

The Dynamics behind the Alignment between Strategy and Knowledge in Small Firms

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Abstract

Using four case studies carried out on a sample of 60 north-eastern Italian small firms, this paper examines how knowledge exploration and exploitation might be differently implicated in the creation of competitive advantages for small firms. A pilot quantitative study on the whole sample demonstrated the existence of an alignment between competitive strategies and knowledge management strategies. The present study tries to address this alignment as an ongoing process, drawing attention to the multiple ways through which this alignment takes form in practical activity.

Introduction

According to the knowledge-based theory of the firm, organizational knowledge should be tailored explicitly to support competitive strategy, leading to competitive advantage and superior performance (Grant, 1996). Thus, organizational knowledge is recognized as a competitive resource that must be managed to maximize its productivity (Nonaka, 1994). Also, there is evidence that organizational performance may result from the alignment between knowledge management and competitive strategy.

However, there is no compelling evidence to suggest that such alignment exists. Interestingly enough, there have not been many studies that have examined the effects of knowledge management on competitive strategy for small firms (SFs).

The objective of this paper is to analyse the dynamics behind the link between knowledge management and competitive strategy, using four case studies carried out on a sample of 60 north-eastern Italian small firms. Previously, a quantitative study was carried out on the whole sample in order to verify the existence of such alignment (Bagnoli et al., 2015). Given the exploratory nature of the pilot study, we decided to focus the analysis by performing a series of further interviews in 4 SFs to integrate statistical results. The four case studies draw on the different relationships verified through statistical analysis. This second step of our research is an attempt to develop some insights into knowledge factors behind the formation of competitive strategy, leading to a more complete understanding of the dynamics behind competitive knowledge management strategies in SFs.

Literature review

Case studies and normative studies have already explored the alignment between competitive strategy and knowledge management strategy. For example, Hansen et al. (1999)

revealed that consulting firms competing through standardized services rely on the reuse of existing knowledge, while firms competing through customized services build their competitive advantage on the development of tacit knowledge. Bierly et al. (2002) distinguished two knowledge strategies - knowledge exploration and knowledge exploitation - based on the existence of a particular fit between knowledge and strategy. Zack (1999), using the traditional SWOT framework, developed a 14-step model for the analysis of strategic gaps and the alignment of competitive strategy and knowledge strategy. Other studies propose making the alignment more effective by eliciting the most coherent knowledge management strategy (Earl, 2001; Oluikipe, 2012; Kim et al., 2014), or by making the role knowledge plays in the strategy formation process explicit (Zack, 2005).

Since the mid-Nineties, many studies have tried to empirically analyse the relationship between competitive strategy and knowledge management activities. Bierly and Chakrabarti (1996) carried out a cluster analysis on five variables to identify the strategic orientation of analysed firms. They identified four strategic knowledge management groups and tested the differences in financial performance. Analysing 51 large Korean companies from diverse industries, Choi and Lee (2003) carried out a cluster analysis on eight variables, identifying four strategic groups; divergences were also tested on organisational performance. Zhu et al. (2006) analysed 223 large firms, testing the relationships between knowledge management strategy and competencies, and organisation performance. Finally, focusing on the knowledge creation process, Un et al. (2004) carried out a survey on 38 large Japanese and U.S. firms, analysing the interdependencies between specific knowledge processes and organisational performances.

Research question

The aim of this research is to lead to a deeper understanding of the dynamics behind the alignment between competitive strategy and knowledge management in SFs. After analyzing statistical data, some relationships were verified; we then used case study methodology to develop new insights into the ways in which the alignment takes form.

Methodology and data analysis

The study was carried out on a sample of 60 SMEs, situated in north-eastern Italy, by adopting a knowledge audit technique (Choy et al, 2004).

The selection of firms was conducted in collaboration with 3 Italian SF associations involved in the research project, in order to gain familiarity with the practitioner perspective and to identify SFs that have demonstrated the use of knowledge management for competitive advantage effectively in the last 5 years, thanks to a product or process innovation.. The majority of the contacts, however, were approached during seminars in Venice in the summer of 2006, where the research team publicly presented the research aims, methodology and activities.

Data was collected using site visits and in-depth interviews. In addition, internal documents (organizational charts, primary and secondary business chain activities, product cost reports and planning charts) and publicly accessible documents (balance sheets, events, paper articles about the firm's products and performances) were collected, some of which could only be accessed during on-site visits. This allowed a triangulation with the interviews. There were no differences between the data sources. Integrating the three data sources, we were able to analyse the innovation process over the duration of several years, with the interviews taking place towards the end of the period (Langley, 1999).

Given the small size of the firms and the crucial role of entrepreneurs for SFs' innovation (Blackman, 2004), we selected the entrepreneurs as respondents, as they possessed the best experience within their respective organizations.

The knowledge audit was articulated in two phases: pre-audit preparation and audit process. The objective of the preparation phase was to brief involved entrepreneurs about the articulation of the knowledge audit as well as the aims, tools and methodology, in order to focus the main business topics on which the audit should be conducted and gain management support. The process phase was conducted by in-depth interviews, with the aim of getting a clear picture of the knowledge resources involved in business processes and their dynamic interactions. In order to understand how a firm's knowledge is translated into competitive advantage, the interview was articulated into two sections: firms' competitive position and knowledge management processes. The first section involved collecting the entrepreneur's subjective judgment of the firm's main sources of competitive advantage, as well as competitive scope. The second section focused on the activities carried out for mobilizing knowledge into business activities: knowledge acquisition, selection, generation and externalisation.

The number of interviews per organization was not pre-determined, but depended on the entrepreneur's availability, as well as on the complexity of the single organization. Interviews typically lasted eight hours and were conducted by 2 researchers, in order to mitigate biases introduced by a single researcher (Lillis, 1999). Answers were given on a five-point Likert scale and respondents were required to explain their choices using storytelling techniques. A semi-structured interview was organized into three major sub-units: (a) main competitive uniqueness and rigidities; (b) main knowledge sources for innovation purposes; (c) how knowledge is developed and deployed through innovation for building a competitive advantage. All interviews were tape-recorded and transcribed into word processing documents. As a means of validation and clarification, interview transcripts were returned to informants for feedback.

To systematically analyse data, we decided to develop a two-stage process analysis. The first stage was developed through a pilot study aimed at investigating the alignment between competitive strategies and knowledge strategies (Bagnoli et al., 2015). The pilot study was conducted through quantitative analysis, carried out on the whole sample of SFs. Findings revealed that SFs pursuing HR-based competitive strategies tend to adopt exploitation strategies of both internal and external knowledge, while firms pursuing PCSQ-based competitive strategies tend to adopt exploration strategies of both internal and external knowledge. The second stage of process analysis involved the exploration of process dynamics behind the 4 alignments discovered by the pilot study. To this end, we adopted a narrative approach and elaborated 30-40 pages per single case study (Langley, 1999). In so doing, we were able to develop explanations regarding the mutual interactions between strategy and knowledge for each pattern in practice. Data was reduced into more abstract categories and linked to theoretical items. This allowed us to compare cases, providing for external validity through the multiple-case study approach (Baxter and Jack, 2008).

Findings

Company 1 – HR-based competitive strategy and internal knowledge exploitation strategy

The company designs and produces to-order moulds for the plastic and steel sectors. It was set up in 1977, when one of the 3 current owners decided to exploit competencies and relationships he had developed over the previous 15 years working as a product engineer for a multinational company.

At the time of the study, the company was based at a single site, where 20 employees worked, and its annual turnover was about €1.5m. The main sources of competitive advantage have always been technological innovation, the ability to adapt to operations and a strong emphasis on the customer's needs. In order to strengthen the firm's competitive position, an independent division for the design activity was set up in 1995 and a significant business renewal was developed by introducing a new business line: the manufacturing of finished products. Industrial manufacturing is essentially involved in commodity products and its applications vary according to the width of the plastic and steel sectors, but common applications might be automotive and mechanical components. Furthermore, the product range was not seen as offering much scope for differentiation.

The manufacturing of finished products is not a very complex process. After receiving customer's orders, a design process is implemented, machinery is set-up and the manufacturing is carried out [...] The two main variables are the organization of workflow and production planning. After that, it's relatively easy to manage this business line. We are selling commodity products... (The owner – director of the design division)

When presented with the competitive strategy typology used in this study, the entrepreneur felt that his company was a human-resource based firm. This assessment was supported by the fact that the company had one industrial product line and that, at the time of this study, it only accounted for a marginal percentage of overall revenue. The firm's main business line was the design process, where core knowledge is generated and deployed for the delivery of high-quality services. The main knowledge source was the engineers' competencies and the knowledge sharing initiatives aimed at exchanging, comparing and analyzing projects that required alternative solutions and involved different capabilities. Furthermore, the company did face increased uncertainty from the changing needs of its customers and the design process became more complex.

Today, the main problem is to handle complex situations where customers ask the engineers to provide innovative projects; this request deviates from the routine design [...] Then we perform a careful analysis of the customer's requests and we discover that more than half of the project is a completely new work, that had never been performed before [...] So, the engineering team tries to make sense of the problem, organizing technical meetings where the situation is focused and a collective brainstorming is undertaken in order to find the right solution. (The owner – director of the design division)

The above quotation clearly indicates that increased changes in customers' requests entailed a switch from a routine-based to a non routine-based design process. It emerged that the change was embedded in more extensive organizational changes, because the new design projects not only implied changes in the design workflow, but also involved a redefinition of the entire design process and a more structured sharing of the existing knowledge. The internal network for knowledge sharing was structured into specific communication channels, where the very central core was represented by entrepreneurs and the engineering director. Around the periphery of the network are the various engineers and the operational director, who is involved in dialogue with the engineering team. In this way, all technical and operational managers participate in the decision-making activities, expressing different competencies that are then merged into a collaborative practice for the production of innovative solutions. Furthermore, the team learns the lessons to aid future innovative design projects.

These changes were perceived as being quite radical and resulted in a substantial increase in overall turnover. As indicated by the balance sheets, about 75-80% of the firm's turnover was generated by projects, with an increase of 15% on average in the last three years.

To sum up, having considered the firm's competitive strategy as deriving from the uniqueness of design competencies and knowledge strategy as deriving from the sharing of existing knowledge, company 1 might be regarded as adopting a human-based competitive strategy and an internal knowledge exploitation strategy. The products were seen as relatively undifferentiated and the company adopted a strategy of focusing on the delivery of project designs, where internal existing knowledge is exploited intensively through internal

cooperation among engineers in facing the environmental uncertainty in the form of new customer technical requirements.

Company 2 – HR-based competitive strategy and external knowledge exploitation strategy

Company 2 was founded in 1978 by a married couple looking for new challenges. The business idea was the production of handmade bread using traditional recipes and processes with simple and natural ingredients, in order to rediscover tastes and smells of wood-burning oven bread. The challenge was perceived by the couple as quite difficult because customers' tastes were evolving towards standardized, long-conservation and industrially manufactured products, with the adoption of chemically treated raw materials. At the time of the case study, company 2 was based at one site in Thiene (90 km from Venice) and employed 6 people, with an annual turnover of around €750,000. It supplies shops and restaurants in the north-east of Italy through an effective distribution network. After a period of intense experimentation and improvement of the bread-making process, the product range was extended by introducing multi-grain and low-gluten bread. As a result, the company grew in size and in the last 8 years it acquired a market leader position. Press reports confirm the high performance of the company, specifically singled out as one of the best-known handmade bread producers in Italy.

For turning a business idea into an effective business model, company 2 had consciously adopted an external knowledge exploitation strategy.

My husband was a skilled professional cook and I was a designer for the textile and clothing industry, yet neither of us had been producing bread before. It was a great challenge, but the desire to make something different in our life has been a fundamental incentive [...] We rediscovered Italian traditional handmade recipes and natural bread-making processes that had been abandoned, working alongside old bakers in different Italian regions, especially, Veneto, Puglia, Trentino-Alto Adige and Tuscany (The wife)

The knowledge acquired by working with Italian traditional bakers was subsequently integrated with internal inventiveness through a process of experimentation. This mode of organizing learning has had a major impact on the product range, via the introduction of low-calory and biological bread, and it is becoming the increasingly prevalent way in the firm's innovation process. This setting provides a practice-based environment, where the ability of all actors to select, access, and reuse the knowledge and practice of others allows to invent better products and reverse the effect of invention experience on invention capacity. That is, previous experience working alongside old Italian bakers harmed the ability to make useful products and process improvements. The cumulative nature of learning emerged in problem-solving activities and in a multi-faceted knowledge environment, where the micro-mechanisms of knowledge creation and application were driven by two fundamental elements: the knowledge exchange among multiple and differentiated actors and the experiential nature of learning.

My husband and I were highly motivated to learn and discover all the secrets involved in making handmade bread, adopting the Italian regional traditional recipes. To effect this, we interacted actively with selected people, like bakers, technical consultants, chemists and University researchers, for the absorption of knowledge and ideas from disparate sources [...] we didn't copy the entire process for making bread from different bakers; neither did we apply technical advice without modifying it [...] changes emerged from internal systematic experimentation activities, based on trial-and-error learning; it was learning from experimentation [...] I remember the first time we tried to bake whole-wheat bread; it was a horrible experience, the bread turned out dense like stone. (The wife)

The rediscovering of old traditional recipes and their original application for the development of new products was seen as pivotal for the firm's growth and the acquisition of market leadership. Company 2 had a constantly changing range of products, which were subject to change in ingredients, taste, form, quantity of calories and other elements. The core of the firm's evolution was the learning cycle where knowledge acquired from selected

external sources was applied to internal processes through intensive experimentation activities. The original combination between external and internal knowledge had significant implications for the generation of rare internal knowledge resources that were the origins of product and process innovation.

In this company, the owning couple is essentially in the centre of the knowledge network because they are responsible for the bread-making processes and communicate with other people informally through dialogue, discussion and a low level of formalization. Knowledge flows around the organization during practical activities and empirical experimentation.

The relatively high degree of valuable internal knowledge, coupled with a strong tendency to acquire external knowledge, seem to make it fair to classify company 2 as adopting an HR-based competitive strategy and external knowledge exploitation strategy.

Company 3 – PCSQ-based competitive strategy and internal knowledge exploration strategy

At the time of the case study, company 3 was based at one site and employed approximately 20 people, with an annual turnover in the range of €2.5m. The company produced electronic micro-components for the payment systems of vending machines and it was founded in the mid-1980s by 4 partners, who had specialized and integrated competencies in the electronic industry. During the start-up phase, due to a strong volatility in revenues and an unclear definition of the firm's strategy and identity, there was a significant development of the product range. The basic technology of production was the printed-circuit board manufacturing process that was organized into 3 standard modules: digital photography, digital printing and third-party production. With the purchase of the totality of the company's stock by one of the founders at the end of the 1990s, not only the product range was regarded as ineffective, but also the firm's competitive strategy was redefined entirely. The breadth of the product line resulted in complexity but not profit, since the introduction of new models in the product range was the result of infrequent orders and was not subject to a deliberate strategy.

Performance is the key for competition and we wanted to remain a profitable business as long as possible, even in a business development phase [...] the extremely large product range was the result of the firm's historical growth through a diversification strategy. But the large product range was the root of the problems with performance, because the management of three product lines was time-consuming. Instead of trying to innovate our products, we preferred to acquire new customers without concentrating on the development of products. That was the core of the problem: developing product innovation and acquiring the leadership in a single, highly focused market. (The owner)

The management started redefining the firm's market offering, as the product line was not perceived as matching the corporate culture of the new owner: making the business profitable and trying to accomplish this in everyday management. The competitive strategy changed towards a product innovation strategy and a rationalization of the product line. As a result of business renewal, the company launched a new electronic payment system for vending machines and established an exclusive supply agreement with a large multinational company.

Product innovation! This is the key for making the business profitable! For a small firm, it is very difficult to generate innovation [...] We can't buy technological innovation from outside the firm, because it is too expensive for us. We have to make innovation possible by developing our knowledge, improving technical processes and making R&D activities. (The owner)

Any attempt at innovation appears to be taking place with sound discussion involving three managers: operations manager, R&D manager and design manager. There was a very low disparity between the levels of knowledge flow from and to the managers in the network and this facilitated the spreading of tacit knowledge for unleashing innovation. One factor that might explain this spreading of knowledge is the small size of the firm, that makes existing

knowledge accessible and stimulates a dynamic knowledge environment where people interact in a dialectic way. This dynamic process of knowledge creation and utilization is continuously in motion because it is incorporated and validated through a set of practical activities. Interestingly enough, the production manager was heavily involved in dialogue with the other managers and this would suggest that problem-solving is not conceptualized as abstract decision-making but is immediately translated into practical activities, where new knowledge stems from learning-by-doing method. Whilst a new product process was started and people were allocated to specific tasks, the development of practical activities was able to stimulate the creation of a system of interrelated learning environments, exciting the spreading of knowledge in action. The product range of company 3 was reduced, in order to focus knowledge application and exploit it for fostering product innovation. This made both product design and production an extremely simple task. In response to the question of how such knowledge systems affected product innovation, the response was:

We don't absorb knowledge, we try to generate it! Our business is very complex in the sense that it requires a strong orientation to innovation. Our customers' needs are very disparate. Someone asks for a quick delivery, others for a tailor-made task or for a multiple-services task. But all our customers view us as a small, highly-specialized research center and expect us to provide them with innovation. (The owner)

The knowledge management style appears to be an extension of that found in company 1. Both companies adopted internal knowledge extensively for making product innovation possible. However, the problem company 3 faced was beyond the capacity to combine external and internal knowledge, because it required the systematic generation of new knowledge. This result is highlighted in the following quotation:

Our product innovation ability has never been in doubt. Product innovation is what customers ask us and we have to be ready to provide them with innovation [...] and it is what we are going to do. (The owner)

To sum up, it would seem reasonable to say that company 3 certainly follows a product-based competitive strategy with a strong emphasis on the exploration of internal knowledge.

Company 4 – PCSQ-based competitive strategy and external knowledge exploration strategy

At the time of the study, company 4 had one manufacturing site that included the administrative office and employed 10 people, with an annual turnover in the range of €1.3m. Support for the assessment of the performance comes from the firm's history. At the end of 1990, there was a strong trading loss with job cuts and a capacity reduction. Not only financial resources were constrained, but the owners - three brothers - felt that their company came back at the starting point. The financial crisis was overcome by a debt consolidation process and the cash flow generated from important trading with a German multinational company. After the death of the older brother, the two remaining owners started looking for alternatives, as the business model was perceived as not aligned with the company's competitive strategy towards the market: the traditional plastic molding method, with mechanical insertion of molten liquid plastic into a ready shaped mold, was not perceived as being able to match changing customers' needs and the manufacturing technology innovation in the field. One complication of business renewal was associated with the complexity and challenging nature of the manufacturing process, demanding ongoing efficiency, innovation and cycle-time reduction:

We looked at how we could innovate our manufacturing process, including the equipment used for compression molding, and of course also the product range, because we had only one way of doing things and we wanted to develop a new way (The owner – Director of Operations)

For the first time in its history, the firm made a radical change, with the aim to reduce production costs and introduce new products by building on the acquisition of external knowledge from specialized sources. When the change started in the early 2000s, the priority was to identify the method for plastic molding that better adhered to the firm's valuable

practical knowledge, developed during previous years, as well as market demand. The chosen methods were injection and blow molding. The first method was useful for allowing the firm to compete in the prototyping sector and the second method opened the door to the bottles, tubes and containers markets. The resulting re-organization of the manufacturing process to reduce industrial costs, as well as the product range renewal that broadened the customers' portfolio, changed the firm's identity and its market positioning. This led to a full reorganization, since many employees favored keeping the traditional competitive approach and some had invested time, personal support and devotion in the new approach. In addition, the introduction of new equipment and the resulting change in the phases of the manufacturing process was very quick, although described as a challenging task.

It was very hard work! We tried to do our best for making the change possible [...] Our aim was to find another way to manufacture molding products by introducing small-lots lean production. But, the right question is: "how to get it"? It was a deep turning point for some employees, who decided to leave the firm; others told me that the challenge could be won only by working together. We introduced the newest production technology and we started to adapt it to our needs in a very pragmatic way [...] Experimentation without knowing where we were going, without planned activities but using what we knew from our history and the acquired knowledge for making something unique (The owner – Director of Operations)

Considerable efforts were expended within company 4 in the building of a highly technical work environment, where employees are expected to work closely together on process and product innovation, and finding the right solution collectively. This context was perceived as a knowledge-creating environment, where the external knowledge was blended with different types of expertise and internal knowledge. Such ability was used to create a flexible manufacturing process able to manage small-lot production, to minimize inefficiency and to produce a high range of products for different sectors. When the introduction of the new production system was completed, the firm started paying attention to product prototyping, using generative techniques that integrated available external knowledge, both formalised and non-formalised, with the knowledge of the practical work necessary for creating original design solutions for customers.

Overall, company 4 appears to compete through a product-based strategy and it could be regarded as an example of exploratory learning, since it possesses the ability to find original solutions using knowledge from open environments.

Summary and conclusion

The data analysis presented above shows that each of the 4 small firms displayed different approaches to competitive strategy and knowledge management. The quantitative research methodology adopted in the pilot study (Bagnoli et al, 2015) leads to a rigorous testing of the alignment between competitive strategy and knowledge strategy in all the firms involved in the research project. The pilot study provides a coherent explanation for the relationships between human-based competitive strategy and exploitation strategy, and between product and customer service quality-based competitive strategy and exploitation strategy, which are consistent with the data presented in the case study.

Under certain conditions, it was suggested that the role of knowledge management for building a firm's competitive advantage was well understood. Knowledge exploitation and exploration could be seen as providing an integrated knowledge-creating environment, where knowledge is socially constructed, produced and shared. This role of knowledge was supported by the creation of an enabling context that stimulated the creation, use and sharing of internal and external knowledge.

Company 1 exhibited a relatively high level of internal knowledge that supported a radical change in the development of design processes, with the translation from routine-based design projects to non-routine based ones. Analysis of the internal knowledge network

showed a prominence of communication, discussion and dialogue among all the members of the design staff, with the pivotal role of the entrepreneurs and the engineering director. In this manner, existing technical and operational competencies were intertwined and original solutions emerged non-deliberately through everyday practices.

This situation contrasts with that of Company 2, which showed a high ability to acquire external knowledge and to adapt it to internal activities, in order to increase the firm's stock of competitive knowledge. The owners were engaged for a long time in an ongoing search for interesting external sources of knowledge and they were able to create a knowledge adaptation process, where external knowledge became integrated within the firm's activities. Despite its lack of experience in the process, the married couple developed a strong ability to work on knowledge adaptation in addition to the creation of new knowledge through internal experimentation.

Company 3 was an example of a firm faced with a strong product renewal programme, using internal competencies for the creation of new knowledge. The development of knowledge was regarded as a problem-solving activity, oriented towards the exploration of available knowledge. This ability was used both to increase the firm's current knowledge base and to develop new technical solutions. The forms used for knowledge development alternated between laboratory experiments towards a target to informal sharing of tacit knowledge and the problem-solving activities were intertwined and built on each other.

Finally, Company 4 was also faced with a radical business renewal programme, due to its strategic shift into more advanced product technology. Unlike Company 3, Company 4 demonstrated quite a sophisticated knowledge management system, aimed at exploring complex external knowledge through activities like experimentation, brainstorming meetings, planning meetings, and prototype testing. Data analysis also indicates that these activities occurred simultaneously, because the problem-solving activities can happen at the beginning of the innovation process, or during the process, or at the end of the process itself. In conclusion, the problem-solving activities were continually interacting and adjusting.

The academic contribution of this research is to analyse the dynamics behind the competitive strategy of small firms and their relationship to knowledge exploration and exploitation. We analysed how the source of competitive advantage and knowledge activities are continually interacting with the dynamic use of internal and external knowledge. It seems that the use of knowledge management has been crucial in keeping or improving each firm's competitive position. For practitioners, this study shows the importance of using different knowledge strategies to develop better competitive strategies. Also, small firms demonstrated a strong ability to develop knowledge internally and to create mechanisms for the acquisition and adaptation of knowledge from the environment.

Limitations and Future Research

The main limitation of this research is linked to the multiple case study methodology, since the results come from the case studies of 4 firms and we cannot generalise our findings. Are the knowledge management activities used in other companies in a similar sample? Do other companies in the sample adopt exploration and exploitation knowledge strategies for the same competitive purposes? Future research should analyse other small firms to investigate how the alignment between competitive strategy and knowledge strategy differs across industries, markets and geographical scope.

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