1997) showed that for a diverse sample of foreign research facilities in the United States, accessing new technology is more important than adapting existing technologies. Chung and Alcácer (2002) also suggest that location is an important factor for knowledge sourcing.

The success of international knowledge sourcing depends on several factors including the embeddedness of the subsidiary within the host country, the development of localized capabilities, and the relationships of the organizational units with each other (Almeida and Phene 2004; Andersson et al. 2002; Song et al. 2011). Andersson et al. (2002) have argued that embeddedness in the host country can influence not only the product performance of the local subsidiary but also other subsidiaries in the firm network. Almeida and Phene (2004) show that, for a sample of foreign subsidiaries of U.S. semiconductor firms, firm capabilities, technological diversity within the host country, and linkages with other host country entities have a positive impact on innovation. Similarly, Song et al. (2011) demonstrated that in a sample of overseas R&D labs of Japanese multinationals knowledge flows from the host country are positively related to capabilities of the subsidiary but also their external embeddedness in host locations. Hence, in the international context, location and embeddedness appear to be important factors related to knowledge sourcing. Finally, studies have focused on international acquisitions (Björkman et al. 2007; Sarala and Vaara 2010) and international alliances (Hohberger 2014; Lane et al. 2001; Nielsen and Nielsen 2009; Tsang 2002) as being critical to knowledge sourcing.

Concluding Thoughts

Research has suggested that knowledge sourcing is a critical activity for many organizations. Yet, due to the nature of organizations and the characteristics of knowledge, there are

challenges associated with being able to source knowledge effectively. Organizations should look to the development of both organizational and individual level mechanisms, both domestically and internationally to accomplish their knowledge needs, and facilitate their success in a knowledge-based economy.

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Knowledge Spillovers

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Abstract

Knowledge spillovers enable an actor to access knowledge generated by another without full (or perhaps any) compensation. Knowledge spillovers are important because they are central to economic growth. In addition, they are strategically important to knowledge-intensive firms. Recent improvements in measurement

have enabled scholars to report three robust empirical findings about knowledge spillovers: (1) they are geographically localized; (2) they are influenced by inventor mobility; and (3) social networks enable them to overcome geographic distance.

What Is a Knowledge Spillover?

Knowledge is often non-excludable and non-rival. Thus, knowledge produced by one actor is often utilized by another without full compensation. Scholars refer to this positive externality as a knowledge spillover. Strategy research often uses the term knowledge “flow” rather than “spillover” because the researcher is not certain whether the user compensated the creator and thus whether the transfer is actually unpriced (an externality).

Why Are Knowledge Spillovers Important?

Knowledge spillovers are central to strategy as well as economic growth. Firms strategically try to limit spillovers generated by their organization and to exploit spillovers generated by others through mechanisms such as recruiting (Singh and Agrawal 2011), co-location (Almeida and Kogut 1999), and open science (Cockburn and Henderson 1998). With respect to growth, when firms conduct R&D with a profit-maximizing objective, if they generate spillovers, then they unintentionally contribute to the overall stock of knowledge. The returns to human capital and R&D increase with the stock of knowledge, and thus knowledge spillovers enhance growth because they increase returns to investments in human capital and R&D (Romer 1990).

How Are Knowledge Spillovers Measured?

Although Krugman (1991) acknowledges the importance of knowledge spillovers in explaining industrial agglomeration, he argues that compared

to labor pooling and intermediate goods supply, knowledge flows “are invisible; they leave no paper trail by which they may be measured and tracked” (p. 53). Jaffe et al. (1993, hereafter JTH) responded that “knowledge flows do sometimes leave a paper trail, in the form of citations in patents” (p. 578). In so doing, JTH ushered in a period of accelerated empirical research on knowledge flows, largely based on citation data analysis.

Researchers studying knowledge flow patterns have since made wide use of citations between patents (Anselin et al. 1997; Jaffe and Trajtenberg 2002; Duguet and MacGarvie 2005; Thompson 2006), between scientific articles (summarized in Cronin and Atkins 2000) as well as between patents and scientific articles (Narin et al. 1997; Meyer 2000; Tijssen 2001; Sorenson and Fleming 2004; Branstetter and Ogura 2005; Breschi and Catalini 2010).

The JTH methodology relies on two main assumptions: (1) citations are a reasonable proxy for knowledge flows, and (2) matched “control patents” provide an appropriate baseline for the underlying distribution of inventiveness across geographic space. Both assumptions have been called into question.

Jaffe et al. (2002) interview inventors on a sample of patents and conclude that the likelihood of a knowledge spillover between inventors at risk is indeed greater if there is a patent citation. However, “a large fraction of citations, perhaps something like one half, do not correspond to any apparent spillover” (p. 400). About 40% of all citations are added by the patent examiner, not the inventor (Alcacer and Gittelman 2006; Sampat 2010), introducing not only measurement error but also bias. In particular, Alcacer et al. (2009) find that larger firms and non-US firms have higher shares of examiner-added citations, which are less likely to be localized (Thompson 2006). This may bias a variety of empirical studies because industries and cities vary in their market structure and industries also differ in their distribution across nations. Moreover, inventor citations are likely to be a selected sample, since applicants may disproportionately disclose cites that support their claims (Hedge and Sampat

2009) and withhold those that would limit the scope of weaker, less defensible patents (Lampe 2012).

Addressing the second assumption, Thompson and Fox-Kean (2005) call into question the JTH method by demonstrating that the main localization finding is sensitive to the matching procedure. While recognizing the limitations of their method, Henderson et al. (2005) highlight the virtues of their approach and cast doubt upon TFK’s critique by noting that it reduces the sample size in a non-random way. Ultimately, both sides agree that empirical research on knowledge flows will benefit from methodological improvements.

Partly in response to these critiques, a number of recent empirical studies combine some version of matching with a difference-in-differences (DD) estimation approach so as to reduce the scope of bias from levels to trends. For example, in their study of knowledge flows due to mobility, Singh and Agrawal (2011) show that a cross-sectional analysis of citation rates exaggerates the increase in knowledge flows after an inventor moves by over 200% relative to the DD estimates.

Finally, although not as widely used as patent and paper citations, other types of data have been introduced to study knowledge flow patterns. For example, Azoulay et al. (2009) and Azoulay et al. (2011) use Medical Subject Headings keywords (MESH), and Murray (2002) and Murray and Stern (2007) use patent-paper pairs.

Key Empirical Findings Regarding the Determinants of Knowledge Spillover Patterns

Geographic Localization

Perhaps the most consistent empirical finding with respect to knowledge spillovers concerns geographic localization. The study of this topic is intertwined with the broader literature on the diffusion of innovations (Rogers 1962) and in particular early models of learning and “epidemic diffusion” through word of mouth. At the same time, geography interacts with heterogeneous benefits from adoption and individual choice (Griliches 1957). By focusing on differences in

profitability for hybrid corn among local farmers, Griliches explains the observed geographic patterns and rates of diffusion of the new corn for different US states.

Jaffe (1989) adopts Griliches' (1979) knowledge production function and shows that, at the regional level, high levels of university research correspond to high levels of corporate patenting. The correlation between local R&D inputs and outputs rapidly became the primary empirical regularity in support of localized knowledge spillovers and encouraged a stream of additional studies (Acs et al. 1992; Audretsch and Feldman 1996). At the same time, Krugman's measurement critique remained essentially unaddressed until JTH started using information on the geographic patterns of patent citations to estimate the co-location premium (i.e., the extent to which patents are more likely, relative to a set of comparable control patents, to cite prior inventions from the same geographic area).

The relationship between geography and knowledge flows is complex since it is influenced by regional structure, among other factors. For example, Agrawal and Cockburn (2003) report that the presence of a large R&D intensive firm (an anchor tenant) may enhance the successful diffusion and implementation of upstream academic research into downstream corporate R&D (vertical spillovers).

While the empirical evidence consistently points in the direction of geography constraining knowledge flows, Blit (2011) shows that firms may be able to overcome distance and access cutting-edge knowledge by establishing a satellite presence in the region of interest.

At a more micro-level, Catalini (2012) uses exogenous shocks to geographic proximity between scientists to measure how co-location affects not only the overall flow of knowledge but also the type of inventive activity that localized flows enable.

Inventor Mobility

Knowledge seems to "follow" the individuals who generate it. Almeida and Kogut (1999) study the localization of highly cited patents and find that institutions that favor intra-regional labor

mobility play an important role in the diffusion of knowledge.

Inventor mobility affects the proximity between inventors. This is important because proximity may facilitate knowledge flows for at least three reasons: (1) lower communication costs, (2) serendipitous interactions, and (3) a higher chance of any two individuals forming a social tie. To identify the effect of the latter, Agrawal et al. (2006) track mobile inventors and examine the citations received by the inventions they patent after they move. The authors report evidence of a disproportionately high level of knowledge flows back to their prior location. The authors interpret these results as evidence of the importance of social ties in facilitating knowledge flows because individuals from the focal inventor's prior location no longer benefit from lower communication costs or serendipitous interactions.

Oettl and Agrawal (2008) look at the effect of inventor mobility in an international context, finding evidence of both national learning by immigration (i.e., knowledge spillovers in the country hiring the inventor) as well as learning from the diaspora (i.e., flows of knowledge back to the original country of the inventor).

Firms are able to learn about technologically distant realms by hiring away engineers from others (Song et al. 2003), but as Singh and Agrawal (2011) highlight, most of the knowledge flows are actually centered on the new hires' immediate circle of collaborators.

Social Networks

The heavy focus on geography has recently begun to shift to research on social ties as evidence mounts that geographic proximity facilitates the formation of such ties, which seem to be the real channels that sustain knowledge diffusion. In other words, geographic proximity is a proxy for social proximity.

Breschi and Lissoni (2004) and Sing (2005) directly compare the relative effect of collaborative ties (co-inventorship) and geographical distance (same region) on knowledge flows. Although the two studies use different datasets, their results are consistent: the probability of a

knowledge flow decreases with distance on the social graph. Once social distance is accounted for, the role of geography is greatly reduced although still statistically significant.

Agrawal et al. (2008) explore whether geographic and social proximity are complements or substitutes. Using co-ethnicity as a proxy for social proximity, they show that co-location and co-ethnicity substitute for each other. They observe that the highest returns to co-location are for socially distant inventors.

Institutions

Institutional norms and incentives may influence the flow of knowledge. Open science, in particular the reward system based on priority and disclosure, generally ensures a high degree of knowledge diffusion (Dasgupta and David 1994). In fact, publication can act as a powerful diffusion mechanism that goes beyond the academic community. Sorenson and Fleming (2004) observe that patents citing published materials tend to receive citations from more geographically and technologically distant areas. Furthermore, institutions that certify the quality and reliability of knowledge have a strong impact on its diffusion (Furman and Stern 2011).

On the other hand, evidence shows that strong intellectual property rights slowdown knowledge spillovers and incremental innovation, at least in some fields of science (Murray et al. 2009; Williams 2013). Scholars commonly refer to this as the “anti-commons” effect (Heller and Eisenberg 1998).

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Knowledge-Based Strategy

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Abstract

Two simple but fundamental questions set knowledge-based strategy apart from other schools of thought in strategy. The first is ‘Why do firms differ?’ Firms differ not just because they have different activity systems

or different resources, but because human beings running the firms envision different futures. The second is ‘Why do firms exist?’ Firms exist not only to maximize shareholder value, but also to improve the human condition and improve the future for their customers, employees, suppliers and other stakeholders as well as for society at large, including the environment.

Definition Knowledge-based strategy is a human, dynamic and social approach to strategy. It is formulated and executed by a subjective, interactive process driven by human beings, based on their beliefs as well as their judgements and actions taken within particular contexts with the common good in mind. It has knowledge creation theory and practical wisdom as its foundation.

Knowledge-based strategy (KBS) differs from other schools of thought in strategy in its singular focus on knowledge as the driver of strategy. Knowledge is defined by Nonaka and Takeuchi as a dynamic, human and social process of justifying personal belief towards the truth. Our definition of knowledge differs from the traditional Greek definition of knowledge as ‘justified true belief’, which suggests that knowledge is something that is objective, absolute and context-free. According to the knowledge school of thinking, strategy is created and executed by a subjective, interactive process driven by human beings based on their beliefs and ‘here-and-now’ judgements and actions taken within particular contexts.

The answer to the question ‘Why do firms differ?’ also sets KBS apart from other schools of thought. Firms differ not just because they have different activity systems or different resources, but because they envision different futures. To be more precise, they differ because the people running the firm have their own visions of the firm’s future, which are different from those of other firms. In this sense, strategy is about creating the future in the KBS view.

This view echoes what Peter Drucker (1993) pointed out, namely that we cannot predict the future, but we can *make* the future. Making the future requires continuous innovation. The

essential feature of innovation, according to Schumpeter (1912), is that it is a new combination which disturbs the existing static equilibrium. To use the words of Hayek (1978), market competition is a discovery process of new knowledge of the particular circumstances of time and space, where equilibrium does not exist. Following such an Austrian school of thinking, KBS recognizes that an important feature of strategy is to interpret the current situation and continuously create the future within the social context.

Knowledge creation fuels innovation. This was the central message of *The Knowledge-Creating Company* (Nonaka and Takeuchi 1995), the subtitle of which was *How Japanese Companies Create the Dynamics of Innovation*. Prior to the publication of this book, there was very little understanding on how firms created new knowledge, other than through spending more money on R&D. This book presented a theory on how new knowledge is created through a process known as SECI (socialization, externalization, combination, internalization: see Fig. 1).

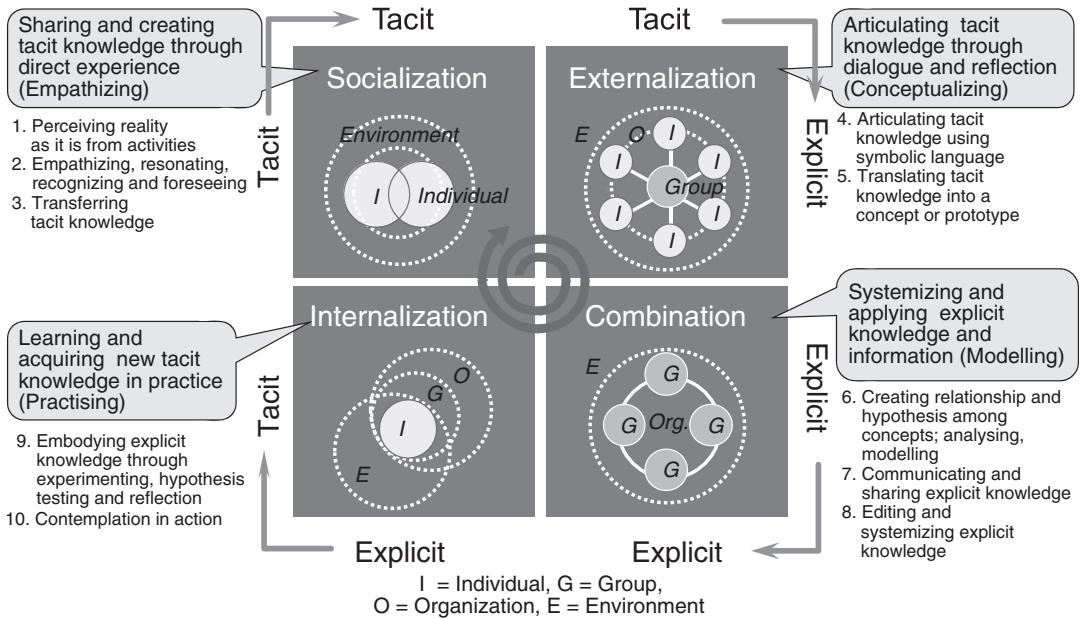
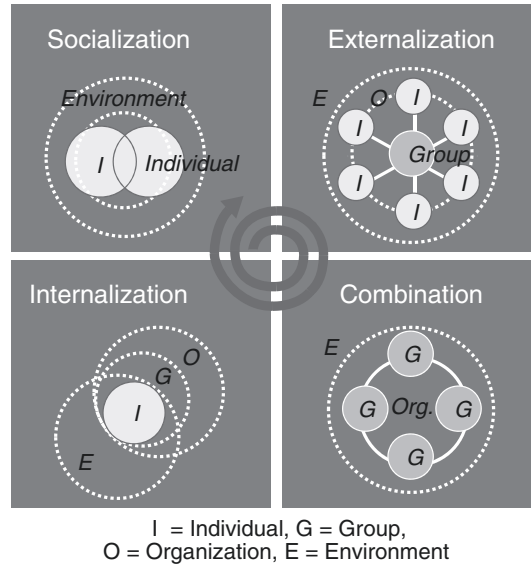
Three key words used in the definition of knowledge – human, dynamic and social – help us to understand the essence of knowledge-based strategy. Each will be discussed below under the following subtitles:

1. Humans at the centre of strategy
2. Strategy as a dynamic process
3. Social agenda of strategy.

Humans at the Centre of Strategy

The most prominent feature of knowledge, compared with physical resources and information, is that it is born out of human interaction. Knowledge is created by people in their interactions with each other and the environment. Hence, to understand knowledge, we must first understand the human being and the interactive process from which knowledge emerges.

Our view of knowledge is based on Michael Polanyi’s concept of knowledge (Polanyi 1958). Polanyi argues that human beings obtain new knowledge through their individual, active and

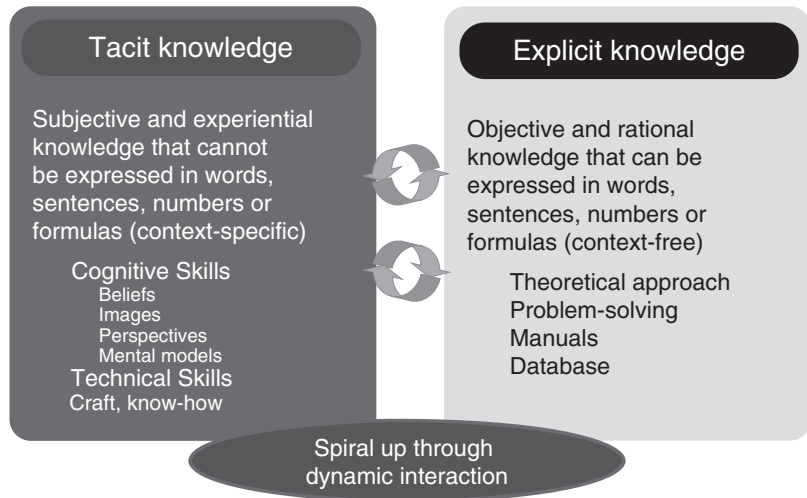


Knowledge-Based Strategy, Fig. 1 How new knowledge is created through a process known as SECI (socialization, externalization, combination, internalization)

subjective shaping and integration of experience (which he calls tacit knowing). The power of tacit knowing is exemplified by a metaphor – when on a bicycle, we can instantly synthesize the handlebars, the force on the pedals, the angle of the body and the bicycle, muscle response and the view in front.

The dominant theories of the firm, however, have tended to neglect human subjectivity. This neglect of the human factor has resulted in management theories that treat human beings as another resource, like land and capital. They fail to account for the significance of the human instinct and emotion as well as context in

Knowledge-Based Strategy, Fig. 2 An explanation of tacit and explicit knowledge



the management process. According to KBS thinking, good strategies are born from tacit knowledge.

In the SECI model, the two dimensions of knowledge – tacit and explicit – interact and interchange with each other through the creative activities of human beings (see Fig. 2 for an explanation of tacit and explicit knowledge). Knowledge, which resides in an individual, is amplified into organizational knowledge through this interactive process. Organizational knowledge is created through the synthesis of different views of different people in an organization.

Top management, middle managers and front-line employees all play a part in creating new knowledge. Top management people create the vision or dream and are constantly in search of the ‘ideal’. Front-line employees are immersed in the day-to-day details of ‘reality’. It is the middle managers who serve as the bridge between the visionary ideals of the top and the often chaotic reality of those in the front line of business, and solve the contradiction through a process called ‘middle-up-down’ management.

Knowledge is created in a context known as ‘*ba*’, which is translated as place, space or field. *Ba* refers to the context in which human beings interact with each other. Participants in a *ba* share their subjective views, build ‘here and now’ relationships, and try to create new meaning. They see

themselves in relation to others and try to understand each other’s views and values intersubjectively. In essence, *ba* is a shared context-in-motion, with members coming and going, relationships changing and contexts shifting over time. *Ba* can be both formal and informal. A formal *ba* may take the form of face-to-face settings (e.g., retreats, conventions, project teams etc.) as well as virtual settings (e.g., video conferences, social network systems etc.). An informal *ba* may take place at a pub, where strangers talk casually about their immediate concerns or problems, sometimes triggering insights or solutions.

To create new knowledge, it is necessary to connect various *ba* on a constant basis and link the knowledge created in them, transcending boundaries. In this respect, organization cannot be separated from strategy; they are linked to each other. Strategy must be embedded in the organization, according to KBS thinking.

Strategy as a Dynamic Process

Individuals interact with each other to transcend their boundaries and realize their vision of the future. As a result, they change themselves and others, the organization and the environment. KBS is characterized by the active creation of change rather than the passive reaction to change.

It is based on the belief that firms can shape their environment while they are being shaped by it.

The future to be created by KBS will not be a mere extension of the present. Discontinuity will be the only constant. Everything will be in continuous ‘flow’, including industry boundaries and resource requirements. In such a world, we need managers at all levels to make judgements knowing that everything is contextual, make decisions knowing that everything is changing and take actions knowing that everything depends on doing so in a timely fashion.

Using the ‘rugby’ metaphor to describe this agile world, new product development is a case in point. As in rugby, the ball gets passed around within the team as it moves up and down the field (*ba*) as a unit. The ball gets kicked around when the players pose for the ‘scrum’. The ball does not move in any defined or structured manner; ball movement is unpredictable and the players have to make judgements on the spot (‘here and now’) (Takeuchi and Nonaka 1986).

In addition to being agile, KBS assumes that the real world is filled with contradictions, opposites and paradoxes. KBS synthesizes them through the use of dialectic thinking derived from Hegel (1969). This dynamic process is composed of three stages of development: a thesis, which gives rise to its reaction, an antithesis, which contradicts or negates the thesis, and the tension between the two, which is resolved by means of a synthesis. Over time, however, synthesis eventually becomes the thesis, which forces another round of thesis-antithesis-synthesis resolution. This continuous process can be visualized as a spiral.

The concept of a ‘spiral’ is used to depict the dynamic nature of KBS at different levels. At the epistemological level, new knowledge is created by a dynamic interaction of tacit and explicit knowledge through the SECI spiral. At the ontological level, knowledge developed at the individual level is transformed into knowledge at the group, organizational and community levels. The truly dynamic nature of KBS can be depicted as the synthesis of these two spirals over time, in which the interaction between tacit and explicit knowledge is amplified as it moves up the ontological level. This dynamic process fuels innovation.

Social Agenda of Strategy

A firm creates value to society by asking and answering on a daily operational basis the question, ‘Why do we exist?’ The answer to this question sets KBS apart from other schools of thought. According to KBS thinking, firms exist to improve the human condition and to create a better future. A firm creates a better future not only by maximizing profit for shareholders, but also by serving the common good of its employees, its customers, its suppliers and other stakeholders as well as the society at large, including the environment.

According to the KBS view, the firm has to have its own future-building vision on how it would like to be in the future and how it would like to change society in the future. This vision should not simply be an extension of the present, but be closer to a leap towards fulfilling a dream or an ideal.

A vision holds meaning when people in top management put their heart and soul into creating one that is unique to the firm; also, when they repeatedly share their vision with people inside and outside the firm. Inside the firm, the use of a formal system of apprenticeship is useful in sharing their experiences, contexts and time with employees at all levels. The use of stories and metaphors is also helpful in expressing the essence of that vision that is difficult to articulate.

A firm also creates value for society by asking and answering on a daily basis another question, ‘What is good?’ We draw on Aristotle’s concept of *phronesis* to show how values, aesthetics and ethics are an integral part of strategy (Aristotle 2002). *Phronesis*, which is commonly known as practical wisdom or prudence, can be interpreted as the higher-order tacit knowledge acquired from practical experience that enables humans to make prudent judgements and take timely action appropriate to a particular context and situation, guided by values, aesthetics and ethics. Aristotle identified two other forms of knowledge: *episteme* and *techne*. In contrast to *episteme* (universally valid, scientific knowledge or ‘know-why’) and to *techne* (skilled-based technical ‘know-how’), *phronesis* is ‘know-what-should-be-done’ for the common good (Nonaka and Takeuchi 2011).

The embracing of *phronesis* into strategy allows the firm to create another spiral at the teleological (purpose) level. *Phronesis* spirals up the synthesis of tacit and explicit knowledge by guiding the firm to do what is good, what is right and what is just for the firm and for society. Doing so elevates strategy from something objective, analytical and profit-driven to something akin to a calling from on high.

Knowledge-based strategy complements the traditional schools of strategy by injecting new thinking along the following lines: (a) defining what the firm does (business domain) in terms of knowledge, (b) putting humans at the centre of strategy, (c) embedding strategy to organization, (d) treating strategy as a dynamic process, and (e) focusing on the common good that strategy brings about, namely to create a better future for the firm and society.

See Also

- ▶ [Knowledge Articulation](#)
- ▶ [Knowledge Networks](#)

- ▶ [Knowledge Sourcing](#)
- ▶ [Knowledge Spillovers](#)

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