Configuring Capabilities for Integrated Solutions: Evidence from the IT Sector

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ABSTRACT This paper investigates the way that firms' environmental context and organizational structure influence their strategic choices and lead to different capabilities configurations. Drawing on contingency theory and the resource-based view, we explore integrated solutions—an emerging business model in which firms bundle products and services—in the IT sector, which is a particularly appropriate context due to its novelty, high-technology characteristics and implications for capabilities development. This study contributes to research and practice by identifying how organizational and environmental/market factors co-evolve with firms' strategy and how firms' distinct strategic decisions lead to differences in capabilities configurations.

KEY WORDS: Capabilities, integrated solutions, IT sector, contingency theory, resource-based view

1. Introduction

In an increasing number of industrial sectors, there is an emerging movement toward the provision of bundled services and products. Scholars have labeled this trend integrated solutions (Galbraith, 2002a; Oliva and Kallenberg, 2003). Integrated solutions represent “a business model that combines products and services into a seamless offering that addresses a pressing customer need” (Wise and Baumgartner, 1999: 138). The provision of bundled products and services poses a number of challenges for manufacturers in terms of capabilities development and configuration. Firms that offer integrated solutions must shift their core capabilities from manufacturing to the provision of services previously carried out by business users (e.g. after-sales support, maintenance, training, operations, finance, consultancy and service provision). They also must develop coordinative capabilities required to manage new types of long-term relationships with suppliers and customers, as well as the embedded service technologies required to support integrated solutions provision, such as the control technologies (mainly based on digital electronics) used to
perform maintenance and run remote diagnostics, system operations and so on. Firms are reinventing themselves as systems integrators able to provide integrated solutions for their customers (Davies, 2004; Hobday et al., 2005; Davies et al., 2006).

Integrated solutions consist in the offering of products and services together in a unique solution (Eppen et al., 1991; Spiller and Zelner, 1997; Bakos and Brynjolfsson, 1999; Cerasale and Stone, 2004; Windahl et al., 2004). It can be considered a special type of product bundling in which the needs of clients are central in choosing the services and products to bundle. Since this is a new business model, empirical evidence is still in its infancy. Research carried out so far has focused on two main issues: rationales that push firms to offer integrated solutions (Slywotzky, 1996; Hax and Wilde, 1999; Wise and Baumgartner, 1999; Oliva and Kallenberg, 2003), and changes required for organizations adopting this new model (Nambisan, 2001; Galbraith, 2002b; Oliva and Kallenberg, 2003; Sandberg and Werr, 2003; Davies, 2004; Windahl et al., 2004; Davies et al., 2006). Our paper aims to contribute to this emerging stream of literature.

Integrated solutions as a business model has emerged in response to a number of changes in the external environment. In certain industries, customer sophistication and low-cost players have undermined traditional sales channels. The low-cost distribution of products and services represents a menace for the traditional players, as many customers have begun to ask for high-value services to be added to products (Slywotzky, 1996). Oliva and Kallenberg (2003) identified the following three factors that underlie the trend towards the offering of integrated solutions: (a) economic factors: services have longer life cycles and larger revenues; (b) market factors: with integrated solutions, firms can satisfy increasing customer demand for more services; and (c) competitive factors: services are more difficult to replicate, and a competitive advantage based on services is more defensible.

The literature on integrated solutions has primarily focused on the transition from product-based to service-based competition. To offer integrated solutions, firms must restructure their organization around customers (Galbraith, 2002b; Davies et al., 2007). From the firms’ point of view, offering a solution means solving a customer’s problem; from the customers’ point of view, buying an integrated solution represents outsourcing some activity and thereby focusing their own resources on their core business. Firms offering integrated solutions must move downstream and provide services in addition to products. The introduction of services is a crucial step, because the capabilities required to provide services differ from those required for products (Wise and Baumgartner, 1999; Windahl et al., 2004). The offering of services requires the development of organizational principles and organizational structure new to a product manufacturer. To achieve this, firms must divert financial and management resources from traditional areas. This process must be carefully managed to achieve a successful transition.

The direction of change can also be upstream. This is the case for consulting firms such as Atkins, which transitioned from an engineering consulting firm to an integrated solutions provider. This services-based firm moved toward the manufacturing of products in its development of systems integration capabilities (Davies, 2004; Davies et al., 2007). Whether the direction of the change is downstream or upstream, firms’ goals are the same: to be able to provide products and services to their customers (Davies, 2004; Davies et al., 2006).

The aim of this paper is to explore the capabilities required to offer integrated solutions, and to identify which factors drive capability configuration in the information technology (IT)
sector. By IT we refer to the science of managing information systems. These systems encompass all forms of technology used to create, store, exchange and use information. The IT sector includes all the businesses related to hardware and software that enable data collection, storage and manipulation. We chose to focus on this sector because it is one of the largest and most important sectors in which the integrated solutions trend has taken hold. In our study, we investigate the factors that lead to differences in capabilities configuration across firms by analyzing a set of 10 cases through two theoretical lenses—the resource-based view and the contingency approach. The integration of these two approaches enables us to identify clusters of firms that, under the influence of various factors, developed similar configurations of capabilities in order to offer integrated solutions.

This paper is organized as follows. In the next section we review the main contributions of the resource-based view and contingency theory and propose the analytical model used in the present work. Section 3 explores the research method used to collect empirical evidence. In Section 4, we analyze the empirical evidence and offer a tentative taxonomy of the capabilities managed by firms offering integrated solutions within the IT sector. In Section 5 we further analyze the empirical evidence and identify groups of firms that show similar patterns of strategic choices and capabilities configurations, which we subsequently explore. Section 6 discusses the implications of our findings and the limitations of the work, as well as suggesting a tentative research agenda for future analysis of the integrated solutions issue.

2. Literature Review and Model Development

The resource-based view of the firm, based on Penrose’s work (1959), assigns central relevance to the internal resources and capabilities of the firm, as they constitute the source of a firm’s competitive advantage. Firms are perceived as a unique bundle of resources, and the primary task of management is to increase firm value through the optimal deployment and development of internal assets. Because performance is a function of the resource mix adopted by the firms, differences in firms’ resource portfolios allow them to achieve competitive advantage (Ansoff, 1965; Barney, 1991). The conceptual link between resources and capabilities is pointed out by Grant (1996), who defined organizational capabilities as the outcomes of resource integration, for which knowledge is the most relevant factor (Chandler, 1990; Grant, 1996, 1998). Grant cited the example of American Express’s billing system as a constellation of complex and team-based productive activities that constitute an organizational capability (Grant, 1996). Following Grant, we consider capabilities to be the activities performed by firms that require distinctive knowledge to integrate different resources. These activities are carried out by internal employees (Williamson, 1975; Grandori, 1997, 2006). In the present paper, we investigate the ways that capabilities are configured in different organizations. We define capabilities configuration as the mix of capabilities directly controlled by firms using a hierarchical mechanism of coordination rather than a market-based mechanism.

Scholars have stressed that to be successful in the migration to integrated solutions offerings, firms must develop adequate capabilities (Wise and Baumgartner, 1999; Galbraith, 2002b). When offering integrated solutions, firms can move upstream and/or downstream. The differences in the possible paths imply a divergence in the way in which new capabilities are developed and in the final configuration of those capabilities. To
embrace the new business model, a change in the existing set of capabilities is required. Previous studies, however, do not provide a detailed analysis suggesting which capabilities are crucial for integrated solutions providers and how to configure them. Following recent contributions (Fredericks, 2005) that combine the resource-based view and the contingency approach, we aim in this paper to shed light on the ways that different factors influence capabilities configuration. Specifically, we seek to determine which factors are the most important in the development of integrated solutions capabilities. We will analyze this issue through the theoretical lens of the contingency approach.

The contingency approach is based on the assumption that a link exists among organizational context, structure and performance (Duncan, 1972; Miles and Snow, 1978; Drazin and Van De Ven, 1985; Venkatraman, 1989). Firms face different types of environments and must be able to cope with such contextual diversity. The geographical location of the market, the type of clients and the structure of the competition are just a few of the many factors that can differentiate environments. A firm's organizational structure needs to be coherent with its context: the greater the coherence, the better the fit between context and structure. Fit is one of the key concepts in the contingency approach. In this study, we define fit as the “degree of internal coherence among a set of theoretical attributes” (Venkatraman, 1989: 432). This definition implies that recurring clusters of attributes must be found among the analyzed firms (Miller, 1981). Following previous research, we use an inductive approach to investigate fit (Venkatraman, 1989). Contingency scholars have employed performance indicators to assess the fit among elements. In the present work, however, we take an approach akin to that adopted by population ecology scholars, who argue that the context–structure relationship is sufficient for the testing of organizational fit, because fit between context and structure is assumed to exist in surviving organizations (Fennel, 1980; Di Maggio and Powell, 1983).

Firms make strategic decisions after analyzing organizational and environmental factors. Their decisions must be coherent with these factors. Because each firm presents a unique configuration of factors, there is a lack of generalizability in strategies (Fredericks, 2005). Hence, contingency scholars argue that no best strategy exists; rather, each strategy must be appropriate to the firm’s unique mix of elements. Each firm has a unique organizational context that has to be matched with the external environment (Miller, 1988). The matching of those elements comes about as the result of natural selection, an evolutionary process of adaptation (Drazin and Van De Ven, 1985). Environmental and organizational factors co-evolve, and the formulation of strategy has to consider those interactions; moreover, capabilities must be configured in accordance with the chosen strategy. For surviving organizations, coherence between strategic decision and capabilities configuration should exist. In our model, however, we will depart from this assumption. Ginsberg and Venkatraman (1985) argue that contingency theory-based strategic research focuses mainly on four aspects: (1) the influence of external environment on strategy; (2) the influence of organizational variables on the formulation of strategy; (3) the influence of performance variables on the formulation of strategy; and (4) the influence of the chosen strategy on organizational arrangement. In this work, we assume that strategies are influenced by organizational and environmental factors, and we aim to explain how capability configuration varies according to different chosen strategies. Departing from Ginsberg and Venkatraman’s taxonomy (1985), we focus on the influence of the external environment and organizational variation on firm strategy as we analyze the relation
between structure and organizational context and explain how different factors interact. In Figure 1 we present the analytical model used in this study, which is adapted from Ginsberg and Venkatraman (1985: 424).

The identification of independent variables relies on the seminal paper by Ford and Slocum (1977), who argue that size, technology and the environment affect firm structure. We include in our analysis both size and environment (market), and we investigate technology from two different points of view: an internal perspective, namely, core business; and an external perspective, the complexity of customers’ needs. We present below a detailed discussion of our variables.

The market represents the first environmental variable in our analysis. Market characteristics differ with the changing geographical extension of the market itself. Local, national and international markets differ in terms of competition, roles, entry barriers and the relevance of territorial proximity (Grant, 1998). The nature of the entry barriers differs across local, national and international markets: entry barriers in international markets consist in economies of scale, the importance of brand and the use of advertising, while in smaller markets lower prices and customer loyalty play a major role in preserving competitive advantage (Rosenbaum and Lamort, 1992). Territorial proximity is not as important in international markets as it is in smaller markets. In the latter case, face-to-face interaction with clients is crucial. In international or national markets, the location of the firm does not represent a competitive advantage, since the firm usually has branch offices in different places. As suggested by Grant (1998), the definition of market boundaries thus must take into account the geographical dimension in order to identify competitors. For these reasons, we use the geographical extension of the market as a proxy for environmental context.

The second environmental factor is the complexity of customers’ needs. In an integrated solutions context, customer satisfaction is crucial (Wise and Baumgartner, 1999):

**Figure 1.** Analytical model
this is what differentiates a simple bundling of products and services from an integrated solution. The more complex the needs of the customers, the more complex will be the solution. The provision of a complex solution thus requires a certain level of technological capabilities (Davies and Brady, 2000). In our investigation of the complexity of customer needs, we consider two distinct factors: the level of standardization of the solution, and the level of sophistication of the client. These two factors are linked: low standardization and high client sophistication entail solutions of high complexity. Standardized solutions can be easily implemented and, more importantly, they allow firms to achieve economies of scale in post-sales activities such as systems maintenance and upgrading (Windahl et al., 2004; Brady et al., 2005). Consumer sophistication refers to the customer’s level of training or experience in relation to the technologies comprising the solution. The higher the level of customer sophistication, the more complex will be the solution provided (Spiller and Zelner, 1997). Customers with low levels of sophistication require simple, low-tech, standardized solutions that are easy to maintain and use. In contrast, highly sophisticated customers have more complex needs that generally require high-tech, customized solutions.

The two organizational factors that we consider are a firm’s size and its core business. Scholars in the field of contingency theory have argued that size significantly affects firm structure (Ford and Slocum, 1977). Since the 1960s, contingency theorists have focused on firm size, because financial capabilities, possible economies of scale, organizational flexibility and innovativeness are factors that are directly linked to this measure (Woodward, 1965; Lawrence and Lorsch, 1986). The strong correlations among those elements have led numerous researchers in this field to use firm size to analyze organizational characteristics (e.g. Mealiea and Lee, 1979). Another reason for the wide use of this factor is the large amount of extant empirical evidence confirming the central role of size in the explanation of organizational characteristics (Penrose, 1955; Pugh et al., 1969).

The second organizational factor on which we focus is the firm’s core business before it transitioned into the provision of integrated solutions. This factor also represents the second specification of the concept of technology (Ford and Slocum, 1977). To operate in a high-tech sector such as IT, knowledge of the relevant technologies is a necessary condition (Kogut and Zander, 1992). Moreover, as pointed out by integrated solutions scholars (Wise and Baumgartner, 1999; Davies et al., 2006), to enter into the new business, a movement in the value stream is required. The core business of firms provides insight into the kind of technologies they manage, the capabilities they possess and the types of processes they have implemented. Given the influence of path dependency (Teece et al., 1997) and organizational inertia (Hannah and Freeman, 1984), we propose that a firm’s core business will also affect its strategic choices. The firm’s core business prior to its integrated solutions offering determines the type of capabilities already possessed and influences the development of new ones.¹

According to Grant (1996), a firm’s strategy must be based on its resources and capabilities and must be determined in relation to its external opportunities. Our

¹ Organization theorists have considered other factors when analyzing firms’ strategic decisions. However, we did not take these into account in order to simplify the analysis and interpretation of our model by limiting the number of independent variables. A partial list of these variables includes bureaucracy; flexibility; communication flows; technology adopted; dimension of work units; characteristics of productive processes; relationships with suppliers, clients and other firms; and control and decision-making processes (Burns and Stalker, 1961; Pugh et al., 1969; Duncan, 1972; Miles and Snow, 1978; Siggelkow, 2002).
investigation of firms’ strategic decisions is organized into three levels of analysis. The first level is represented by the configuration of capabilities. As explained before, we rely on the capabilities approach proposed by Grant (1996), in which we consider capabilities to be resources, integrated by distinctive knowledge, that allow a firm to perform selected activities. The configuration of capabilities has a central role in our model because firms must configure their capabilities properly in order to successfully implement a strategy.

The second level of analysis examines the rationales that motivate the offering of integrated solutions. In other words, we analyze the external opportunities that firms exploit when entering the integrated solutions business. The literature on integrated solutions identifies various rationales that push firms into this new business area (Slywotzky, 1996; Oliva and Kallenberg, 2003). Although the firms’ goals are the same, their integrated solutions offers can be a response to different internal or external stimuli.

The third level of analysis investigates the role of integrated solutions in the overall firm offering. Integrated solutions can represent the new core business of the firm, or it can play a secondary role. In the next section we describe the method used to investigate the phenomenon and to test our analytical model.

3. Method

The aim of this work is to investigate the configurations of capabilities adopted by integrated solutions providers. We have chosen to focus on the IT sector because it was the first to start the transition towards integrated solutions (Cerasale and Stone, 2004). After years of implementation, procedures and routines are now becoming standardized, and it is therefore possible to identify common paths in the capabilities managed by the firms. The rapid growth in the area of integrated IT solutions is due to the nature of products sold, which are characterized by a high level of complementarity and which also require a high level of expertise to use (Spiller and Zelner, 1997).

Two sources of data were used for our study: documents (including reports, journal articles, databases and firms’ official websites) and personal interviews. The document analysis, which constituted the preliminary phase, enabled us to acquire an understanding of the specific characteristics of integrated solutions in the IT sector and to identify sample firms and people to interview. In the second phase, open-ended interviews served as our principal source of data. The length of the interviews was between 60 and 90 minutes. Interviews were conducted between May and July 2004 at the firm’s site, or at the customer’s site if the interviewee was working there. All interviews were tape recorded and fully transcribed in order to preserve the details of the conversations.

The interviews, which were exploratory in nature, consisted of questions about specific topics related to integrated solutions. The responses reflected the particular point of view of the interviewees (Oppenheim, 2000). The questions are reported in Appendix A.

The questions were divided into three parts. The first part asked for a description of a typical project managed by the firm. For each phase of the project, the interviewees described the activities performed, the capabilities required and the organizational form adopted. The second part focused on capabilities. We followed the taxonomy provided by Davies et al. (2006) in the development of the capabilities questions. Davies et al. identified four types of capabilities: systems integration, operational services, financing and business consulting capabilities. For each capability, we investigated the level of standardization/
customization, the type of professionalism required for the activities, the problems and the critical features. The third part focused on the firm’s boundaries, with specific questions on types of relationships the firm had with its suppliers of products and services.

We adopted a multiple case study approach. Sample selection was carried out so as to ensure theoretical replicability—that is, so that the selected case studies could be reproduced either with results similar to those of the original framework or with contrasting results but for predictable reasons (Yin, 2003). Through the sample selection we sought to capture a representative variety of experience among the sample firms. We first selected five cases, for which we wrote individual reports. After a preliminary analysis of the results, we selected an additional five firms to further increase the sample variety. Each of the sample firms contributes to the theory-building process by representing a unique and interesting approach to the integrated solutions challenge. The interviews were conducted on-site in Italy. The sample comprises three firms operating in local markets, five firms operating in national markets and two firms operating in international markets. Two firms are hardware producers, three are software houses and five are consulting firms (Table 1). Firm names have been kept confidential.

Data analysis allowed us to identify 12 major activities that can be managed by firms when offering integrated solutions. Based on Grant’s definition (1996), we considered activities to be a proxy for the concept of capabilities. The 12 capabilities, which constitute a tentative taxonomy that will be described in detail in Section 4, operationalize our proposed capabilities configuration.

We grouped the firms into different clusters to test whether similarities in external and internal factors lead to similar configurations of capabilities. We operationalized the four variables described in Section 2 as follows. (1) Size has been proxied for using revenues and number of employees. (2) Core business has been operationalized in terms of the number of activities internalized by the firms and the role of services/products in the firms’ offerings before they moved into the integrated solutions business. In this way, we capture the distinctive elements characterizing the firms. (3) Market has been operationalized as the extent of the geographical boundaries of the markets served. Specifically, we distinguished among local, national and international markets. (4) Complexity of customers’ needs has

<table>
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<tr>
<th>Firm</th>
<th>Size</th>
<th>Core business</th>
<th>Market</th>
<th>Complexity of customers’ needs</th>
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<tbody>
<tr>
<td>Alpha</td>
<td>Large</td>
<td>Hardware producer</td>
<td>International</td>
<td>Medium/high</td>
</tr>
<tr>
<td>Beta</td>
<td>Small</td>
<td>Software house</td>
<td>Local</td>
<td>Low</td>
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<tr>
<td>Gamma</td>
<td>Medium</td>
<td>Consulting</td>
<td>National</td>
<td>Medium/high</td>
</tr>
<tr>
<td>Delta</td>
<td>Small</td>
<td>Consulting</td>
<td>Local</td>
<td>Low</td>
</tr>
<tr>
<td>Epsilon</td>
<td>Large</td>
<td>Software house</td>
<td>National</td>
<td>Low/medium</td>
</tr>
<tr>
<td>Zeta</td>
<td>Large</td>
<td>Consulting</td>
<td>International</td>
<td>High</td>
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<tr>
<td>Eta</td>
<td>Small</td>
<td>Software house</td>
<td>Local</td>
<td>Low/medium</td>
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<tr>
<td>Theta</td>
<td>Medium</td>
<td>Consulting</td>
<td>National</td>
<td>Medium</td>
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<td>Iota</td>
<td>Large</td>
<td>Consulting</td>
<td>National</td>
<td>High</td>
</tr>
<tr>
<td>Kappa</td>
<td>Large</td>
<td>Hardware producer</td>
<td>National</td>
<td>High</td>
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</table>
been proxied for at different levels. The identification of the levels was based on an analysis of the characteristics of the markets served and the solutions provided.

On the basis of this operationalization, we constructed Table 1 and performed a hierarchical cluster analysis using the SAS/STAT software (SAS 9.1 for Windows). To identify the clusters, we looked for managerial interpretability of the clusters and for a pronounced increase in the tightness of clusters as measured by the $R^2$ and the pseudo-$F$ statistic. This analysis led us to adopt the four clusters solution. The statistical results have been integrated with our analytical model to determine the compositions of the four groups (Ginsberg and Venkatraman, 1985; Venkatraman, 1989). Due to the small size of the sample and to the exploratory nature of our approach, the statistical results serve as supporting evidence for the qualitative interpretation of the data. Yet, the results of the cluster analysis represent a good point of departure for our analysis. Statistical details can be found in Appendix B; the interpretation of the four clusters is presented in greater detail in Section 4.2.

4. Integrated Solutions Capabilities in the IT Sector

4.1. A Preliminary Taxonomy of Integrated Solutions Capabilities

Systems integration capabilities make up the first set of capabilities, and the most important, according to the literature and empirical observations. We can distinguish between the capability to integrate products and services and the capability to integrate different technologies. The former is central for an integrated solutions provider, because to provide an integrated solution it is often necessary to buy activities, services or products outside the firm’s boundaries. Our data show that the latter capabilities are fundamental to the provision of solutions, as the role of a systems integrator is to make different technologies work together. In implementing solutions, different technological platforms must be able to communicate to ensure the proper flow of data.

Firms in our sample offer integrated solutions that consist of a complete IT system. This type of system must be tailored to the customer’s needs; thus, the understanding of these needs plays a central role in the success of integrated solutions offerings. Therefore, great importance is assigned to consulting capabilities. We distinguish two types of consulting capabilities: business consulting and technology consulting. The offering of business consulting services is required by the nature of the product sold. These services involve helping the client to improve its internal organization, that is, the efficiency of its internal processes. Business consulting includes all business-, organization- and marketing-related issues. The offering of integrated solutions also requires the capability to put together different technologies, as noted earlier. For this reason, integrated solutions providers must be able to offer technology consulting. If the technologies offered are not appropriate to satisfy the need of the customers, the firm risks building useless solutions. The role of the systems integrator thus is to understand the needs of the client and, in that light, to select the most appropriate technologies for the offering.

The third set of integrated solutions capabilities comprises operational capabilities. These capabilities are fundamental because of the nature of the products sold. It is not possible to sell software without assistance. The capabilities related to the operational services offered can be divided into four categories: hardware maintenance, software
problem solving, software maintenance and user training. The first type involves the maintenance of hardware, such as servers, workstations and networks. The second and the third types of operational services capabilities are concerned with software assistance. These two capabilities are strongly linked, because they represent two phases of the same process. The software problem-solving phase, often called “hotline service”, is performed by a call center and consists in the solving of software problems by phone. Some problems cannot be solved by phone, however, because they require capabilities that the call center does not have, such as the ability to modify lines of software code, eliminate a bug from the system or change software parameterizations. In such cases, the calls are redirected. This represents the second phase of the post-sales assistance process, which we call software maintenance. The fourth category of operational capabilities involves the training of the users. This consists in teaching customers’ employees how to use the new IT system.

Production capabilities can be subdivided into hardware production and software development capabilities. Only one out of 10 firms possesses the capabilities required for the production of hardware; software development capabilities, however, are more widely diffused. The latter capabilities consist in the ability to write code for a software product. All the software houses in the sample have software development capabilities. According to the interviewees, the possession of these capabilities represents a competitive advantage for their firms.

The last set of capabilities involves delivery capabilities. Among these, we distinguish the capability to deliver hardware and the capability to deliver software (i.e. software customization ability). The hardware delivery capability consists in the ability to deliver the hardware components of the solution, namely, servers and workstations. Software customization represents the core of integrated solutions in IT, because software, especially enterprise resource planning (ERP), needs to be customized to fit client characteristics.

Empirical evidence for our theoretical framework is summarized in Table 2, which shows that capabilities configurations may vary across firms. In the first column we list the 12 capabilities described earlier, grouped into five types: systems integration capabilities, consulting capabilities, operational capabilities, production capabilities and implementation capabilities. This categorization is an expansion of Davies et al.’s framework (2006). Because that framework was not sufficiently broad to accommodate all the activities observed in the interviewed firms, we have modified it to better fit the observed data. For each macro-category, one or more specific capabilities have been identified. These 12 capabilities are IT-sector-specific, and they represent all of the activities performed by the sample firms.

4.2. Capabilities Configuration for Integrated Solutions Delivery

The objectives of this section are twofold: to identify how organizational/market factors co-evolve with firms’ strategy, and to investigate the characteristics of strategic decisions according to the three levels of analysis previously described—capabilities configurations, rationales and the role of integrated solutions in firms’ overall offerings. Our data analysis allowed us to identify four groups of firms. The results of the cluster analysis of these groups are presented in Figure 2.

The number of firms within each group varies because certain factors and strategic choices are more common than others. In Figure 3 we show the positions of the firms and
A description of the four groups follows. For each group we discuss the relevant factors, strategic choices, capabilities configurations, rationales and role of integrated solutions.

Group A is composed of two firms, Alpha and Epsilon. Each has a high percentage of activities managed in-house: 100 percent for Alpha and 75 percent for Epsilon. Although they operate in different markets (national for Epsilon, international for Alpha), these firms are both large, with more than 500 employees each. The most important characteristic that Alpha and Epsilon share is that they both moved downstream into services. Alpha’s prior core business was hardware production, while for Epsilon it was software production. Because both were product-oriented firms, the offering of integrated solutions required a downstream movement.

For Group A firms, integrated solutions represent a new way to sell products, to know customers better and to forge a stronger link with them. In a sense, integrated solutions is more a new sales technique than a new vision for the entire firm. Although these firms have introduced certain organizational changes in order to provide integrated solutions, they have retained in-house all of the production, operational and delivery capabilities they already possessed, as they continue to sell their own products (hardware for Alpha and software for Epsilon). Due to the large number of these in-house capabilities, Group A firms

<table>
<thead>
<tr>
<th>Systems integration capabilities</th>
<th>Alpha</th>
<th>Beta</th>
<th>Gamma</th>
<th>Delta</th>
<th>Epsilon</th>
<th>Zeta</th>
<th>Eta</th>
<th>Theta</th>
<th>Iota</th>
<th>Kappa</th>
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<tr>
<td>Integration of products and services</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>100%</td>
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<td>Integration of different technologies</td>
<td>✓</td>
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<td>✓</td>
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<th>Consulting capabilities</th>
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<td>Business consulting</td>
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<th>Operational capabilities</th>
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<tr>
<td>Hardware maintenance</td>
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<td>Software maintenance</td>
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<td>Software problem solving</td>
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<td>Training of users</td>
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<th>Production capabilities</th>
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<td>Hardware production</td>
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<td>Software development</td>
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<th>Delivery capabilities</th>
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<tr>
<td>Software customization</td>
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<td>Hardware implementation</td>
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| In-house managed activities | 100% | 83% | 50% | 58% | 75% | 50% | 67% | 50% | 50% | 33% |

Source: Authors elaboration of interview data.
do not have any important suppliers; however, they do have many downstream partners that sell their products. The focus of their activity thus is still on production capabilities, and this represents a distinctive source of competitive advantage for them. Their capabilities configuration is a direct consequence of their decision to keep production capabilities
in-house. In fact, these firms are the only ones in the sample that still have in-house production capabilities and pay significant attention to them. This group considers production, delivery and operational capabilities as sources of competitive advantage.

Group B is composed of three firms: Beta, Delta and Eta. These three firms operate in a local market only and have fewer than 50 employees each. Firms in this group are software houses or consulting firms, and their percentage of managed activities is fairly high: 83 percent for Beta, 58 percent for Delta and 67 percent for Eta. The complexity of these firms’ solutions is low. For these firms, the offering of integrated solutions represents a movement both upstream and downstream and, from a strategic point of view, it is a way to fulfill the needs of their customers. The decision to internalize many activities represents a way for Group B firms to conserve resources: due to their small size, these firms cannot achieve scale economies in either marketing or personnel, and they do not have enough resources to manage a network of suppliers. Therefore, these firms tend to perform many activities in-house. People that work in these firms are skilled in multiple technologies and usually are able to work in different functional areas (for example, workers may perform both marketing- and delivery-related activities). They have broad knowledge about different aspects of the integrated solution but do not solve complex problems. Group B firms’ operational and delivery capabilities represent the core of their offering, due to the characteristics of their market: their customers’ sophistication is low, the customers require only simple systems to solve their problems and they are especially interested in post-sales assistance. What their customers require is what Group B firms offer.

Group C comprises four firms: Gamma, Zeta, Theta and Iota. These firms share the same core business: they are all consulting firms that began to offer integrated solutions. They operate in both national and international markets, and the level of sophistication of their customers and the complexity of the problems to be solved is high. The critical task for Group C firms is to find the right solution for their customers. The motivation for these firms to move into the integrated solutions business is the need and ability to differentiate their offerings from those of their competitors. As observed by one interviewee, the combining of three or more distinct pieces into a solution increases the firm’s opportunity to differentiate its offering and, as a consequence, also the possibility of resisting in the market. The offering of integrated solutions, for Group C firms, is a way to create a niche in which to operate where competition is not as strong. Integrated solutions also represent a way to provide a more comprehensive offering of consulting services for their customers.

The migration into the integrated solutions business required an upstream movement for Group C firms, and in doing so, they developed some product-related capabilities. Specifically, they acquired the capabilities necessary to offer additional products related to the consulting services already being provided. In many cases, the product-related activities were developed jointly with partners: three out of the four firms have strong relationships with product providers (i.e. hardware producers or software houses). Due to their size, they can achieve economies of scale and contractual advantages that make it profitable for them to outsource non-core activities. The percentage of in-house managed activities is the same for all Group C firms (50 percent), but the distribution of their capabilities varies because they operate in different market niches. One constant is that none of the firms manages its product-related capabilities in-house: the rationale for this decision is that these capabilities are not considered strategic.
Group D is composed of only one firm (Kappa). Kappa has more than 500 employees and operates solely in the national market. This firm is the only pure systems integrator in our sample. As a systems integrator, their role is to achieve technological and organizational synchronization within established product architectures (Brusoni and Prencipe, 2001), and that is precisely what this firm does. The solutions offered by this firm are very complex, customized around the specific requests of the customer, and with a high level of innovativeness in the use of technologies. Originally a hardware producer of infrastructure for the telecommunication industry, Kappa moved downstream into integrated solutions. The rationale behind this decision was the view that, according to the interviewee, only in the integration of products and services would it be possible to add value. When this firm started the transition towards integrated solutions, it outsourced to its partners all the activities that management considered non-strategic. So Kappa now offers complete solutions and acts as a systems integrator of different components produced and delivered by a large network of suppliers. Kappa has devoted special attention to the development of its systems integration capabilities because Kappa provides to its customers an integrated bundle of different products and services available through its large network of suppliers/partners.

In Table 3 we summarize the differences in the strategies pursued by the four clusters of firms. This figure reflects firms’ core capabilities, their rationales for pursuing integrated solutions and the role assigned to the new business model, as highlighted in the above discussion.

5. Discussion and Conclusions

In this paper we have analyzed the capabilities configurations related to the offering of integrated solutions by a sample of firms in the IT sector. To successfully offer integrated solutions, firms must manage service-related as well as product-related capabilities. This implies a movement upstream for service-based firms and a movement downstream for

<table>
<thead>
<tr>
<th>Group</th>
<th>Core capabilities</th>
<th>Rationales</th>
<th>Role</th>
<th>Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Production/Delivery/</td>
<td>New way to sell existing</td>
<td>Secondary to the</td>
<td>Manufacturer</td>
</tr>
<tr>
<td></td>
<td>Operational</td>
<td>products</td>
<td>previous offer</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Delivery/Operational</td>
<td>Accomplish simple</td>
<td>As important as the</td>
<td>Problem solvers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>customer needs</td>
<td>previous offer</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Consulting</td>
<td>Differentiation,</td>
<td>As important as the</td>
<td>Solutions providers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>creation of a niche</td>
<td>previous offer</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Systems integration</td>
<td>Add value to the offer</td>
<td>Central</td>
<td>Systems integrator</td>
</tr>
</tbody>
</table>

Source: Authors elaboration of interview data.

2 Kappa’s integration with its suppliers is very strong: for example, the contractual agreement with the supplier performing hardware maintenance requires that the supplier’s employees, while working with Kappa’s customers, must wear a uniform bearing the Kappa name.
product-based firms. According to contingency theory, environmental and organizational factors influence firms’ strategies, which in turn have an impact on firms’ capabilities configuration. We have aimed to identify and describe the relationships between environmental and organizational factors, strategies and capability configurations through a multiple case study in the IT sector (Drazin and Van De Ven, 1985; Venkatraman, 1989). Relying on previous studies (e.g. Davies et al., 2006) and on empirical evidence from our analysis, we have developed a taxonomy of capabilities that firms must manage in order to successfully offer integrated solutions in IT.

Using four contingency factors (i.e. size, core business, market and solution complexity), we have identified four groups of firms and have defined them by means of a hierarchical cluster analysis. Integrating the results of this analysis with previous analytical results in the literature, we have concluded that firms within the same group pursue similar strategies. This is consistent with the reasoning of contingency theory (see, e.g. Drazin and Van De Ven, 1985; Siggelkow, 2002) in that, for our sample, similarities in organizational and environmental factors lead to similar strategic choices, and the varied importance attributed to different capabilities within each group is influenced both by external and organizational factors and by strategic choices. These findings are summarized in Table 4.

Our empirical evidence sheds new light on the analysis of firms’ capabilities for integrated solutions. The literature (Davies et al., 2006) has stressed that systems integration capabilities are central to the offering of integrated solutions. Our results illustrate that the importance of different capabilities varies across groups, and therefore there are different ways to offer integrated solutions. Specifically, the importance of firms’ systems integration capabilities varies from medium to high (cf. Group D, and Tables 3 and 4). However, environmental and organizational factors also play an important role in shaping capabilities configurations. The fact that firms’ responses may differ despite similar technological or market conditions is consistent with the evolutionary approach upon which we rely (Nelson, 1991).

The empirical evidence also illustrates the factors that influence firms’ strategic decisions in offering integrated solutions. The complexity of the solution is the most influential factor (Table 4), as it has an impact on each group. This again is consistent with the observations that the offering of integrated solutions can be carried out in different ways and that the differences across integrated solutions firms operating in the same sector may be very large. Although each integrated solution in the IT sector may feature hardware, software, consulting and post-sales assistance components, the specific needs of firms’

<table>
<thead>
<tr>
<th>Group</th>
<th>Relevant factors</th>
<th>Strategy</th>
<th>Capabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Core business/Size</td>
<td>Manufacturers</td>
<td>Production Delivery Operational</td>
</tr>
<tr>
<td>B</td>
<td>Market/Complexity of solution</td>
<td>Problem solvers</td>
<td>Delivery Operational</td>
</tr>
<tr>
<td>C</td>
<td>Core business/Complexity of solution</td>
<td>Solutions providers</td>
<td>Consulting</td>
</tr>
<tr>
<td>D</td>
<td>Complexity of solution</td>
<td>Systems integrators</td>
<td>Systems integration</td>
</tr>
</tbody>
</table>

*Source: Authors elaboration of interview data.*
customers vary in complexity, and the possibilities for a given firm to differentiate are many. Therefore, depending on the characteristics of the solutions offered, both the strategic decisions and the capabilities configurations can vary across firms. This is consistent with what has been stressed by scholars in previous studies: that in integrated solutions, the central role is assigned to the customers and, to satisfy their varied needs, firms may need to be able to configure their capabilities in very different ways.

The present research offers practitioners fresh evidence as they consider how best to manage their business and benchmark their capability configuration. Our analysis may help identify paths to success in firms’ migration towards integrated solutions and factors to take into account when making strategic decisions about capabilities insourcing or outsourcing. This study, however, is subject to certain limitations due to its exploratory nature. Because of the small sample size and the fact that all the sample firms are from the same country, it may be difficult to generalize these findings to the IT industry as a whole or to other industries and countries. Furthermore, this research offers a static view of the phenomenon, and it does not take into account the possible cyclical variation of integrated solutions. This arises from the fact that the study is cross sectional rather than longitudinal in nature.

These limitations point in the direction of further research that may be undertaken to further explore the issue of integrated solutions. It would be valuable to test the pattern identified in the present work on a larger sample of firms located in different countries. In this way, it would be possible to test the four clusters identified in this study, find these and/or other common patterns across firms, generalize the findings and verify whether firms’ nationality affects their strategic decisions. Future research could also aim to expand our findings to other sectors and to test whether differences among capabilities configurations may be due to the novelty of the business model, to sector specificities or to other contingencies.

References


Appendix A

Introduction

1. May I tape record the interview?
2. When did you start working for this firm?
3. What is your professional CV?

Projects

4. Can you describe a typical integrated solutions project?
5. Can you articulate it in different stages?
6. What kinds of people work on the different stages of a project (consultants, technicians …)?
7. How do they contribute to the overall scope of the project?
8. How standardized and how customized is the solution prepared by the projects team?

Capabilities

Systems integration: integration of products, services, technologies.

9. Is there room for standardization of procedures and routines at the firm level? Or does every single project team solve problems by itself?
10. Can you describe how this activity is performed in your firm?
11. How are project teams’ procedures coordinated at the firm level?
12. What kinds of professionals work in this activity?
13. How important is this activity to achieve the goal of the project?
14. What kinds of problems are related to this activity? How do you solve them? Could you give some examples?

**Business consulting.**
15. Are consulting services related to technological or to business aspects of the solution?
16. Can you describe how this activity is performed in your firm?
17. How are project teams’ procedures coordinated at the firm level?
18. What kinds of professionals work in this activity?
19. How important is this activity to achieve the goal of the project?
20. What kinds of problems are related to this activity? How do you solve them? Could you give some examples?

**Operational services.**
21. What kinds of operational services do you provide? Post-sales services? Training activities? Maintenance services?
22. Can you describe how this activity is performed in your firm?
23. How are project teams’ procedures coordinated at the firm level?
24. What kinds of professionals work in this activity?
25. How important is this activity to achieve the goal of the project?
26. What kinds of problems are related with this activity? How do you solve them? Could you give some examples?

**Firms’ Boundaries**

**Products.**
27. Are products offered and used in the solutions sold by your firm?
28. Are they included in the overall price of the solution, or do you charge for them separately?
29. Do you have some kind of commercial or strategic relationship with your suppliers? What kinds of alliances do you have with the suppliers of the products that you use in the solutions (contractual, preferred suppliers, joint venture …)?
30. Who is in charge of the post-sales assistance, maintenance and training for the users for such products?

**Services.**
31. Are services (consulting, assistance, post-sales …) offered by your firm, or do you have collaborations with external suppliers?
32. If you have such collaborations, why?
33. Do you have some kind of commercial or strategic relationship with your suppliers?
34. What kinds of alliances do you have with the suppliers of the services that you include in the solutions (contractual, preferred suppliers, joint venture ...)?
35. If you work with external consultants, what kind of contract do they have?
36. What kinds of services do the external consultants usually manage?

Appendix B

Table B1.

<table>
<thead>
<tr>
<th></th>
<th>A Manufacturer (n=2)</th>
<th>B Problem solvers (n=3)</th>
<th>C Solutions providers (n=4)</th>
<th>D Systems integrator (n=1)</th>
<th>F-Value Pr&gt;F</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Size</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cluster mean</td>
<td>0.87</td>
<td>-1.30</td>
<td>0.32</td>
<td>0.87</td>
<td>13.20</td>
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<tr>
<td>Std. deviation</td>
<td>0</td>
<td>0</td>
<td>0.62</td>
<td>-</td>
<td>(0.004)</td>
</tr>
<tr>
<td><strong>Market</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cluster mean</td>
<td>-0.81</td>
<td>1.21</td>
<td>-0.47</td>
<td>-0.13</td>
<td>5.84</td>
</tr>
<tr>
<td>Std. deviation</td>
<td>0.95</td>
<td>0</td>
<td>0.67</td>
<td>-</td>
<td>(0.03)</td>
</tr>
<tr>
<td><strong>Level of sophistication</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cluster mean</td>
<td>0</td>
<td>-1.22</td>
<td>0.61</td>
<td>1.22</td>
<td>10.00</td>
</tr>
<tr>
<td>Std. deviation</td>
<td>0</td>
<td>0</td>
<td>0.70</td>
<td>-</td>
<td>(0.009)</td>
</tr>
<tr>
<td><strong>Core business</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cluster mean</td>
<td>-0.97</td>
<td>0.04</td>
<td>0.85</td>
<td>-0.57</td>
<td>8.46</td>
</tr>
<tr>
<td>Std. deviation</td>
<td>0.85</td>
<td>0.70</td>
<td>0</td>
<td>-</td>
<td>(0.01)</td>
</tr>
</tbody>
</table>

$R^2 = 0.81$.
Pseudo $F=8.76$. 