Information and Knowledge Management
ISSN 2224-5758 (Paper) ISSN 2224-896X (Online)
Vol.3, No.10, 2013
www.iiste.org

Knowledge Management Strategies to Support Operational Security Requirements of Transmission System Operators of Electricity: the case of MAVIR

Zsolt Bertalan[1], Zoltan Csedo[2,3], Adam Tamus[4]

[1]MAVIR Hungarian Independent Transmission Operator Company Ltd.
[2]Innotica Group
[3]Corvinus University of Budapest, Faculty of Business Administration, Institute of Management
[4]Budapest University of Technology and Economics, Faculty of Electrical Engineering and Informatics, Department of Electric Power Engineering
E-mail of the corresponding author: tamus.adam@vet.bme.hu

Abstract

The Operational Security Network Code will provide the basis on European Union level for the power system to function with a satisfactory level of security and quality of supply, as well as efficient utilization of infrastructure and resources. It requires each TSO to launch knowledge sharing and knowledge management initiatives with emphasis on Transmission System elements, the operation of the Transmission System, use of the on-the-job systems and processes, as well as inter-TSO operations and market arrangements

In order to analyse the organizational context for successful knowledge management strategies, we completed both quantitative and qualitative research at MAVIR Hungarian Independent Transmission Operator Company. We undertook a knowledge management survey among 580 employees, and performed 15 semi-structure interviews with senior management.

Based on our research findings, knowledge management strategies to support operational security requirements of TSOs should focus on:

- Knowledge-sharing technology development, that is able to integrate within one single platform all knowledge management needs, supported by an intelligent search engine.
- Knowledge content development, focused on informal/tacit knowledge, as well as knowledge gaps. Companywide involvement of senior experts and knowledge worker is essential within the content development projects.
- Transparent knowledge management processes and well-defined roles and responsibilities within the knowledge creation, sharing and application.
- Cultural change / change management project to support the whole organization in realizing its knowledge management strategy. Individual incentives should also be included to encourage active involvement within knowledge sharing.

Keywords
Knowledge management, knowledge sharing, strategy, TSO, operational security, network code, MAVIR

1. Introduction

1.1. Operational security and knowledge management in European TSOs

The Operational Security Network Code will provide the basis on European Union level for the power system to function with a satisfactory level of security and quality of supply, as well as efficient utilization of infrastructure and resources (ENTSO-E 2013). The Network Code is focusing on common operational security principles, pan-European operational security, coordination of system operation, and some important aspects for grid users connected to the transmission grid.

The Operational Security Network Code requires each TSO to launch knowledge sharing and knowledge management initiatives with emphasis on Transmission System elements, the operation of the Transmission System, use of the on-the-job systems and processes, as well as inter-TSO operations and market arrangements, including (ENTSO-E 2013):

- relevant areas of electrical power engineering;
- relevant aspects of the European Internal Electricity Market;
- safety and security for persons, nuclear and other equipment in Transmission System operation;

- Transmission System operation in a Normal and all other System States;
- inter-TSO cooperation and coordination in real-time and in operational planning at the level of main control centres; and
- exchange and training in conjunction with DSOs and Significant Grid Users with Connection Point directly to the Transmission System where deemed appropriate.

It is also required that each TSO shall exchange operational knowledge and experience with their neighbouring TSOs and delegated entities defined in respective TSOs' agreements on RCSIs' in the region where they have a role in operational planning coordination between TSOs, including facilitating visits and exchange of experiences between System Operator Employees (ENTSO-E 2013). There shall be improved the knowledge of the characteristics of neighbouring Transmission Systems and communication and coordination between System Operator Employees of neighbouring TSOs.

Knowledge management is going to play a strategic role in operational security initiatives. Although the knowledge-based view of strategy has significantly advanced, less is known about how knowledge becomes a strategic resource. Moreover, it is essential to highlight knowledge management strategies that would support the practical implementation of operational security initiatives.

A further challenge is going to be imposed by the fact, that Network Code generated operational security initiatives shall be launched at the same time across most European Union countries. Single-location projects, however, draw on a reservoir of shared tacit knowledge and trust that international projects might lack. International TSO teams in operational security would need significant collaboration competencies to deliver successfully the expected results (Wilson and Doz 2012).

1.2. Role of knowledge workers in TSOs

Knowledge management relies on knowledge workers. High performance and competitive advantage today increasingly comes from the particular, hard-to-duplicate know-how of a company's most-skilled knowledge workers: talented engineers, scientists, physicians, and other professionals. The problem is that in many industries there aren't enough of them to go around, and research shows that the situation promises to get worse. (Martin 2010, Dewhurst, Hancock et al. 2013)

In spite of the low amount of knowledge workers, they tend to spend, on average, 41% of their time on activities that offer little personal satisfaction and could be handled competently by others (Birkinshaw and Cohen 2013).

In order to achieve a more efficient knowledge management in TSOs, five fundamental aspects of knowledge work require fresh thinking: the value of the relationship with a larger enterprise; the settings in which work is done; the organization of workflows and how individual contributors add value; the technologies used to support higher achievement; and the degree to which employment arrangements are tailored to individuals (Johns and Gratton 2013).

In knowledge-based environments, teams must develop a systematic approach to integrating knowledge resources throughout the course of projects in order to perform effectively (Gardner, Staats et al. 2012). Self-managing teams engaged in knowledge-intensive work can perform more effectively by combining autonomy and external knowledge to capture the benefits of each while offsetting their risks. The complementarity between having autonomy and using external knowledge is contingent, however, on characteristics of the knowledge and the task involved (Haas 2010).

Highly specialized knowledge workers are great assets to the organizations. Research demonstrates that only domain-specific expertise -the kind that teams underuse when facing higher pressure- increases significantly team performance (Gardner 2012).

As knowledge work expands and technology advances, we've entered an era of hyper specialization: work previously done by one person is divided into more-specialized pieces done by multiple people, achieving improvements in quality, speed, and cost. TSO managers who want to capitalize on hyperspecialization's possibilities need to learn how best to divide knowledge work into discrete tasks, recruit specialized workers, ensure the quality of the work, and integrate the pieces into a final whole (Malone, Laubacher et al. 2011).

Quality and efficiency concerns are also often raised regarding knowledge work. Staats and Upton argue that knowledge work can be made lean, if managers draw on six principles: continuously root out all waste; strive to make tacit knowledge explicit; specify how workers should communicate; use the scientific method to solve problems quickly; recognize that a lean system will always be a work in progress; have leaders blaze the trail (Staats and Upton 2011).

A useful insight for TSO managers, therefore, might be that given the complexity of the knowledge work and daily routines, they can focus on developing unique ways to scan for and acquire information without having to spend an inordinate amount of time doing so (i.e., by scanning more proactively). In simple terms, the idea "scan smarter, not harder" might prove to be a useful suggestion (Nag and Gioia 2012).

1.3. Knowledge management strategies: challenges of innovations and realizations

Knowledge management requires innovations in both internal processes and systems. Research shows that organizations with a broad knowledge base are more likely to achieve innovation in the presence of internal knowledge sharing rather than market knowledge acquisition. In contrast, organizations with a deep knowledge base are more capable of developing innovation through market knowledge acquisition rather than internal knowledge sharing (Zhou and Li 2012). Broader horizons with respect to innovation objectives and knowledge sources are associated with successful innovation. (Leiponen and Helfat 2010)

It is essential to emphasize that the he realization of a knowledge management strategy depends on countless knowledge workers. So it's no surprise that when a strategy fails, the reason cited is usually poor execution. But this view of strategy and execution relies on a false metaphor. Executives at the top should make the broader choices involving long-term investments while empowering employees toward the bottom to make more concrete, day-to-day decisions that directly influence customer service and satisfaction. When downstream choices are valued and feedback is encouraged, employees send information upward, improving the knowledge base of decision makers higher up and helping everyone in the organization make better choices. (Martin 2010)

While making the right choices, a value network map might guide knowledge workers in their every day's tasks. Ryall's Value Capture Model framework replaces the firm's value chain with a value network map -essentially, a productive social network with linkages defined by actual and potential transactions (Ryall 2013).

Another challenge in realization of knowledge management strategies is how to manage supporting technology and deal with data. As managers seek to exploit the tremendous amounts of data now available from internal and external sources, they're likely to use the approach they use with all their IT projects - that is, they'll focus on building and deploying technology on time, to plan, and within budget. That works for projects designed to improve business processes and increase efficiency, but when it comes to extracting valuable insights from data and using information to make better decisions, managers need a different approach and mind-set.

Research suggests five guidelines to deal with these challenges (Marchand and Peppard 2013):

- Place users-the people who will create meaning from the information-at the heart of the initiative.
- Unlock value from IT by asking second-order questions and giving teams the freedom to reframe business problems.
- Equip teams with cognitive and behavioral scientists, who understand how people perceive problems and analyze data.
- Focus on learning by facilitating information sharing, examining assumptions, and striving to understand cause and effect.
- Worry more about solving business problems than about deploying technology.

The role of leadership is crucial in realization of knowledge management strategies and organizational knowledge creation (von Krogh, Nonaka et al. 2012). Executives are increasingly explicit in their desire to 'go beyond databases' and want to know how concrete governance mechanisms shape their employees' actual knowledge sharing behaviour and, as they apply several mechanisms simultaneously, how those interact and what are the effects of these interactions on knowledge sharing in the organization (Foss, Husted et al. 2010).

2. Research methodology

We undertook our research at MAVIR Hungarian Independent Transmission Operator Company. Its duties are, as follows:

- to provide for the reliable, efficient and secure operation of the Hungarian Power System including the required reserve capacities of generation and transmission;
- to supervise and augment the assets of the transmission system, to perform any renewal, maintenance and development works required for a proper and reliable supply;
- to ensure the undisturbed operation and further extension of the electricity market and access on equal terms for system users;
- to process the data received from the participants of electricity supply;
- to inform the market players as not to have unfeasible contracts;
- to harmonise the operation of the Hungarian Power System with the neighbouring systems;
- to coordinate international co-operations;
- to prepare the Network Development Strategy and to put forward proposals for the development of the generation pool.

We applied both quantitative and qualitative research methods. We undertook a knowledge management survey among 580 employees, and performed 15 semi-structure interviews with senior management. Afterwards, the data was analysed, and results have been further evaluated during critical discussions with senior management.

3. Research findings

89% of all employees have confirmed that knowledge management processes and systems need to be further developed in MAVIR. The need for action is also emphasized by the fact that 93% of all employees would like to be personally committed to knowledge sharing and knowledge management.

Our results showed that 24.4% of employees possess such critical knowledge that is not documented and they claim to be their personal tacit knowledge in relation to their every day's work.

It was also surprising to experience the different channels of knowledge sharing (Figure 1). 51% of knowledge is shared by word of mouth. MAVIR employees simply call their colleagues or walk into each other's offices, if they need any new information. These conversations will certainly remain undocumented, therefore it is a highly inefficient way of knowledge sharing, also because the many questions disturb especially those knowledge workers in their duties, which have the deepest expertize or broadest knowledge in their fields.

The amount of knowledge sharing via e-mails is also high: almost one quarter of the whole knowledge is shared by e-mail. At the interviews we experienced a significant dissatisfaction imposed by the heavy e-mail traffic, caused also by the knowledge sharing.

The documented knowledge sharing is currently narrowed to knowledge documents and formal trainings, which consists only 14% of shared knowledge.

We have asked employees to define the percentages of available knowledge needed to their every day's work that are documented, informal (tacit knowledge) or if they perceive any lack of knowledge (Figure 2). Our results showed that 63% of needed knowledge proved to be available documented, while 30% was the percentage of informal/tacit knowledge and 7% of knowledge was lacking.

Employees had lots of suggestions regarding knowledge sharing initiatives in MAVIR (Figure 3). Most of them (75%) felt the need for one integrated knowledge-sharing platform. Currently, knowledge is stored in six different ICT systems, which makes difficult a quick search. This is an important reason why many people would just pick up the phone or walk across the other office in order to find an answer to a question instead of using the available internal knowledge sharing systems.

An intelligent search engine should be therefore an integral part of the knowledge-sharing platform, as well. It was suggested to assure the search of both current ICT systems and the new knowledge-sharing platform, in order not to miss any important document.

Easier accessibility to knowledge resources is also needed. The challenge, however, remains to secure a very differentiated access to knowledge resources based on the individual fields of expertize, as well as level of seniority within the organization.

Significant number of employees realized that knowledge sharing requires a cultural change within the company. It doesn't happen immediately after the launch of a new technology or introduction of new processes. The cultural change should be widely supported by trainings and on-line forums, where employees are able to exchange their experience regarding knowledge sharing, as well.

The improvement of communication between different departments was also mentioned as a knowledge management initiative, ranked as important as the cultural change within the organization. Although significant progress has been achieved on this area, as well, there still is a culture of vertical communication which itself makes horizontal knowledge sharing difficult.

We have also prepared a knowledge flow map (Figure 4.) that illustrates the significant differences between knowledge sharing intensity of different departments.

4. Conclusion

In order to comply with European Union's Operational Security Network Code, operational security initiatives should be supported by appropriate knowledge management strategies at European TSOs.

Based on our research findings, knowledge management strategies should focus on:

- Knowledge-sharing technology development, that is able to integrate within one single platform all knowledge management needs, supported by an intelligent search engine.
- Knowledge content development, focused on informal/tacit knowledge, as well as knowledge gaps. Companywide involvement of senior experts and knowledge worker is essential within the content development projects.
- Transparent knowledge management processes and well-defined roles and responsibilities within the knowledge creation, sharing and application.
- Cultural change / change management project to support the whole organization in realizing its knowledge management strategy. Individual incentives should also be included to encourage active involvement within knowledge sharing.

It is important to highlight the limitations of our findings, as well. We have performed our research at one TSO only. Our empirical results are in-line though with key literature findings. Further empirical research is needed, however, to validate our results within other European TSOs.

Figures

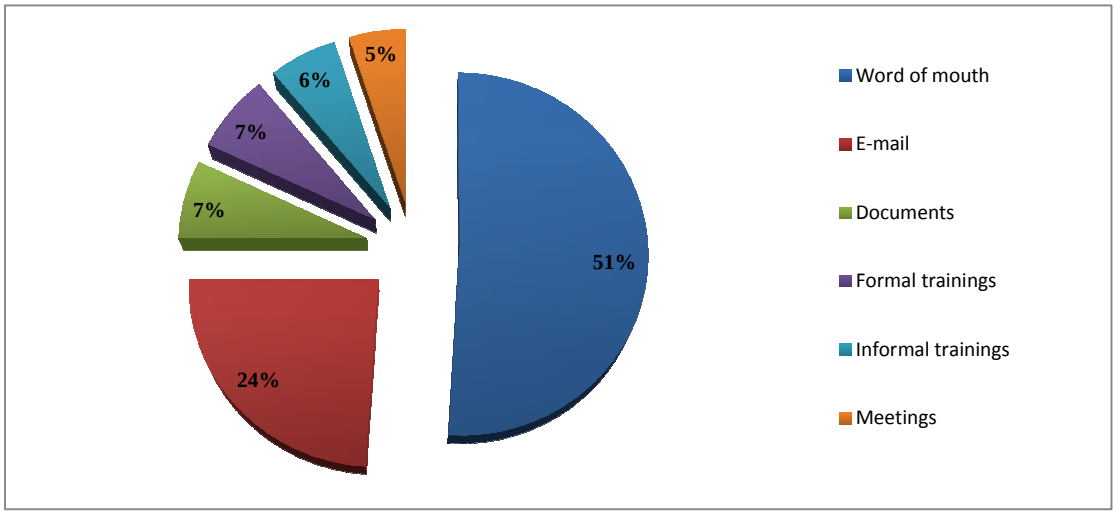

Figure 1.
Knowledge sharing channels in MAVIR

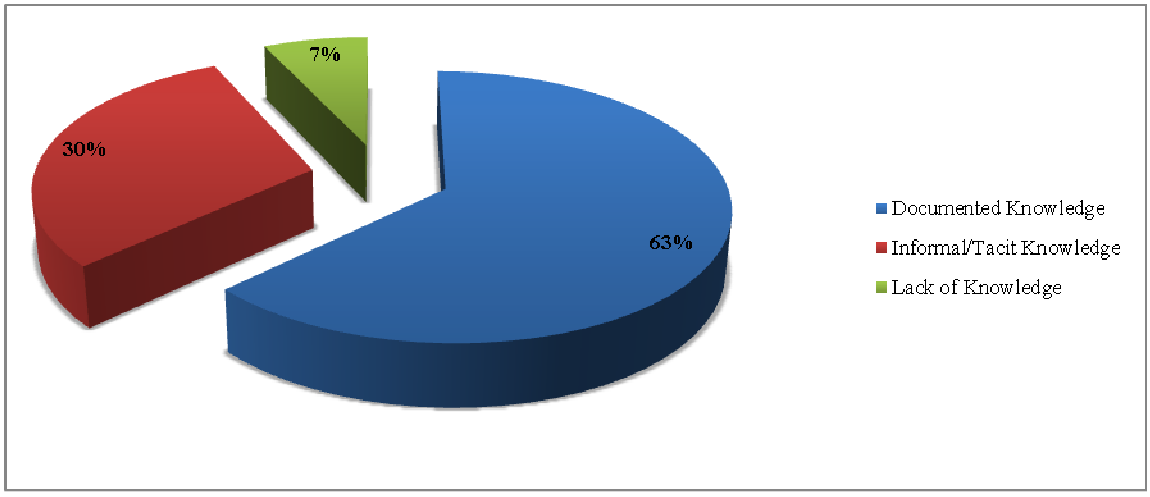

Figure 2.
Documented, informal/tacit and lack of knowledge in MAVIR

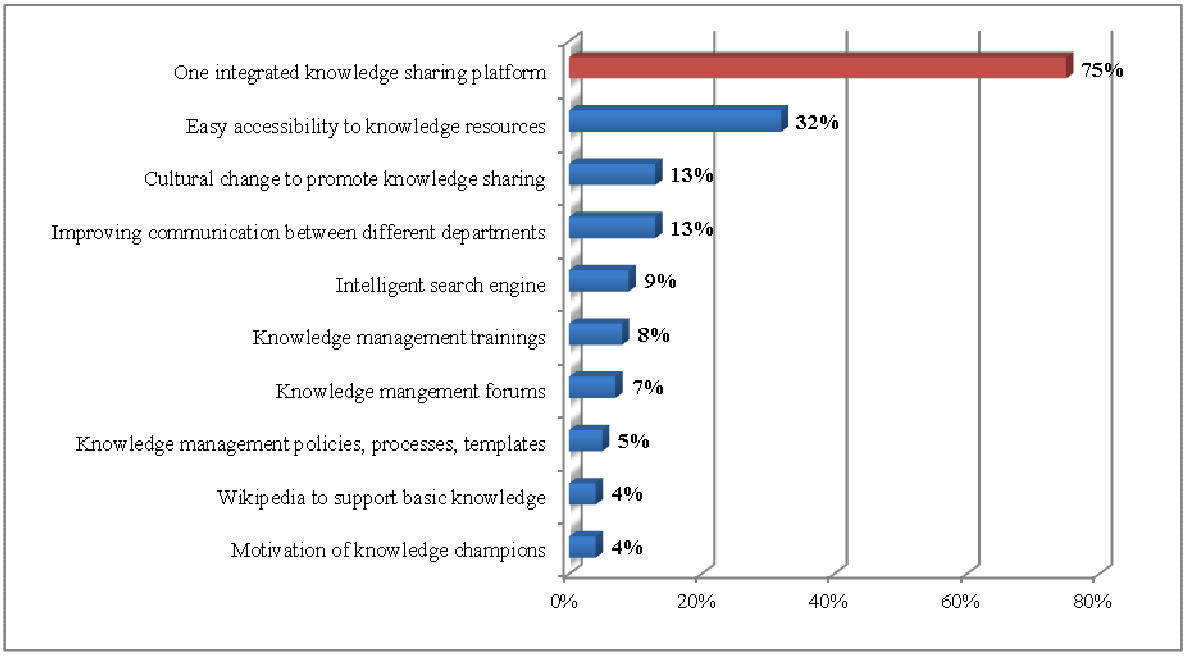

Figure 3.
Employee suggestions for knowledge management initiatives in MAVIR

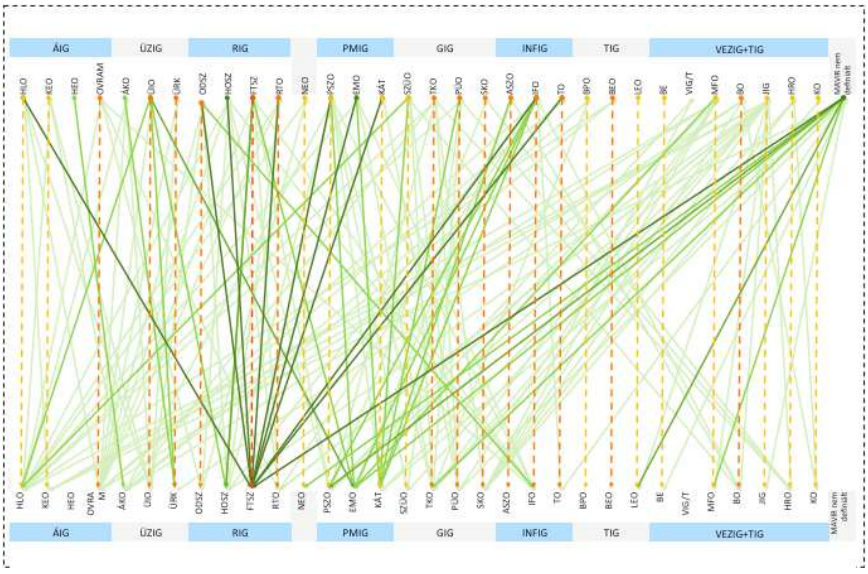

Figure 4.
The map of knowledge flow between MAVIR departments

References

1. Birkinshaw, J. and J. Cohen (2013). "Make Time for the Work That Matters." Harvard Business Review 91(9): 115-115.
2. Dewhurst, M., B. Hancock and D. Ellsworth (2013). "Redesigning Knowledge Work." Harvard Business Review 91(1): 58-64.
3. ENTSO-E (2013) "The Network Code on Operational Security." European Commission.

4. Foss, N. J., K. Husted and S. Michailova (2010). "Governing Knowledge Sharing in Organizations: Levels of Analysis, Governance Mechanisms, and Research Directions." Journal of Management Studies 47(3): 455-482.
5. Gardner, H. K. (2012). "Performance Pressure as a Double-edged Sword: Enhancing Team Motivation but Undermining the Use of Team Knowledge." Administrative Science Quarterly 57(1): 1-46.
6. Gardner, H. K., B. R. Staats and F. Gino (2012). "DYNAMICALLY INTEGRATING KNOWLEDGE IN TEAMS: TRANSFORMING RESOURCES INTO PERFORMANCE." Academy of Management Journal 55(4): 998-1022.
7. Haas, M. R. (2010). "THE DOUBLE-EDGED SWORDS OF AUTONOMY AND EXTERNAL KNOWLEDGE: ANALYZING TEAM EFFECTIVENESS IN A MULTINATIONAL ORGANIZATION." Academy of Management Journal 53(5): 989-1008.
8. Johns, T. and L. Gratton (2013). "The Third Wave Of Virtual Work." Harvard Business Review 91(1): 66-73.
9. Leiponen, A. and C. E. Helfat (2010). "Innovation objectives, knowledge sources, and the benefits of breadth." Strategic Management Journal 31(2): 224-236.
10. Malone, T. W., R. J. Laubacher and T. Johns (2011). "THE AGE OF HYPER SPECIALIZATION." Harvard Business Review 89(7/8): 56-65.
11. Marchand, D. A. and J. Peppard (2013). "Why IT Fumbles Analytics." Harvard Business Review 91(1): 104-112.
12. Martin, R. L. (2010). "The Execution Trap. (cover story)." Harvard Business Review 88(7/8): 64-71.
13. Nag, R. and D. A. Gioia (2012). "From Common to Uncommon Knowledge: Foundations of Firm-Specific Use of Knowledge as a Resource." Academy of Management Journal 55(2): 421-457.
14. Ryall, M. D. (2013). "The New Dynamics of Competition." Harvard Business Review 91(6): 80-87.
15. Staats, B. R. and D. M. Upton (2011). "LEAN KNOWLEDGE WORK." Harvard Business Review 89(10): 100-110.
16. von Krogh, G., I. Nonaka and L. Rechsteiner (2012). "Leadership in Organizational Knowledge Creation: A Review and Framework." Journal of Management Studies 49(1): 240-277.
17. Wilson, K. and Y. L. Doz (2012). "10 Rules for Managing Global Innovation." Harvard Business Review 90(10): 84-90.
18. Zhou, K. Z. and C. B. Li (2012). "How knowledge affects radical innovation: Knowledge base, market knowledge acquisition, and internal knowledge sharing." Strategic Management Journal 33(9): 1090-1102.