

**DASTA**

Dipartimento delle Scienze Aziendali,  
Statistiche, Tecnologiche e Ambientali

**DASTA Working Paper Series**

**Paper n. 6**

**Configuring Capabilities for Integrated Solutions:  
Evidence from the IT Sector**

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**October, 2006**



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## Abstract

This paper aims to illustrate how environmental context and organizational structure influence firms strategic choices and lead to different capability configurations. Drawing on contingency theory and resource-based view, this paper explores integrated solutions in the IT sector. Integrated solution is an emerging business model that combines products and services. The IT sector appears appropriate for such studies due to its novelty, high technology characteristics, and relevant implications on capabilities development. Contributions of the present paper reside in the identification of the main factors that lead to differences in capabilities configurations and, consequently, clusters of firms that adopted similar strategic approaches.

**Keywords:** Capabilities, Integrated Solution, IT sector, Contingency theory, Resource-based view.

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## 1. Introduction

In an increasing number of industrial sectors, there is an emerging trend towards the provision of bundled services and products sold together. Scholars labelled this trend integrated solutions (Galbraith, 2002; Oliva and Kallenberg, 2003). Integrated solutions represent “a business model that combine products and services into a seamless offering that addresses a pressing customer need” (Wise and Baumgartner, 1999: p.138). The trend towards the provision of bundled products and service poses a number of challenges for manufacturers in terms of capabilities development and configuration. Firms that offer integrated solutions shift their core capabilities from manufacturing to new capabilities to provide services previously carried out by business users (e.g. after-sales support, maintenance, training, operations, finance, consultancy, and service provision). They also develop coordinative capabilities required to manage new types of long-term relationships with suppliers and customers, and develop embedded service technologies required to support integrated solutions provision, such as control technologies (mainly based on digital electronics) to perform maintenance, remote diagnostics, system operations, etc. Firms are reinventing themselves as systems integrators able to provide integrated solutions for their customers (Davies, 2001, 2004; Hobday, Davies and Prencipe, 2005).

Integrated solution consists in offering product and services together in a unique solution (Bakos and Brynjolfsson, 1999; Cerasale and Stone, 2004; Eppen, Hanson and Martin, 1991; Spiller and Zelner, 1997). Integrated solutions can be considered a special type of product bundling where the needs of clients are central in choosing services and products to bundle. Since integrated solutions are a new business model, few scholars devoted their attention on this topic. Research carried out so far has focused on two main issues: rationales that pushed firms in offering integrated solutions (Slywotzky, 1996; Wise and Baumgartner, 1999; Hax and Wilde, 1999; Oliva

and Kallenberg, 2003) and changes required by the organization to adopt the new business model (Nambisan, 2001; Galbraith, 2002b; Oliva and Kallenberg, 2003; Davies, 2004; Sandberg and Werr, 2004, Davies, Brady and Hobday, 2006). This paper aims to contribute to this emerging stream of literature.

Integrated solutions as a business model emerged to face changes in occurring external environment: in certain industries customer sophistication and low cost players undermined the traditional sales channels. A low cost distribution of products and services represented a menace for the traditional players. In such scenario, a large portion of customers asked for high value services added to the traditional products (Slywotzsky, 1996). Oliva and Kallenberg (2003) identified the following three factors that underpinned the trend towards the offer of integrated solutions: (a) economic reasons: services have longer life cycle and largest revenues; (b) market reasons: with integrated solution firms can satisfy an increasing customer demand for more services; and (c) competitive reasons: services are more difficult to replicate and a competitive advantage based on service is more defensible.

Literature on integrated solutions has also focused on the transition from product-based to service-based competition. To offer integrated solutions, firms must restructure their organizations around customers (Galbraith, 2002). From a firm point of view, offering a solution means solving a customer problem; from a customer point of view, buying an integrated solution represents outsourcing some activity and therefore focusing their own resources on core business. To offer integrated solution, firms must move downstream and provide services in addition to products. The introduction of services is a crucial step because capabilities required to provide services are different from capabilities required for products (Wise and Baumgartner, 1999). The development of adequate capabilities is essential but to do that, firms must divert financial and management resources from traditional areas. The offer of services requires organizational principles and organizational structure new to a product manufacturer: this development process must be carefully managed to not fail the transition. The direction of change can also be

upstream: this is the case of consulting firms like WS Atkins that from engineering consultant firm became integrated solutions provider. This services-based firm, moved toward the provision of integrated solutions by entering the manufacturing of products and therefore developing systems integration capabilities (Davies, 2004). Although the direction of the change can be different (downstream or upstream), the goal should be the same: be able to provide to the customers products and services (Davies, 2001; 2004).

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. With 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. Computer represents one central component of these systems. The IT sector includes all the business related to hardware and software that enable data collection, storage, and manipulation. This sector has been chosen because it is a large, important sector in which this trend appears to have taken hold. The contribution of this paper is represented by the analysis of the factors that lead to differences in capabilities configuration across firms. This contributions will be accomplished through an analysis of a set of 10 cases. The phenomenon will be analysed through two theoretical lenses: resource based view and contingency approach. The integration of two approaches allows us to identify clusters of firms that, under the influence of similar factors, present similarities in the configuration of capabilities developed to offer integrated solutions.

The paper is organised as follows. The next section reviews 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. Section 4 analyses empirical evidence offering a tentative taxonomy of the capabilities managed by firms that offer IT solutions. In section 5, empirical evidence is further analysed to identify groups of firms that presents similarities. Firms strategic choices and capabilities configuration will be then explored. Section 6

discusses implications of the findings, limitations of the work and provides a tentative research agenda for further analysis of the issue.

## **2. Literature review**

The resource-based view of the firm, based on Penrose's work (1959), gives central relevance to internal resources and capabilities as they constitute the source of a firm's competitive advantage. Firms are perceived as a unique bundle of resources and primary task of management is to increase the value through an optimal deployment and development of the internal assets. Performance is a function of the resource mix adopted by the firms and, differences in the resource portfolio allow firms 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, where knowledge is the most relevant factor (Grant, 2002; 1996; Chandler, 1990). Grant provided the example of American Express's billing system as complex and team-based productive activities that represent an organizational capability (Grant, 1996: p. 116). Following Grant, we consider capabilities as the activity performed by firms, activities that require distinctive knowledge to integrate different resources. Moving from this definition of capabilities, in the present paper we aim to investigate how capabilities are configured in the different organizations. We define as capabilities configuration the capabilities directly controlled by the firms using a hierarchical mechanism of coordination rather than a market based one. Such activities are the ones that are carried out by internal employees (Williamson, 1975, Grandori, 1997).

In the specific context of integrated solutions, scholars stressed that to be successful in the migration to integrated solution offerings adequate capabilities must be developed (Galbraith, 2002; Wise and Baumgartner, 1999), but, in fact, not all the firms developed the same type of capabilities (Davies, 2001; Davies, Brady and Hobday 2006, Hardstone, 2004). While offering integrated solutions, firms can move either up or downstream. Such differences in the path imply differences in the way in which new capabilities

are developed and in the final configuration of such capabilities. To embrace the new business model, a change in the existing asset of capabilities is required. Previous studies, however, do not provide a detailed analysis of which capabilities are crucial for integrated solutions providers and how to configure them. Following recent contributions (e.g. Fredericks, 2005) that combined resource-based view and contingency approach, this paper aims to shed light on how different factors influence capabilities configuration and specifically which factors are more influential than others. This issue will be analysed through the theoretical lens of the contingency approach.

The contingency approach is based on the main assumption that there is a link between organizational context, structure, and performance (Duncan, 1972; Miles and Snow, 1978; Venkatraman, 1989; Dazin and Van De Ven, 1985). Firms face different types of environments and have to be able to cope with such diversities. Geographical location of the market, typology of clients, structure of the competition are few of the many aspects that can differentiate environments. The organizational structure has to be coherent with the context, represented by the environment. The greater is the coherence, the greater is the fit between context and structure. The concept of fit is one of the key concepts in the contingency approach but in the literature is loosely defined. In our specific approach, we are likely to define it as the “degree of internal coherence among a set of theoretical attributes” (Venkatraman, 1989: p. 432). This definition implies that recurring clusters of attributes have to be found among the analysed firms (Miller, 1981). Usually, analytical schemes used for such investigations of the concept are inductive (e.g. cluster analysis, q-factor analysis) (Venkatraman, 1989), and this is the scheme that will be used in this work. Traditionally, contingency scholars used performance indicator as one of the possible ways to assess the fit among elements. But our approach is akin to those adopted by population ecology scholars who argue that in order to test organizational fit, the context-structure relationship is sufficient as a fit between context and structure is assumed to exist in surviving organizations (Fennel, 1988; Di Maggio and Powell, 1983).

Strategic decisions are taken analysing organizational and environmental factors and must be coherent with such factors. Because each firm presents a unique factors configuration, there is a lack of generalizability in strategies (Fredericks, 2005). Henceforth, contingency scholars argue that no best strategy exists, but each strategy has to be appropriate to the unique mix of elements. Environments are complex, many different variables shape them and each firm present a unique organizational context that has to be matched with the external environment. (Miller, 1981). Due to the lack of generalizability stated by these scholars, strategies must be formulated in coherence with environmental and organizational factors, and capabilities must be configured in accordance to the decided strategy. For surviving organizations, coherence between strategic decision and capabilities configuration should exist. Ginsberg and Venkatraman (1985) argued that contingency theory-based strategic research addresses their attention mainly to 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 variable on the formulation of strategy; and (4) the influence of chosen strategy on organizational arrangement. In this work, we aim to explain how capability configuration varies according to different chosen strategies as we assume that strategies are influenced by organizational and environmental factors. Departing from Ginsberg and Venkatraman (1985) taxonomy, we focus on aspects 1 and 2 as we analyze the relation between structure and organizational context and explain how different factors interact. Figure 1 illustrates the analytical model used in this work. A contingency approach model is different from a congruent approach in the way in relationships are structured and analysed. In congruent models, a simple association is assumed to exist among the variables in the model. In contingent models, two or more independent variables interact among them and then influence the dependent variable (Fry and Schellenberg, 1984, cited in Dazin and Van De Ven, 1985). This is the case of our model, where environmental and organizational factors influence strategic decision and these two sets of variables influences together the configuration of capabilities. The model will be tested in the specific context of integrated solutions.



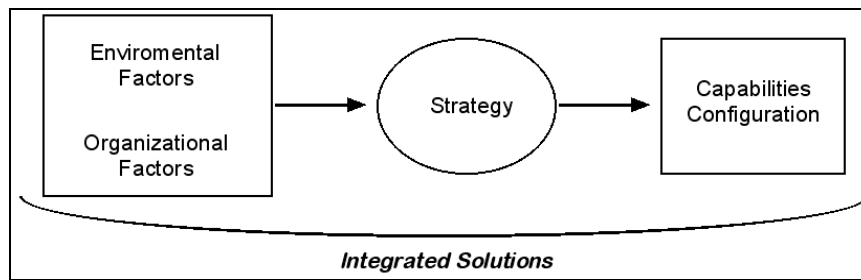


Figure 1: Analytical model

The analytical model has been developed from theory and its application in a specific context required an operationalization of the variables. In particular, has been important to decide how to investigate the environmental and the organizational factors. For each of them, we identified two factors, relevant in the specific context of the integrated solution.

The market represents the first environmental factor. As affirmed by contingency scholars, firms must face different types of environments and should be able to cope with such diversities (Duncan, 1972). In particular, structure of competition and typology of clients largely varies across different markets. The geographical extension of the markets influences the characteristics of the competitive structure. In big markets firms compete with multinational competitors and competition is fiercer. Location of the company does not represent a competitive advantage since their clients usually have branch and offices located in different countries. Territorial proximity is not important for this kind of firms while in smaller market face-to-face interaction with the client is crucial. Firms that operate in an international context have face an environment that differ largely from the one that has to be faced by firms operating in a local market. In those markets, structure of competition and contractual power of client are completely different. So the geographical dimension of the market plays an important role to understand the environmental context, since the characteristics of the market are completely different.

The second environmental factor is represented by the complexity of customer's needs. In the integrated solution context, satisfying the needs of

the customer is crucial (Wise and Baumgartner, 1999); this is what differentiates a simple bundling of products and services from an integrated solution. In order to investigate the complexity of customer needs, we will consider three distinct aspects: the innovativeness of the technologies adopted in the solution, the level of customization of products and services included in the solution offered and the level of sophistication the client. With level of sophistication we refer to the level of knowledge that solution user has in relation to the solution in question (Spiller and Zelner, 1997). These three aspects are deeply linked together: i.e. high levels of innovativeness, customizations and client sophistication imply high complexity of the solution. The possibility to offer solutions more standardized is achievable only if the need of the client are easy to satisfy. Standardisation means solutions that can be easily implemented and, more important, allow achieving economies of scale in the post sales activities such as system maintenance and upgrading of the systems. Indeed, offer a standardized solution it is feasible only if the clients is willing to adopts it, in other words, if his needs are relatively simples.

The two organizational factors that will be taken into accounts are represented by the core business and by the dimension of the firm. The first aspect is represented by the core business of the firms before moving into the integrated solution business. As pointed out by integrated solution scholars (Davies, Brady and Hobday 2006; Wise and Baumgartner, 1999), to enter into the new business a movement in the value stream is required. Considering the impact of path dependency (Teece, Pisano and Shuen 1997) and organizational inertia (Hannah and Freeman, 1984), this organizational aspect has a great impact on the strategic choices of the firm. The type of core business that firms had before moving into the new offering determines the type of capabilities already possessed and influences the development of new ones.

The second organizational factor considered in the present study is the dimension of the company. The dimension has been defined considering the turnover and the number of employees of the firm. The dimension of the firms

represents an important organizational factor since financial capabilities, possibilities to reach economies of scale, mayor or minor flexibility in the organization, innovativeness are aspects that are directly linked with the dimension of the firm (Penrose, 1955; Hadjimanolis, 2000).

According to Grant (1994), a strategy has to be based on firm resources and capabilities and has to be relative to external opportunities. Departing from this statement, we will differentiate the different strategies pursued by the firms analysing the rationales that pushed the firms in moving in the new offer. In other words, in this paper we will analyse the external opportunities that the firm has been able to exploit entering into the new business. Literature on integrated solution identified different rationales that can push firms in the new business (Slywotsky, 1996). Although the answer provided is the same, the offer of integrated solution can respond to different questions, different needs and can be the results of a different combination on environmental and organizational factors. We will also investigate the role of the integrated solution in the overall firm offering. In fact the IS can represent the new core business of the firm or can play a secondary role. This choice has to be coherent with the environmental and organizational factors that characterize the firms context.

The last aspect present in the analytical model is represented by the configuration of capabilities. Capabilities configuration is the dependent variable that we will use to assess fit among the elements of the model. As explained before, we rely on the capabilities approach proposed by Grant (1996) and we consider as capabilities the organizational capabilities that allow the firm to perform selected activities (Walsh and Linton, 2001). The configuration of capabilities is used to test the fit in the model since the environmental and organizational factors leads to different strategic decision and to be able to implement the new strategy, the firm have to configure his capabilities accordingly. The next section appraises the method used to investigate the phenomenon and to test the analytical model explained so far.

### **3. Method**

The aim of this work is to find empirical arguments regarding the relationships between environmental and organizational factors, strategy, and capability configuration. The integrated solutions context has been chosen due to its high innovativeness. We chose to study the IT sector because it was the first in starting the transition towards integrated solutions (Cerasale and Stone, 2004). After years of practice, procedures and routines are becoming standardized and it is therefore possible to identify common path in the capabilities managed by the firms. The rapid growth of this offer is due by the nature of products sold, characterized by a high level of complementarities and a high level of expertise required to user (Spiller and Zelner, 1997).

We adopted a multiple case study approach. Two sources of data were used: interviews and documents, such as reports, journal articles, database and firms official web sites. The documental analysis represented the preliminary phase finalized to acquire a general understanding of specific characteristics of integrated solution in the IT sector and to identify firms and people to interview. Open-ended interviews constituted the principal source of data. This type of interview, also defined exploratory interview, consists in asking questions about a specific topic, including the particular point of view of the interviewee (Oppenheim, 2000). The semi-structured questionnaire is reported in appendix A.

The questionnaire is divided in three parts. The first one asks for a description of a typical project managed by the firm. The interviewees described each phase of the project, activities performed, competencies required and organizational form adopted. The second part focused on capabilities. We followed the taxonomy provided by Davies (2000), to develop questions on capabilities. Davies (2001) identified four types of capabilities: systems integration, operational services, finance and business consulting capabilities. We relied on this taxonomy in preparing the questionnaire. For each capability, it is investigated the level of standardization/customization, the type of professionalism required for the activities, problems and criticalities. The third part focused on firm's boundaries. These questions focus on the

typology of relation with suppliers that provide products and services. The length of interviews was between 60 and 90 minutes. Interviews were conducted at the firm site or at the customer site if the interviewee was working there, between May and July 2004. All interviews have been tape recorded and transcribed integrally, in order to not lose any detail of the conversation.

Sample selection has been done to assure theoretical replication. With theoretical replication we mean that the selected case studies can present both similar results to the original framework or contrasting results but for predictable reasons (Yin, 2003). The purpose of sample's selection was to assure variety of experience between firms. We first selected five cases. For each of these cases we wrote individual reports. After a preliminary analysis of these results, we selected five firms more to further increase variety. Each of the analysed firms contributes to the theory building process with a unique and interesting approach to the problem. The interviews have been conducted on site operating in Italy. The sample is composed by three firms that operate in local markets, five firms operating in national and two firms operating in international market. Two firms are hardware producer, three are software houses and five are consultant firms (Figure 2). Firms name are kept confidential.

Data analysis allowed us to identify 12 major activities that can be managed by firms while offer integrated solutions. According to the definition of Grant (1997) provided in the literature, we considered activities as a proxy for the concept of capabilities. The 12 capabilities constitute a tentative taxonomy that will be illustrated in detail in section 4 and it allowed us to operationalize capabilities configuration. To accomplish the aim of the research an operationalization of the concept of capabilities was also needed. We did that considering for each firm the activities/capabilities managed internally (with its own employees). The presence or the absence of such capabilities represents the different configurations that capabilities can assume in each firm.

Considering the four factors described in section 2, we identified four groups of firms. These four groups have been identified performing a hierarchical cluster analysis, using the SAS/STAT software (SAS 9.1 for Windows). An initial analysis of the hierarchical cluster identified three clusters. A deeper analysis on strategic choices performed by firms, suggested us to further split one cluster in two (B and A). Statistical results has been integrated with analytical analysis to determine the compositions of the four group (Ginsberg and Venkatraman, 1985; Venkatraman, 1989).

<b>Firm</b>	<b>Size</b>	<b>Nature of the business</b>	<b>Market</b>	<b>Complexity of solution</b>
Alpha	Big	Hardware producer	International	Medium/ High
Beta	Small	Software house	Local	Low
Gamma	Medium	Consultancy	National	Medium/ High
Delta	Small	Consultancy	Local	Low
Epsilon	Big	Software house	National	Low / Medium
Zeta	Big	Consultancy	International	High
Eta	Small	Software house	Local	Low/ Medium
Theta	Medium	Consultancy	National	Medium
Iota	Big	Consultancy	National	High
Kappa	Big	Hardware producer	National	High

*Figure 2: Structure of the sample*

#### **4. Capabilities for integrated solutions in the IT sector**

##### **4.1. A preliminary taxonomy of integrated solution capabilities**

*Systems integration capabilities* are the first set of capabilities and the most important, according to literature and empirical observations. We can distinguish between capabilities to “integrate products and services” and capabilities to “integrate different technologies”.

The former is central for an integrated solution provider as 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 provide solutions as the role of the systems integrator is to

make different technologies working together. In implementing the solution it is important that different technological platforms are able to communicate to assure a correct flow of data.

Firms in our sample offer integrated solutions that consist in a complete IT system. This kind of system has to be tailored around the customer and the understanding of its needs plays a central role. Therefore, big importance is assigned to consulting capabilities. We can distinguish two types of *consulting capabilities*: business consulting and technology consulting. Offering business consulting services is required by the nature of the product sold. These services consist helping the client in improve its internal organization, the efficiency of its internal process. Business consulting is related to all business, organization and marketing related issue. The offer of integrated solutions also requires capabilities in putting together different technologies, as examined before. For this reason, integrated solution providers must be able to offer technology consulting. If technologies are not appropriate to satisfy the need of the customers, the risk is to build useless solutions. The role of the systems integrator is to understand the needs of the client and to select the most appropriate technologies.

The third set is constituted by *operational capabilities*. These capabilities are fundamental because of the nature of products sold. It is not possible to sell software without assistance. The capabilities related to the operational services offered could be divided into four categories: hardware maintenance, software assistance, software problem solving, and training of users. The first typology is represented by maintenance of hardware, such as servers, workstations and networks. The second and the third type of operational services capabilities identified concern software assistance. These two capabilities are strongly linked, because represent two phases of the same process. The first phase, often called “hot line service”, is performed by a call centre and consists in solving assistance’s requests by phone. All the calls are directed to a call centre and operators try to solve the problem, if possible. We refer to this capability as software problem solving. If the problem cannot be solved by phone, it may require capabilities that the call centre does not

have: actions such as modify some lines of software codes, eliminate a bug from the system or change software parameterizations can be required. In this case calls are redirected. This represents the second phase of the post sales assistance process, called software maintenance in this work. The last capabilities refer to the activities called: training of the users. It consists in teaching customers' employees how to use the new IT system.

*Production capabilities* represent the fourth set and can be distinguished in hardware production and software development capabilities. Only one out of 10 firms possesses the capabilities required for the production of hardware. More diffused are software development capabilities. These capabilities consist in writing codes for a software product. All the software houses present in the sample have these capabilities and according to the interviewees, to possess these capabilities represents a competitive advantage

The last set of capabilities is represented by the *delivering capabilities*. These can be divided into capabilities to deliver hardware and capabilities to deliver software (software customization). The hardware delivery capability consists in delivering the hardware components of the solution: servers and workstations. The second delivery capability is the software customization. Software, especially E.R.P., need to be customized to fit client characteristics. This activity represents the core of integrated solution in IT.

The empirical evidence discussed above is summarized in Figure 3. The first column shows the activities that can be carried out by the firms. The first row shows the firms in our sample, the last row the percentage of presence of the capability within the firms in the sample, the last column the percentage of capabilities in house managed. Figure 3 illustrates that capabilities configuration may vary across firms. In the first column are stated the 12 capabilities described before, grouped into five different types: (a) systems integration capabilities, (b) consulting capabilities, (c) operational capabilities, (f) production capabilities, and (g) implementation capabilities. This categorization has been done expanding Davies' framework (2001). A careful



analysis of empirical evidence showed that using Davies framework was not possible to organize all the activities observed in the interviewed firms. Thus, Davies’s framework has been modified to better fit observed data. For each macro category, one or more specific capabilities have been identified. These 12 capabilities represent all the activities performed by firms and they are specific for the IT sector.

	Alpha	Beta	Gamma	Delta	Epsilon	Zeta	Eta	Theta	Iota	Kappa	
<b>Systems integration capabilities</b>											
Integration products services	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	100%
Integr. different technologies	✓	✓	✓							✓	40%
<b>Consulting capabilities</b>											
Business consulting	✓		✓	✓	✓	✓	✓	✓	✓		80%
Technology consulting	✓	✓	✓					✓	✓	✓	60%
<b>Operational capabilities</b>											
Hardware maintenance	✓	✓		✓	✓						40%
Software maintenance	✓	✓			✓		✓			✓	50%
Software problem solving	✓	✓		✓	✓	✓	✓	✓	✓		80%
Training of users	✓	✓		✓	✓	✓	✓	✓	✓		80%
<b>Production capabilities</b>											
Hardware production	✓										10%
Software development	✓	✓	✓		✓		✓				50%
<b>Delivering capabilities</b>											
Software customization	✓	✓	✓	✓	✓	✓	✓	✓	✓		90%
Hardware implementation	✓	✓		✓	✓	✓	✓				60%
<b>In house managed activities</b>	100%	83%	50%	58%	75%	50%	67%	50%	50%	33%	

Figure 3: Integrated solution capabilities in the IT sector.

Source: author elaboration on interviews data

#### 4.2. Capabilities configuration to deliver solutions

The objectives of this section are twofold: (a) identify which factors lead to differences in firms strategy, (b) link differences in strategies with differences in capabilities configurations (Ginsberg and Venkatraman, 1985). The analysis performed on the data allowed us to identify four groups of firms. Results of cluster analysis integrated with analytical analysis are illustrated in Figure 4.

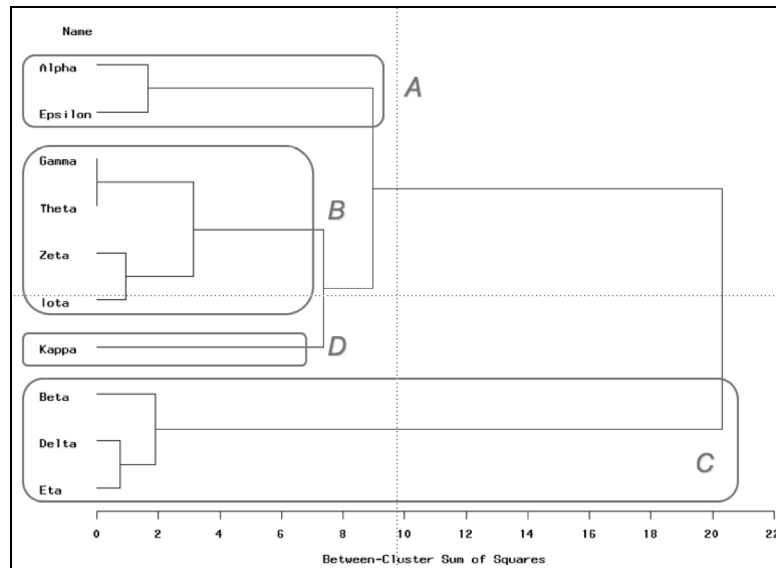


Figure 4: hierarchical cluster analysis

Source: author elaboration on interview data

The number of firms within groups varies because some factors and some strategic choices appear to be more common than others. Figure 5 shows the position of the firms and the composition of the four groups according to two of the factors that we considered, “nature of the business” and “market”. This figure shows that some factors characterize groups more than others, since some factors are equal for all the firms in the specific group. For example, firms in group C are homogenous according to the factor “nature of the business”, while firms in group B are homogeneous according to the factor “market”.

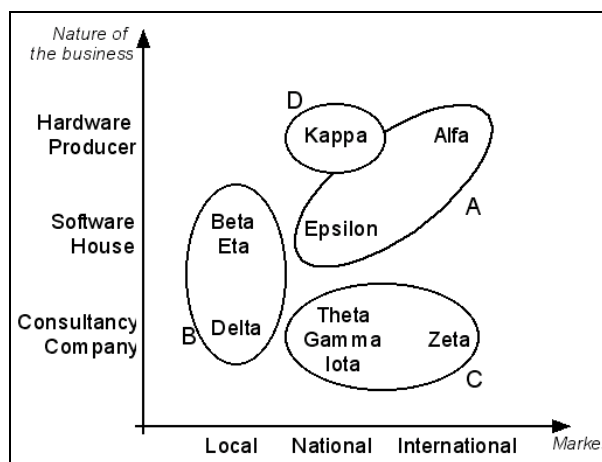


Figure 5: Composition of the 4 groups

Source: author elaboration on interview data

Figure 6 shows the importance of capabilities in each group of firms. The dimension of each circle is proportional to presence of these capabilities in each specific group. Circles may have three different dimensions that refer to different level of importance of activities related to capabilities. The importance of these activities has been assigned integrating qualitative information provided by managers during the interviews and the level of presence of these activities within the groups, as showed in Figure 3. Each group presents some capabilities more important then others and such capabilities differ from group to group. In the remaining of the section a description of the four groups is offered: for each group relevant factors, strategic choices, and implications on capabilities configurations are discussed.

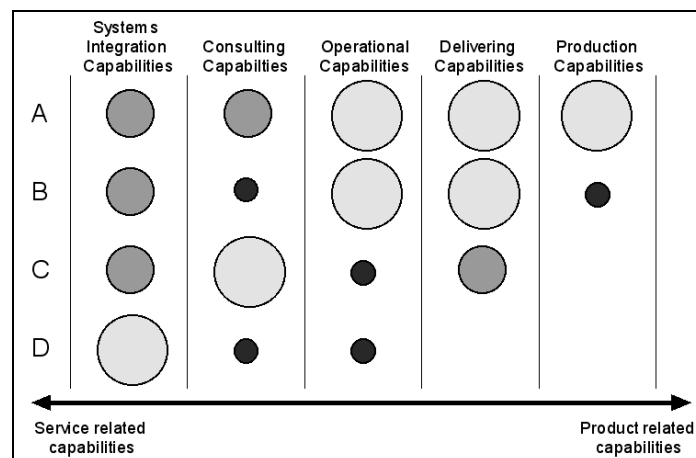


Figure 6: Capabilities configuration

Source: author elaboration on interview data.

Group A is composed of two firms: Alpha and Epsilon. Both of them present a high percentage of in house managed activities: 100% for Alpha and 75% for Epsilon, they operate in different markets (national for Epsilon and international for Alpha) and both are big firms (more then 500 employees). The most important characteristic that they have in common is that both of them moved downstream into services. In fact, nature of the business was hardware production for Alpha and software production for Epsilon. They

were both products oriented firms and, to offer integrated solutions, a downstream movement was required.

These factors influenced their strategic decisions. In fact, for them, integrated solutions represented a new way to sell products, to better know customers and to have a stronger link with them. Offering integrated solutions represented a new sales technique rather than a new vision for the entire firm. For this reason, also if they changed part of their organization in order to provide solutions, they are still selling their own products (hardware for Alpha and software for Epsilon). In this migration, they kept in house all the capabilities already owned. Due to the large number of managed capabilities, they do not have any important suppliers but they do have many partners that sell their own products. The focus of their activity 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 that still have in house production capabilities and that pay big attention to them. This group consider production capabilities, delivering capabilities and operational capabilities as a source competitive advantage.

Group B is composed of three firms: Beta, Delta and Eta. These three firms operate in a local market and have less than 50 employees. Firms present in this group were software houses or consultancy firm and their percentage of managed activities is quite high: 83% for Beta, 58% for Delta, 67% for Eta. They operate in the local market, and the complexity of their solution is low. The offer of integrated solutions represented a movement both upstream and downstream and, from a strategic point of view, a way to accomplish needs of customers. The decision to internalize many activities represented a way to save resources: due to the small size of these firms, they cannot reach scale economies to use the market, to hire new people and they do not have enough resources to manage a network of suppliers. Therefore, due to the low sophistication of their customers, these firms tend to perform many activities in house. People that work in these firms are skilled in different technologies and usually are able to work in different areas, for example they

can perform marketing activities as well as delivering activities. They have knowledge about different aspect of the solution but they do not solve complex problems. Operational and delivering capabilities represent the core of their offer, due to the characteristics of their market. The level of customers' sophistication is low, they require simple systems able to solve their problems and they are especially interested in having post sales assistance. That is what their customers require and this is what firms offer.

Group C is composed of four firms: Gamma, Zeta, Theta and Iota. These firms have the same core business: they are consultancy firm that started offering integrated solutions. They operate in national and international market and the complexity of their solutions is high. The level of sophistication of their customers is high and they have to help them in solving complex problems. The critical point for them is to find the right solution: the rationale that pushed these firms in moving into the new business was to differentiate their offer. As observed by one interviewee, putting together three or more pieces of a solution, the possibility to differentiate the offer increase and, as a consequence, also the possibility to resist into the market. The offer of integrated solutions for them is a way to create a niche in which operate and where the competition is low. The offer of integrated solutions was a way to make more complete the previous offer of consultancy services. The migration into the integrated solution business required an upstream movement and doing so, they developed some product-related capabilities. More specifically, they acquired capabilities required to offer products related to consulting services already offered. In many cases the product-related activities are developed jointly with partners: three out of four firms have strong relationship with products providers (hardware producer or software house). Due to their size, they can achieve economies of scale and contractual advantages that make profitable for them to outsource not-core activities. The percentage of managed activities is the same for all the firms (50%) but the distribution of the capabilities varies within them. This is because they operate in different niches of market. A constant is that none manage product related capabilities: the rationale beyond this decision is that these capabilities are considered not strategic.

Group D is composed by only one firm (Kappa). This firm is the only pure systems integrator in our sample. According to the definition of systems integrators, their role is to achieve technological and organizational synchronization within established product architectures (Brusoni and Prencipe, 2001). And this is what this firm does. The solutions offered by this firm are very complex, customized around the specific request of the customers and with a high level of innovativeness in the use of technologies. It has more than 500 employees, it operates in the national market, and it was a hardware producer of infrastructure for the telecommunication industry that moved downstream into integrated solution. The rationale behind this decision is that, according to the interviewee, only in the integration of products and services it is possible to add value. In fact, when this firm started the transition towards integrated solutions, it outsourced to its partners all the activity that the management considered non-strategic. So Kappa now offers complete solutions and acts as systems integrator of different components that are produced and delivered by a large network of suppliers. The integration with the different suppliers is very strong: for example, a partner performs hardware maintenance and the contractual agreement requires that the workforce, while working in the customer place, have to wear a uniform where the brand of firm Kappa is shown. Firm Kappa, devoted special attention in developing the systems integration capabilities and what he can provide to his customers is an integration of different services performed by its large network of partners. It outsourced all the activities to external suppliers and the systems integration capability is now central for them.

Figure 7 focuses on the differences in the strategy pursued by the groups of firms. In this figure, are reported the rationales that pushed firms into the business of integrated solution and the role assigned to the new business model are reported, as they emerged in the discussion. As explained in the literature review section, these two aspects represent the two elements used to define the strategy.

<b>Group</b>	<b>Rationales</b>	<b>Role</b>	<b>Strategy</b>
A	New way to sell existing products	Secondary to the previous offer	<i>Manufacturer</i>
B	Accomplish simple customer needs	As important as the previous offer	<i>Problem Solvers</i>
C	Differentiation, creation of a niche	As important as the previous offer	<i>Solution Providers</i>
D	Add value to the offer	Central	<i>Systems Integrator</i>

*Figure 7: Strategies and Capabilities Configuration*

*Source: author elaboration on interview data*

## 5. Discussion & Conclusions

The aim of this paper was to analyse capability configuration for the offer of integrated solution in the IT sector. Integrated solutions consist in bundling products and services. To offer integrated solutions firms must manage service-related as well as product-related capabilities and this imply a movement upstream for services based firms and a movement downstream for product based firms. According to contingency theory, environmental and organizational factors influence strategies pursued by firms and such strategies impact on capability configuration. We wanted to analyze the relationship existing between environmental and organizational factors, strategies, and capability configuration (Venkatraman, 1985; Drazin and Van De Ven, 1985). This aim has been achieved performing a multiple case study in the IT sector. To be able to investigate capability configuration, an operationalization of this concept was needed. To do so we integrated previous study on capabilities (Davies, 2001) with our empirical evidence and we developed a taxonomy of capabilities that represent the capabilities that can be managed to offer integrated solution in IT. The development of this represents the first contribution of this paper. This taxonomy can be used to further explore the integrated solution model from a capability point of view since it represent a way to operationalize the concept.

Using four factors (size, nature of the business, market and complexity of the solution), we identified four groups of firms. The definition of each group has been done performing a hierarchical cluster analysis. The results of this analysis has been integrated with analytical results and we defined four groups. Within each group, we analysed the strategies pursued: firms within the same group have the same strategy. This is consistent with our conjectures that: (a) similarities in organizational and environmental factors lead to similar strategic choices: (b) the importance attributed to different capabilities within each group varies and it is influenced by external and organizational factors and by strategic choices. Findings are summarized in figure 8. the fact that importance of the different types of capabilities varies across groups entails that there are different ways to offer integrated solution. Environmental and organizational factors play in fact an important role in shaping capabilities configurations.

<b>Group</b>	<b>Relevant Factors</b>	<b>→ Strategy</b>	<b>→ Capabilities</b>
A	Nature of the business Size	<b><i>Manufacturers</i></b>	Production Delivering Operational
B	Market Complexity of solution	<b><i>Problem Solvers</i></b>	Delivering Operational
C	Nature of the business Complexity of solution	<b><i>Solution Providers</i></b>	Consulting
D	Complexity of solution	<b><i>Systems Integrators</i></b>	Systems Integration

*Figure 8: Factors, Strategies and Capabilities Configuration*

*Source: author elaboration on interviews data*

Our empirical evidence sheds a new light on the analysis of firm capabilities for integrated solution. Literature on integrated solutions (Davies, 2001) stressed that systems integration capabilities are central for firms that offer integrated solutions. Our empirical evidence shows that the importance of systems integration capabilities varies from medium level to high (e.g. group D) (fig. 6 and 8).



The empirical evidence also illustrates the factors that mostly influence firms strategic decision in offering integrated solutions. Figure 8 illustrate that “complexity of the solution” is the most influential factor, as it has been mentioned in each group. This is consistent with what has been discussed before: offering of integrated solution can be carried out in different ways and differences across firms operating in the same sector may be very large. An integrated solution in the IT sector consists in hardware, software, consultancy and post sales assistance but, despite of this approximate way to define it, the request of the customer varies and the possibility for the firm to differentiate are many. Therefore, depending on the characteristic of the solution offered, the strategic decision and capabilities configuration may vary across firms. This is consistent with what has been stressed by scholars that studied integrated solutions offer: central role is assigned to the customer and, to satisfy their different needs, firms can configure their capabilities in very different way. The fact that firms’ responses may differ despite similar technological or market conditions is consistent with the evolutionary approach on which we rely (Nelson, 1991).

The present study offers to practitioners fresh evidence to think about how they manage their business and benchmark their capability configuration with the firms in the sample. The analysis may help identify paths to be successful in the migration towards integrated solution and factors to take into account when taking strategic decisions about capabilities insourcing or outsourcing. The current study, however, presents some limitations due to its exploratory nature. Due to the small size of the sample and to the fact that all the firms present in the sample are from the same country, it can be difficult to generalize the findings to the whole industry or other industries and to other countries. These limitations show the direction for further research that can be taken to further explore the topic. To overcome these limitations, we suggest to test the pattern identified in the present work within a larger sample of company. These firms can be part of the same industrial sector and based in different countries. In this way, it will be possible to identify common patterns across firms, test the four clusters identified with this study, generalize findings and verify if firms nationality affects strategic decisions. Future

research could aim to expand our findings to other sectors and to test if differences among capabilities configuration are due to the novelty of the business model or to the sector specificities.

### **Author Contribution Statement**

Both authors conceived the idea for the study and contributed to the design and planning of the research. Federica Ceci was involved in data collection, analysed the data and wrote the first draft of the manuscript. Both authors edited and approved the final version of the manuscript.

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## Appendix A

### Introduction

1. May I record the interview?
2. When you started working for this company?
3. What is your professional cv?

### Projects

4. Can you describe a typical IS project?
5. Can you articulate it in different stages?
6. What kinds of people work in 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 projects team?

### Capabilities

Systems integration: integration of products, services, technologies

9. Is there room for standardization of procedures and routines at 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 firm level?
12. Which kinds of professionals work in this activity?
13. How important is this activity to achieve the goal of the project?
14. Which kinds of problems are related with this activity? How do you solve them? Could you produce 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 firm level?
18. Which kind of professionals work in this activity?
19. How important is this activity to achieve the goal of the project?



20. Which kind of problems are related with this activity? How do you solve them? Could you produce some examples?

#### Operational services

21. What kind 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 firm level?
24. Which kinds of professionals work in this activity?
25. How important is this activity to achieve the goal of the project?
26. Which kinds of problems are related with this activity? How do you solve them? Could you produce 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 kind 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 sale assistance, maintenance and training for the users for such products?

##### Services

31. Are services (consultant, 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 kind 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 does external consultant usually manage?