

Chapter 2

Review of the Literature

2.1 Traditional Approaches to Problem-Solving

2.1.1 External Sources

Drawing on external sources (i.e., individuals, firms, suppliers or universities) to innovate has been the subject of a rich body of early research. Researchers considered the role of innovation created outside the firm by individuals. Empirical studies show that many users (up to 40 %) engage in developing or modifying products for many reasons. Sometimes, users may innovate if they want something that is not available on the market or they may value the process of innovating because of the enjoyment or learning that it brings them. Recent studies find evidence that some users, “entrepreneurial users” have also commercialized their own innovations in a wide range of industries (i.e., medical devices, sporting equipment, stereo-components, new media) (Shah and Tripsas 2012). In some cases, the firm is explicitly present and collaborating in organizing or producing the innovation—with its customers or other partners—for its own financial benefit, as with co-creation (Prahalad and Ramaswamy 2004). In other cases, the firm is explicitly absent. This innovation is often referred to as user-driven innovation (von Hippel 2007). The largest category of such research emphasizes the creation of innovations by users who utilize their own scarce knowledge to provide utility for their own benefit (Bogers and Bastian 2010), which may be harnessed for the benefit of firms (Morrison and von Hippel 2000), or in direct competition with firms (Baldwin and von Hippel 2011). The importance of user innovations spans a variety of industries. While companies operating in a resource- and expertise-intensive industry can only rely on highly skilled professionals working for a research lab or a university to innovate (Terwiesch and Ulrich 2009), most other industries can benefit from user innovations. Initially, scholars found evidence of users modifying or creating physical goods, mostly in manufacturing (von Hippel 1986). More recent research finds user innovation to be also significant in and across industries services (Oliveira and von Hippel 2011). Among user innovators

the concept of *lead users* remains a significant source of new product development. Lead users are people or firms that have advanced needs for products or services that are not being met by other companies. They are ahead of the majority of users in their populations with respect to an important market trend and have either to tolerate their unmet needs or innovate themselves to address them. They provide consequently the basis for products manufacturers could commercialize (von Hippel 1986, 2007).

Still another approach to sense innovation opportunities and solve a variety of organizational challenges can be found in *external markets*.

2.1.2 Internal Sources

It seems obvious that companies should use the knowledge possessed by their employees for solving organizational challenges, but few organizations actually do so (van Dijk and van den Ende 2002). Research shows that employees with promising ideas often lack the motivation or a channel to communicate them (Burt 2004). Many firms, however, recognize that innovation isn't about the Chief Innovation Officer or even the CEO mandating what milestones R&D or Engineering must pursue or achieve. Effective innovation begins with breaking down silos that separate departments, divisions or teams—and encouraging, even welcoming participation from across the organization. Conventional participative techniques to problem-solving and innovation generation consist in running brainstorming sessions, using suggestion boxes or workshops where a diverse group of participants generate a large number of opportunities (Osborn 1963). The proliferation of internet-based technologies suggests new methods for accessing distributed knowledge as they enable the connection of a vast number of participants. One of these emerging methods is to rely on market-mechanisms. Markets provide a platform for aggregating dispersed information as they leverage the collective wisdom of the organization.

2.2 Markets as a Key Mechanism for Problem-Solving

The market system has proved throughout history as a remarkably effective means for promoting efficient, cooperative interactions among entities with diverse knowledge, skills, and goals. Despite the long history of markets as an effective means of exchange, bringing market-based mechanisms inside a particular firm has not gained momentum until recently. Fueled by the promise of improving forecasting, decision-making, risk management, innovation and knowledge management, knowledge markets have been adopted recently in a wide range of firms.

Large organizations that have a wealth of information and talent often have difficulty accessing it. The larger and more segmented the company, the harder it

gets to match people to problems. Managing information flows laterally and vertically, across specialties, locations and countries, has proven particularly challenging. Managing the growing demands for expertise in diverse contexts requires decentralizing information exchange by providing access to diverse sources, not just the central repository. Meeting unanticipated needs also implies providing access to untapped knowledge. Markets provide the most common form of such decentralization.

Consider the following Market benefits:

- Enabling buyers and sellers to find each other
- Allowing individuals to make the kind of consumption choices they prefer
- Establishing accurate prices based on supply and demand
- Validating (or rejecting) product and service offerings

A knowledge Market is an IT platform for matching information seekers and sources, together with the material and social incentives to encourage effective trading. Now that the Internet has linked us all so closely, we need better mechanisms to help us find “who knows what” and to reward people who provide valuable information. The size of the problem—that of creating and moving information to the people who need it—is so large that applying market principles is one of the best ways to find solutions.

Markets provide opportunities for matching knowledge seekers with sources. In addition to their role in solving traditional knowledge problems, markets provide a good match to help generate, combine, and rank ideas and also help develop new solutions, products, and services. Markets are great for facilitating the reuse of existing information, for creating new information to address previously unsolved problems, and for effectively using information resources, including peoples’ time.

2.2.1 Differences Between Traditional Approaches versus Internal Knowledge Markets

We find knowledge sharing and innovation using market mechanisms to require fundamentally different design logic than traditional hierarchies (Fig. 2.1).

First-generation attempts to manage knowledge and innovation relied mainly on centralized Knowledge Management Systems (KMS). In this top-down approach, a central authority prioritizes development to address mainstream problems based on two assumptions: (1) knowledge needs are predictable and (2) experts rather than peers handle knowledge elicitation and validation. Both assumptions have limitations.

Unpredictable events routinely affect business. The banking crisis of 2008 brought into sharp relief problems whose answers did not yet exist. KMS can only contain historical facts. They cannot contain solutions for issues that have not occurred. When Japan experienced a magnitude 7 earthquake, Oyo Corporation used its knowledge market to rapidly solve problems by connecting people to

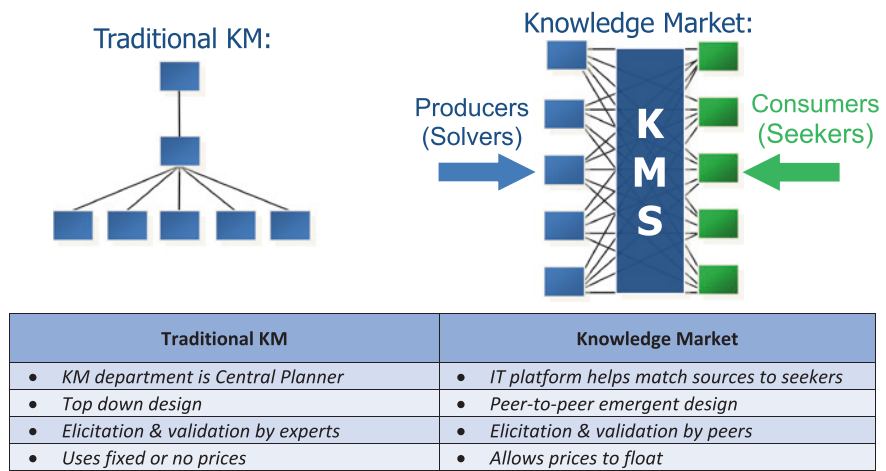


Fig. 2.1 Traditional versus emerging approaches to managing knowledge and innovation (Benbya and Van Alstyne 2011)

people rather than force employees to wade through a mountain of paper that would have stacked “as high as Mt. Fuji.”

Relying on experts to provide all answers works when they have capacity to serve all requests—in addition to doing their own work. But, when the volume of challenges exceeds capacity, experts become bottlenecks. Problems that would admit to an adequate solution from a peer go unanswered while waiting for a perfect solution from an expert.

Further, because knowledge capture is costly, organizations selectively package only a fraction of their best practices. This leaves many workers with unacknowledged needs. Not surprisingly, centralized systems produce mixed results. One audit and consulting firm we studied spent more than two years codifying best practices to place on its KMS. Yet, giving the system to more than 1,500 consultants left only 130 who could find useful content.

By contrast, an internal market is the information equivalent of just-in-time inventory. The platform helps people pull information and contacts when needed. Meeting unanticipated needs implies providing access to untapped knowledge, and it means providing access to diverse sources not just the central repository. At NTT Software, a year and a half after introducing a knowledge market, queries posted to the Q&A forum received answers in as few as 5 min. Employees provided faster customer service; best practices spread across software engineers and sales reps; and redundant work fell by 9,000 h.

Now, executives tend to think of knowledge markets as a powerful mechanism. But its implementation inside firms still remains tricky. Executives need to consider carefully which design features to select. Specifically, they need to consider who can provide answers and comments, whether to use free or price-based mechanisms, and which properties the market platform should have.

Some external market applications, for example, apply a fee and provide a handful of selected experts who may provide a solution to a knowledge problem. Take, for example, Experts-Exchange, a knowledge market through which a user pays a fee to access the knowledge base, post a technology problem and solicit solutions from experts. The experts are rewarded with points that can be converted to prizes and other benefits. Other applications of knowledge markets provide free services. Yahoo Answers and Answer iN, for instance, are services open to participation to any registered user and questions may be answered by both subject experts and novices. These services, at the difference of the former knowledge markets allow participants to exchange discussions, comments, advice and opinions on a variety of topics but they lack a mechanism that filters the correct answers from the incorrect ones.

Internal markets are environments where users trade their knowledge via price mechanisms. Although such markets have existed for years (Hayek 1945), their use to facilitate knowledge transfer and innovation inside organizations is relatively new. Early adopters such as Infosys, Siemens, McKinsey and Eli-Lilly have proven their value for managing information flows relative to traditional solutions. But complications have revealed implementation challenges.

2.3 Markets and Prices

The importance of such incentives for sustaining knowledge sharing has long been recognized (Ba et al. 2001). Even though the literature on knowledge sharing in organizations recognizes the need to align incentives to promote participation, existing studies offer conflicting evidence on what motivates participation (Faraj and Johnson 2010). The appropriate design of incentives for knowledge sharing remains subtle and multi-dimensional (Benbya and Belbaly 2010). Market prices, in the form of monetary incentives or other proxies, stimulate participation and are often associated with greater effort and performance.

However, some studies reveal mixed findings with regards to such monetary incentives and indicate that they may even have some perverse effects on participation (Bonner et al. 2000). In psychology, this effect has been referred to as “hidden costs of reward” (Lepper and Greene 1978), while in economics it’s recognized as “crowding-out” (Deci and Ryan 1985; Frey and Jegen 2001). According to self-determination theory (Deci and Ryan 1985), financial incentives can produce over justification, and turn intrinsic motivation into extrinsic motivation. The debate over these findings has generally shifted to the question of what specific circumstances give rise to these counterintuitive effects (Heyman and Ariely 2004). Additionally, organizations often use rigid incentive mechanisms that neglect the power of market participants to themselves determine appropriate rewards.

Given these issues, a large number of companies that rely on fixed rewards when creating their internal knowledge markets have encountered mixed results. HP, for example, established a fixed incentive program based on frequent flyer

miles to stimulate participation. Posting a useful resource to the internal platform earned 2,000 miles, posting a question earned 1,000 miles, and posting an answer earned 500 miles. But 90 days after launch, only 20 % of the target audience had performed any of these activities. Siemens, similarly, relied on a fixed number of “shares” that participants could redeem for prizes. For contributing solutions and success stories, participating employees earned 20 shares while they earned 10 shares for developing customer, technology or market bids. This program significantly increased contributions; nevertheless information quality remained poor.

According to price theory, however, fixed rewards are inefficient because the prices fail to adjust. When prices are fixed, information that is more valuable than the price *is not* created—experts won’t waste their time—while information that is less valuable than the price *is* created—in effect, less-expert workers volunteer just to get paid. As a result, participants can find that such systems contain irrelevant content, or excessive rewards can divert workers from more valuable activities. On the other hand, not all knowledge sharing is guided by prices (Simon 1991). Rather, knowledge sharing is also embedded within long-term relations, social ties, and trust (Uzzi 1997; Zenger et al. 2011). Research on public goods has shown that, across a wide variety of situations, people sometimes contribute even when they incur costs from their pro-social behavior (Fehr and Fischbacher 2004). Such interactions cannot be explained through economic incentives. The literature on online communities, for example, suggests the importance of social incentives for participation, such as recognition and reciprocity but highlights problems of under contribution and sustained participation (Bateman et al. 2010).

In addition, participants’ social relationships can also shape their knowledge transfer dynamics and their choices as to whether to participate in markets or communal interactions. A key social psychological principle is that people compare themselves to others to gain information on what constitutes the “right behavior” in various contexts, especially when situations are ambiguous (Buunk and Mussweiler 2001; Suls et al. 2002). Thus, people in online settings might likewise follow norms (community vs. market) that have been established by the consensus of others.

Our research will describe and document how the advantages and challenges of these models emerge in a dynamic knowledge sharing environment.

References

- Ba, S., Stallaert, J., & Whinston, A. B. (2001). Introducing a third dimension in information systems design: The case for incentive alignment. *Information Systems Research*, 12(3), 225–239.
- Baldwin, C., & von Hippel, E. (2011). Modeling a paradigm shift: From producer innovation to user and open collaborative innovation. *Organization Science*, 22(6), 1399–1417.
- Bateman, P. J., Gray, P. H., & Butler, B. (2010). The impact of community commitment on participation in online communities. *Information Systems Research*, 22(4), 841–854.
- Benbya, H., & Belbaly, N. (2010). Understanding developers’ motives in open source projects: A multi-theoretical framework. *Communications of the Association for Information Systems*, 27(30), 589–610.

- Benbya, H., & van Alstyne, M. (2011). How to find answers within your company. *MIT Sloan Management Review*, 52(2), 65–75.
- Bogers, M., Afuah, A., & Bastian, B. (2010). Users as innovators: A review, critique, and future research directions. *Journal of Management*, 36(4), 857–875.
- Bonner, S. E., Hastie, R., Sprinkle, G. B., & Youg, S. M. (2000). A review of the effects of financial incentives on performance in laboratory tasks: Implications for management accounting. *Journal of Management Accounting Research*, 12, 19–64.
- Burt, R. (2004). Structural holes and good ideas. *American Journal of Sociology*, 110(2), 349–399.
- Buunk, B. P., & Mussweiler, T. (2001). New directions in social comparison research. *European Journal of Social Psychology*, 31, 467–475.
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-regulation in human behavior*. New York: Plenum Press.
- Faraj, S., & Johnson, S. (2011). Network exchange patterns in online communities. *Organization Science*, 22(6), 1464–1480.
- Fehr, E., & Fischbacher, U. (2004). Social norms and human cooperation. *Trends in Cognitive Sciences*, 8(4), 185–190.
- Frey, B. S., & Jegen, R. (2001). Motivation crowding theory: A survey of empirical evidence. *Journal of Economic Surveys*, 15(5), 589–611.
- Hayek, F. (1945). The use of knowledge in society. *The American Economic Review*, 35(4), 519–530.
- Heyman, J., & Ariely, D. (2004). Effort for payment a tale of two markets. *Psychological Science*, 15(11), 787–793.
- Lepper, M., & Greene, D. (1978). *The hidden cost of rewards*. Hillsdale, NJ: Erlbaum.
- Morrison, P. D., Roberts, J. H., & von Hippel, E. (2000). Determinants of user innovation and innovation sharing in a local market. *Management Science*, 46(12), 1513–1527.
- Oliveira, P., & von Hippel, E. (2011). Users as service innovators: The case of banking services. *Research Policy*, 40(6), 806–818.
- Osborn, A. F. (1963). *Applied imagination: Principles and procedures of creative problem solving* (3rd ed.). New York, NY: Charles Scribner's Sons. (Revised).
- Prahalad, C. K., & Ramaswamy, V. (2004). Co-creation experiences: The next practice in value creation. *Journal of Interactive Marketing*, 18(3), 5–14.
- Shah, S., & Tripsas, M. (2012). When do user innovators start firms? A theory of user entrepreneurship. In: *Revolutionizing innovation: Users, communities and open innovation*. Cambridge, MA: MIT Press.
- Simon, H. A. (1991). Organizations and markets. *The Journal of Economic Perspectives*, 5(2), 25–44.
- Suls, J., Martin, R., & Wheeler, L. (2002). Social comparison: Why, with whom and with what effect? *Current Directions in Psychological Science*, 11(5), 159–163.
- Terwiesch, C., & Ulrich, K. T. (2009). *Innovation tournaments*. Boston: Harvard Business School Press.
- Uzzi, B. (1997). Social structure and competition in interfirm networks: The paradox of embeddedness. *Administrative Science Quarterly*, 42(1), 35–67.
- Van Dijk, C., & Van den Ende, J. (2002). Suggestion systems: Transferring employee creativity into practicable ideas. *R&D Management*, 32(5), 387–395.
- von Hippel, E. (1986). Lead users: A source of novel product concepts. *Management Science*, 32(7), 791–805.
- von Hippel, E. (2007). Horizontal innovation networks by and for users. *Industrial and Corporate Change*, 16, 293–315.
- Zenger, T., Felin, T., & Bigelow, L. (2011). Theories of the firm–market boundary. *The Academy of Management Annals*, 5(1), 89–133.

Exploring the Design and Effects of Internal Knowledge
Markets

Benbya, H.

2015, VIII, 49 p. 7 illus., Softcover

ISBN: 978-3-319-14516-7