Knowledge-Based Strategies: Case-Study Analysis of Local Computer Service Companies

Enrico Scarso and Ettore Bolisani
DTG - University of Padua, Vicenza, Italy
enrico.scarso@unipd.it
ettore.bolisani@unipd.it

Abstract: The studies of models for formulating business strategies that explicitly consider knowledge as the core resource are still insufficient. This paper analyses this issue by considering the particular case of computer service firms, which can be seen as Knowledge Intensive Business Services (KIBS) connecting the sources of technological innovation (i.e. large multinationals, research laboratories, universities, etc.) to the individual needs of the local customers. In particular, they operate as mediators between the local cognitive requirements and the more generic knowledge resources available in the global environment. Since the activity of those companies is based on the capability to manage knowledge flows among various actors, the formulation of their business strategies requires new approaches that directly focus on cognitive processes. The paper describes the results of an extensive survey involving the computer service companies located in a specific region (Northeast of Italy). The study allows to draw useful schemes for the identification of knowledge-based strategies, which can be of use beyond the specific context of investigation. In particular, the paper: a) analyses approaches that can be used to establish a knowledge-based business strategy; b) uses such approaches to identify how computer service firms pursue their business strategy by means of a proper management of their knowledge assets; c) discusses the utility of the illustrated approaches, and provides some suggestions for a future research agenda.

Keywords: Knowledge-based strategy; KIBS; knowledge mediators; computer services; case study

1. Introduction

Even if the business software industry is dominated by a restricted number of large vendors (Microsoft, Oracle, SAP, etc.) the role of small computer service companies that operate locally is still crucial (Bolisani and Scarso 2009). This role can be fully explained in cognitive terms. In particular, such firms can be seen as Knowledge Intensive Business Services (KIBS) (Martinez-Fernandez and Miles 2006; Rajala et al. 2008), namely companies whose main function is to connect the sources of technological innovation (large multinational vendors, laboratories, universities, etc.) to the specific needs of local customers and especially those that can't interact effectively with the global environment. Consequently, they perform as mediators between the particular knowledge requirements of their clients and the more generic knowledge resources available in the economic system (Miles, 2005; Aslesen and Isaksen, 2007).

Since the activity of KIBS is chiefly based on the capability to manage knowledge flows among various and different players, the formulation of their business strategies requires new approaches that directly focus on their cognitive processes (Landoni et al. 2008). So far, models for formulating business strategies that explicitly consider knowledge as the key resource are still insufficient, which is especially critical for KIBS (Muller and Doloreux 2009). Also, there is the need to link the formulation of a KM strategy to the more traditional approaches of strategic planning (Haider 2009).

The aim of the paper is to provide insights into these issues by describing the results of an extensive survey of computer service companies in a specific area (Northeast of Italy). Especially, the study focused on the processes of external acquisition, internal elaboration, and, finally, transfer of the knowledge needed to provide services to the clients. The analysis allowed drawing some useful schemes for the identification and classification of knowledge-based strategies, which can be of use even beyond the specific context of investigation. In particular, the paper:

- illustrates and discusses some approaches that companies can use to formulate a knowledge-based business strategy;

- makes use of such approaches to summarise the results of an empirical investigation concerning how computer service firms pursue their business strategy by means of a proper management of their knowledge assets;

- investigates the utility of the illustrated approaches, and provides some suggestions for a future research agenda.

In detail, we first define the characteristics of computer service companies seen as KIBS and particularly cognitive mediators. We then illustrate the notion of knowledge strategy and its relationships with the more classic strategic models, with the purpose to define general classification schemes. Finally, we describe the results of the empirical survey, and then derive some remarks about the utility of the notion and categories of knowledge strategy proposed.

2. Computer services as KIBS companies

The notion of KIBS was introduced by Miles et al. (1995) to denote private companies whose job consists in collecting, generating, analysing, and distributing knowledge with the aim to provide competencies and solutions that client firms are not able or willing to develop by themselves. KIBS firms rely on qualified professionals, which are experts in specific technical disciplines or functional domains, and supply information, knowledge or other knowledge-based services to the clients. Examples of KIBS include a great variety of categories (Thomi and Böhn 2003): business consultancy and HRM, marketing and advertising, R&D services, computer and IT-related services, legal services, and technical services. A useful distinction has been made between P-KIBS (pure professional KIBS) and T-KIBS (technology-based KIBS, such as R&D services - Miles et al. 1995). Recently, an additional category has been included: C-KIBS, that refers explicitly to computer and software related services (Martinez-Fernandez et al. 2004).

Knowledge is the major asset that KIBS handle: these firms acquire, transform and supply knowledge to the client organisations. Usually, such knowledge is created in a strict contact with the clients, who are consequently directly committed to giving a substantial contribution to its production and are involved in interactive learning processes (Bettencourt et al. 2002; Leiponen 2006). The complex nature of knowledge as the basic element of the service shapes the structure of KIBS sectors, since the "useful" knowledge is not as generic and mobile as is often considered. For that reason, rather than isolated KIBS companies it would be more appropriate to speak of KIBS sectors or chains (Miles 2005), consisting of the combination of various firms whose different cognitive specialisations integrate. Usually, there are (few) large trans-national KIBS companies, that "lead the way" with the new innovative services, and a larger number of small service firms, which deal with specific areas and/or niches of market.

Recent studies underline that KIBS play an essential role in the processes of technological development, because they provide the intangible assets, which are the key drivers of innovation (Miozzo and Grimshaw 2006). Also, since they *shuttle* between distinct clients, KIBS carry new ideas and best practices from one firm to another, thus resulting a vehicle for the diffusion of new ideas and practices (Smedlund and Toivonen 2007).

KIBS can play a range of functions in innovation processes (den Hertog 2000; Smedlund and Toivonen 2007). As *facilitators*, they help the clients to develop their own products or processes. As *carriers* (or *brokers*), they transfer innovations developed elsewhere. As *innovation sources*, they directly elaborate innovative solutions for the customers. On the whole, their impact on the clients' innovative capability can vary, depending on the kind of relationship that is established (Hyypiä and Kautonen 2005). When KIBS assume an intermediate position between external knowledge sources and local recipients, they act as *innovation brokers*, performing the function of "bridges for innovation" (Muller and Zenker 2001; Leiponen 2006), i.e. acting as interface and mediator between the knowledge buried in the daily practice of client firms and the generic knowledge available in the economy as a whole. KIBS are also containers and dynamic sources of "quasi generic knowledge" extracted from repeated interactions with customers and other actors, including producers of new scientific knowledge. They are thus complementary to the public R&D sector as well, and serve as a tie or conduit between research centres and firms (especially the smaller ones) that lack internal resources to participate in public research directly.

Computer service companies encompass a highly intellectual value-added, since their job consists in applying the skills and competencies of their employees to solve the problems raised by clients (Rajala et al. 2008). Therefore, the source of their competitive advantage is grounded on the capability of (internally) developing and (externally) acquiring, integrating and assimilating, processing and transforming, accumulating and storing, retrieving and finally transferring to the clients a specific set of knowledge, in the form of an applicative solution. Therefore, knowledge is the "raw material" of the business processes of those companies, and accordingly they can be considered KIBS firms in all respects. This has been confirmed by many authors, who used such notion to investigate the role of

computer service companies (Miozzo and Grimshaw 2005; Martinez-Fernandez and Miles 2006; Aslesen and Isaksen 2007; Rajala and Westerlund 2007). Hence, those companies provide an interesting empirical field to investigate the utility of a knowledge-based approach to the formulation of business strategy.

3. Knowledge strategies as business strategies

The relationship between knowledge and strategy has been already stressed in the literature, even before the upsurge of interest in KM. However, it is with KM that knowledge strategies have become a recurrent focus of analysis. In short, knowledge strategy can be referred to the general guidelines that shape an organization's manipulation of knowledge assets (Kasten 2006). In more practical terms, the notion can be associated to the deliberate plans of the organisation for making the best use of knowledge for competitive advantage (Zack 1999; Holsapple and Jones 2006). From this point of view, the definition of a knowledge strategy should be strictly associated with the firm's business strategy (Eisenhardt and Santos 2002): that is, the knowledge strategy has to outline the KM initiatives or, more generally, the way knowledge is deliberately used as a strategic "weapon". This should be especially true in the case of KIBS, since knowledge is their key asset. Here, we will analyse some approaches that can be of use to connect traditional models of strategy definition to the ones that can be employed to set a company's knowledge strategy. In particular, we will refer to traditional classifications of business strategies and to their possible applications to knowledge strategies.

3.1 Porter's competitive strategies

One of the most popular classification refers to Michael Porter's (1980) "competitive strategies" that are: *cost leadership*, which pursues efficiency by means of product standardisation or economies of scale; *differentiation*, which aims at the creation of new services or markets; and *focus*, which refers to the identification of a narrow segment or niche in which the company attempts to reach a leadership position.

These strategic models can be applied to knowledge strategies as well. *Knowledge cost leadership* can refer to efforts to use of "existing" knowledge more efficiently. In other words, the company tends to exploit a specific well-controlled knowledge domain, by developing the capability to activate cognitive resources quickly and efficiently whenever a new project requires it. Organisational (such as: structured documentation processes, taxonomies, knowledge maps, etc.) and technical arrangements (e.g. knowledge repositories, knowledge retrieval systems, etc.) can be adopted to ensure the efficient use of knowledge assets.

A *knowledge differentiation strategy*, instead, implies developing or activating completely innovative knowledge when this is required by a new project or business. This implies the capability to resort to internal or external pools of knowledge whenever it is necessary, and to integrate and combine wide-ranging cognitive resources for facing a new problem. A focus on tools or arrangements that enhance exploration, creativity and knowledge sharing is therefore useful here.

Lastly, a *knowledge focalisation strategy* means that a company specialises on a particular knowledge domain. The scope of cognitive assets is restricted, but the knowledge of employees and, more generally, of the organisation is more profound. This strategy is especially useful for companies that base their competition on the capability to conduct specific but high-quality projects.

3.2 Knowledge strategy matrix

Some studies have built knowledge strategy classifications by developing and adapting the well-known Ansoff's product/market strategic matrix (Von Krogh et al. 2001; Landoni et al. 2008). Here, we propose an adapted version of a knowledge strategy matrix (fig. 1) which is particular functional to the investigated firms, and is based on the combination of applicative and technological knowledge. The technological knowledge refers to the technical specialisation of the company, i.e. the kind of technology required to deliver the products or services provided by the company. The applicative knowledge considers the "client" perspective, i.e. the kind of needs which the product or service is designed to meet. Four distinct strategies can be thus identified:

- *consolidation*, which implies to maintain the boundaries of the current cognitive positioning of the company. To be successful, this strategy requires that the possessed knowledge base is continuously updated and exploited in order to provide always new and improved services;

- *expansion*: the company attempts to develop its pool of technological knowledge (for instance, by acquiring competencies on new platforms, programming languages, hardware systems, etc.) but remains in the same applicative area. This strategy is useful to meet specific needs of customers that, for instance, are interested in a particular application but require its adaptation to different environments;

- *exploitation*: the same "old" knowledge pools are exploited to provide new applicative services. For instance, this can mean to adapt a vertical ERP system to another sector. The company needs to extend its knowledge about new needs of clients or applicative markets, which have not been considered so far;

- *exploration*: this strategy means to radically modify the pool of knowledge currently possessed, with the purpose to explore new technologies or new market applications. This represents an effort to reach new frontiers that, in the future, might be the starting point for new consolidation strategies.
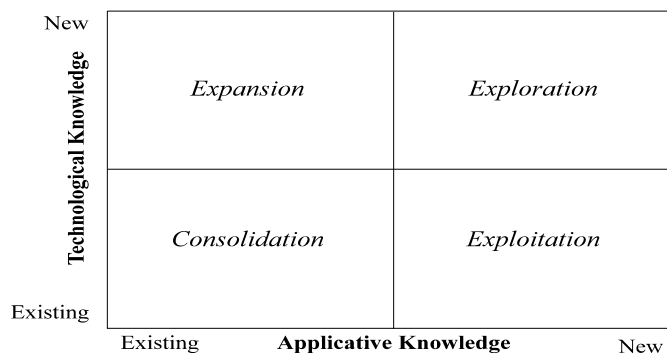

Figure 1: Knowledge strategy matrix

The first strategy ("consolidation") represents a conservative approach, which may be not risky in the short run, but can weaken the position of the company especially in highly dynamic environments. The last strategy ("exploration") is very risky and requires a particular attitude of the organisation; however, if it turns out to be successful, this strategy can lead the company to reach a position of advantage in the future competition. The other two strategies can be seen as strategies for growth by avoiding being kept locked in a specific domain but, at the same time, avoiding the risk of investing in completely new areas.

3.3 Knowledge chain

In the KM literature, there have been some attempts to adapt Porter's notion of value chain to the activities of knowledge manipulation. One of the best results is Holsapple and Singh's (2001) *knowledge chain* (fig. 2).

Similar to Porter's approach, this model can be also used as a tool for strategic setting. It allows managers to identify the knowledge manipulation activities that add value to the company, and the relevant supporting activities needed to sustain them. The assumption is that, by focusing the knowledge strategy on the effective management of these critical processes, the organisation can improve its competitiveness.
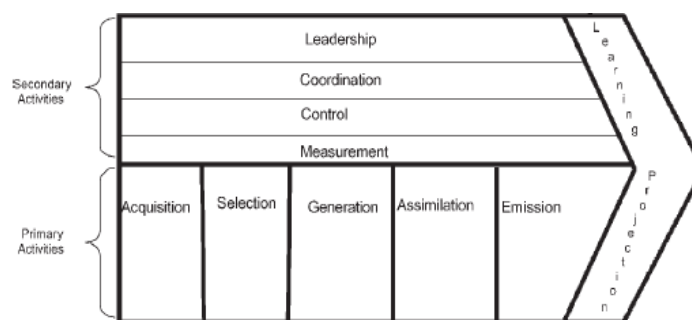
Figure 2: Knowledge chain (from: Holsapple and Singh 2001)

4. Empirical survey: purpose and methodology

Here we present the results of a study of knowledge-based strategies of local computer services, aimed at investigating the relationship between the business strategies pursued by companies and the knowledge-intensive orientation of their business, and classifying these *cognitive strategies* in accordance with the schemes previously illustrated.

Due to the exploratory nature of the analysis and its classificatory purpose, a case-study methodology (Yin 1989) was considered to be the most appropriate approach. Hence, the research was carried out by means of a multiple case-study concerning the business and knowledge strategies of 21 small firms in a specific area (Northeast of Italy - tab. 1). Pure resellers, as well as the single software developers or micro software houses, were excluded, and the focus was on suppliers capable of (partly) producing fresh knowledge based on existing technological streams, and of interacting with customers effectively.

Table 1: An outline of the cases examined (disguised names for reason of confidentiality)

Company	Specialisation	Main markets	Size
A	IT Infrastructure	SMEs	7
B	ERP	Retailing, Manufacturing	50
C	ERP	SMEs, Beverage	60
D	ERP; Business Intelligence	Manufacturing SMEs	110
E	IT Infrastructure	Finance; Insurance	50
F	IT Infrastructure	SMEs	20
G	ERP	Manufacturing SMEs	100
H	Test and measuring systems	Manufacturing; Laboratories	22
I	Network management	Large enterprises; Public org.	53
J	Software applications	Large manufacturing firms	40
K	Security; Business Intelligence	Manufacturing firms	26
L	IT Infrastructure	PA; medium enterprises	30
M	Services; Connectivity	PA; Private companies	60
N	ERP; Consulting	Manufacturing SMEs	10
O	ERP	Manufacturing	250
P	MIS	Finance	273
Q	Information Systems	SMEs; Retailing; Hospitality;	140
R	ERP; MIS	Large Distributors	70
S	ERP	Manufacturing SMEs	50
T	BPR	Large distributors	15
U	Consulting	PA; Large firms	9

The survey mainly consisted of in-depth semi-structured interviews with managers, based on a framework previously sent to the interviewees. Firstly, it was intended to discover whether and to what extent the investigated companies are aware of the value of their knowledge assets, and what resources they activate in relation to that. Secondly, each interview examined how the single company generates economic value through the processes of external acquisition, internal processing and finally transfer the knowledge needed to supply services to the clients. By analysing these findings, it was possible to identify the knowledge-based characteristics of the strategies pursued by companies. The research was conducted in 2008 and early 2009.

5. Main findings and discussion

5.1 Cognitive characteristics of the surveyed firms

Here, we will first describe the overall features of the sample from a cognitive perspective. In the following section, we will apply the schemes previously illustrated for identifying and classifying the knowledge-related characteristics of the companies' strategies.

Although with some variations from one case to another, all interviews confirm that these companies are rich of technical and applicative competencies, which allow them to fully meet the local demand for computer services. They provide highly customised solutions, and the core of their business is the capability to identify and analyse the problems of clients, and to find and mix up the proper solutions based on the available technical tools developed elsewhere.

The managers confirm, with no exception, that knowledge exchanges with clients are vital. The clients are not only the final users of services, but also the source of new knowledge that the providers can use for future projects. They also affirm that cognitive interactions and exchanges with clients are favoured by the small distance, both in geographical and especially in cognitive terms (i.e. language used, common knowledge of local business practices and economic environment, etc.).

As regards the knowledge pools used by companies, since any application is an "ad hoc" solution developed or personalised for each specific customer, it is generally impossible for them to simply replicate "old" projects. Several interviewees assert that the use of systematic KM programmes, to store and retrieve documentation of past projects, might be very important for their companies. Unfortunately, due to the small dimension, only a few firms declare that they are able (or willing) to devote resources to this complementary but essential activity. This is the reason why the experience and capability of people are still the most important assets of companies, as confirmed by all respondents, and by the fact that training and recruiting are regarded as crucial activities.

The interaction with large vendors (and, more generally, with the sources of generic technological knowledge) is considered critical as well, although it varies depending on the kind of product or service provided by the firm. Especially for the companies that are direct partners of large multinationals (e.g. SAP, IBM, etc.), these interactions often entail bi-directional knowledge flows: the computer service firm provides technical knowledge to its customers, and provides information about the final markets to the large vendor as well. Consequently, the nature of knowledge exchanges modifies with the partner involved along the value chain.

5.2 Knowledge strategies and their classification: lessons learned

As illustrated in the previous section, a conclusion that can be drawn is that knowledge really seems to be the core asset of the investigated companies. The attention devoted by managers to the capabilities of the employees, to the possible re-use of the experience of past projects, and the importance ascribed to the knowledge exchanges with clients and vendors confirm it. Therefore, an essential question is to understand how the exploitation of this asset can be planned for business purpose.

Concerning this the cases are useful for interpretative purposes: in particular they allow to understand the conduct of knowledge-intensive companies, by means of the classifications and models previously described. It is possible to identify the available strategic options, their contents, and the critical aspects of their implementation. Similarities and differences with the classic strategic models defined for traditional manufacturing firms can be also highlighted, and comments for the implementation of these strategies can be made.

As concerns the model of competitive knowledge strategies, the cost leadership strategy aims at providing low-cost services to the customers by exploiting the existing knowledge pools in an efficient way. For computer service firms, it requires that their knowledge assets be activated rapidly to meet the demand. A highly structured KM approach could be necessary, which implies a sufficient standardisation of procedures, codes, and contents, which enables the exploitation of cognitive "scale economies". In this industry, consequently, this strategy seems to be appropriate for large vendors only, who distribute standard applications in a large market, but not for small local providers. As regards the differentiation strategies, they involve the capability of activating new R&D projects

(which, for small providers, can be difficult and risky) or to join in partnerships with larger vendors (which is typical of a part of the small KIBS companies, although it reduces their autonomy). Niches or focus strategies seem to be aligned with the cognitive dimension of several local providers, and with the customised services they provide. In this case, small KIBS specialise in offering personalized configurations of "general" solutions developed by others.

As regards the "knowledge matrix" model, the four strategies allow focusing on the risks and long-term sustainability of knowledge management approach. The consolidation strategy is the easiest one, especially for small-sized firms. However, the company needs to build a robust knowledge base. Its sustainability depends on the capability to maintain current clients; therefore, the companies tend to keep their focalisation on existing customers' needs, which means that, without appropriate lock-in policies to keep the clients (which are, generally, more difficult for small providers), there is the risk that a sudden change in the market weakens the company.

The two strategies of expansion and consolidation are similar as regards the nature, but complementary as concerns the effects. They require deliberate efforts and investments to extend the knowledge base of a company, to identify new uses of a specialised domain. For small firms, this can be very expensive in terms of both financial and human resources. A possibility can be to grow by acquisition of other (small) companies, which can however lead to problems of integration. Lastly, the exploration strategy can be very risky and difficult, since it requires the activation of knowledge resources well beyond the boundaries of the company. For small companies, a complication can be the old age, because this factor might introduce a path dependency and a lower attitude to risking.

The knowledge value-chain model helps to understand why and how companies focus on specific KM activities. Here, we can just mention two examples. For companies that provide customisation of standard services (like, for instance, the SAP network), the most important cognitive activities are probably the assimilation of knowledge from the vendor and the emission of adapted solutions for the benefit of the customer. On the contrary, the generation of new knowledge and, even more important, its external acquisition and selection seem to be the real source of value for the companies that produce small but proprietary systems. This can explain why those companies organise their KM activities in different ways. Also, the model allows identifying and understanding some specific points of weakness. In particular, the investigated companies, which are mainly small, show a lack of resources that can be devoted to "organisational" activities. In other words, the supporting processes of the knowledge chain (e.g. organising knowledge mapping, storage and retrieval; arranging systematic training of employees, etc.) are generally less developed in these firms, because they are more involved in day-by-day projects due to their limited resources. As a result, the overall effectiveness of the "knowledge chain" can suffer.

6. Conclusion

On the whole, the approach to strategic analysis proposed here allows to read the classic strategic models, originally introduced for manufacturing industries, under a new light, namely by focusing on the cognitive aspects. This appears particularly critical in sectors, like those examined, where knowledge is the key competitive resource.

The research work conducted so far is mainly an explorative analysis of the strategies and behaviours of companies seen from a knowledge-based view. The models proposed offer useful classifications both from a descriptive viewpoint of the different competitive positioning of companies in a knowledge-intensive sector, and as managerial tools. As regards the last point, we argue that the connection between traditional strategic models and the new notion of knowledge strategy is appropriate for managers: since these models are often part of their professional background, the effort of extending and adapting them to knowledge strategies can be particularly effective. Also, this approach can facilitate the diffusion of KM practices, even in small businesses.

An overall impression is that there is no "best approach" to define a knowledge-based strategy. Even though there are connections between the different classifications (e.g. the "knowledge cost leadership" strategy has points in common with the "knowledge consolidation" strategy, etc.), each model shows different and complementary views.
The limitations of this study represent the opportunity for a future research agenda. A first one relates to the sample examined. Although these represent a good example of industry where the management of knowledge is central for the business, the models require further empirical

validations, in other knowledge intensive industries or even in traditional sectors. In addition, the sector analysed is populated by many small businesses and geographically restricted. This was consistent with the exploratory aim of the research, but there is the need to conduct more extensive surveys of larger and differentiated samples.

A second important limitation is that the study has mainly a descriptive purpose. The research allowed to identify possible classifications of the conducts of existing companies. Instead, the development of the models in the direction of operative guidelines may require the definition of methods for strategic planning in advance. For instance, it may be useful to investigate how these models can be used to plan knowledge strategies based on specific environmental aspects (for instance: markets, competitors, local socio-economic constraints etc.), organisational characteristics of the company, business projects, etc.

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