Specialised capabilities in integrated solutions: the role of fit

Federica Ceci*

Dipartimento di Economia Aziendale,
Università G. d'Annunzio,
Viale Pindaro 42, Pescara, Italy
E-mail: f.ceci@unich.it
*Corresponding author

Andrea Masini

HEC Paris,
1 Rue de la Libération,
78351, Jouy-en-Josas, France
E-mail: masini@hec.fr

Abstract: Contingency theory suggests that the selection of coherent combinations of organisational capabilities and operational environments has important performance implications. This paper builds upon this perspective to analyse the emergence of a new business model that is modifying the structure of many industries: the provision of integrated solutions. The aim of the paper is to examine the strategic decisions behind the adoption of a business model based on integrated solutions and to understand how internal firm capabilities must be modified to match the external environment. Relying on primary data from 102 European IT firms, we discuss the value of specialised capabilities, and we analyse their degree of fit with the operational environment in which they are applied. Results show that solution providers that possess specialised capabilities obtain greater benefits when they operate in homogeneous environments.

Keywords: contingency theory; integrated solutions; IT sector; capabilities.

Reference to this paper should be made as follows: Ceci, F. and Masini, A. (xxxx) 'Specialised capabilities in integrated solutions: the role of fit', *Int. J. Business and Systems Research*, Vol. X, No. Y, pp.000–000.

Biographical notes: Federica Ceci is an Assistant Professor in the University G.d'Annunzio, Italy. Her research interests focus on: theory of the firm, analysis of managerial implications of integrated solutions on firm's boundaries and capabilities, management of innovation. She has published in *Research Policy*, *Industrial and Corporate Change*, *Industry & Innovation*, *Journal of Management and Governance*, *International Journal of Technology and Innovation Management* and other Italian journals and she has participated in international conferences. She sits on the editorial board of *International Journal of Business and Systems Research*. She has also published a book with Edward Elgard Publishing: *The Business of Solutions* (July, 2009).

Andrea Masini is an Associate Professor at HEC Paris. He conducts interdisciplinary research to study the operational and organisational impact of technological innovations, with a particular emphasis on ICT, renewable energy technologies and sustainability issues. His recent work has been published in *M&SOM*, the *Journal of Operations Management*, *Energy Policy and Technological Forecasting and Social Change*. He has taught courses on operations management, supply chain management and technology strategy at the MBA, executive as well as at the PhD level. He also consults for private and public organisations on themes related to process optimisation, ICT and technological innovation. He holds a PhD in Management from INSEAD (France). Prior to joining HEC Paris, he was an Assistant Professor of Operations and Technology Management at the London Business School. He has a background in Mechanical Engineering and Environmental Management.

1 Introduction: the role of fit in the market of integrated solutions

Business environments are changing at unprecedented rates, even in industries traditionally considered stable. Competitive landscapes are rapidly shifting: technological innovation is increasing, the evolution of consumer behaviour is following unexpected routes, firms boundaries are increasingly blurred, and continuous changes in the structure of markets oblige firms to operate in ever larger and more global competitive arenas. These environmental changes require corresponding changes in business models, which are risky, difficult, and cause profound and often unpredictable shifts in the allocation of rents (Cusumano et al., 2008; Sandstrom and Osborne, 2011; Zott and Amit, 2008).

Management scholars have adopted a variety of theoretical lenses to study this phenomenon and explain successes and failures of business organisations. Among those lenses, contingency theory has historically been one of the most successful approaches and it is gaining renewed attention in several fields, including competitive strategy (Pelham and Lieb, 2011; Pertusa-Ortega et al., 2010), innovation management (De Clercq et al., 2011; Huang, 2009), operations management (Aksin and Masini, 2008; Mayorga and Subramanian, 2010) and IS management (Huang, 2009; Masini and Van Wassenhove, 2009). Contingency theory studies economic phenomena involving the interaction between external variables (such as market characteristics, market dynamics and country-specific factors) and internal variables (such as organisational structure, routines, resources and capabilities). This perspective suggests that the fit between internal organisational capabilities and the external environment has performance implications (Drazin and Van De Ven, 1985; Duncan, 1972; Miles and Snow, 1978; Venkatraman, 1989). Contingency scholars have challenged the notion of best strategy, and long argued that a strategy is successful only when there is coherence – or fit – between external and internal variables (Venkatraman, 1989). To achieve superior performance, firms must operate strategic, operational or organisational choices coherent with the environmental context in which they operate.

While this perspective has been extensively adopted to study stable environments, its application to fast changing industries remains somewhat limited. This paper aims to fill this gap and to investigate the role of fit in rapidly changing environments. We ground our study in the context of integrated solutions, a new business model that is gaining increasing importance in various sectors and reshaping the competitive landscape of

many industries (Ceci, 2009; Davies, 2004; Oliva and Kallenberg, 2003). We adopt a contingency approach to study the strategic drivers leading to the adoption of the integrated solutions and to examine the effectiveness of alternative strategies deployed by firms that adopt this business model. Integrated solutions represent an excellent test bed for our analysis because the continuous evolution of the business models underlying them forces firms to quickly develop new capabilities to match ever-changing external requirements.

More than a simple bundle of products and services, 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), p.138]. The diffusion of integrated solutions is particularly significant in the IT sector (Ceci, 2009; Gager, 2006; Gerstner, 2002): in order to remain competitive in a sector where value creation is shifting from hardware manufacturing or software development to service-oriented activities (Dolbeck, 2007; Pynnonen et al., 2008), product and service providers face increasing pressure to supply bundled systems rather than individual subsystems. These bundles, often linked by proprietary interfaces, tie customers into a solution with a single point of purchase and after-sales support, and guarantee higher margins than stand alone products or services (Wise and Baumgartner, 1999).

Whilst economically appealing, the provision of bundled products and services poses a number of challenges for IT firms. In this new competitive environment, firms become integrators of components, resources, and services that are developed by external organisations (Brusoni et al., 2001). Supplying integrated solutions thus entails a change in the boundaries of the firm (Windhal et al., 2004; Windhal and Lakemond, 2006). It also requires a redesign of the firm's offers and the reconfiguration of its capabilities (Davies et al., 2006; Miozzo and Grimshaw, 2011; Sato, 2010). Compared to firms focusing only on either products or services, integrated solutions providers must develop multiple capabilities to address a broader set of customer needs. They must also carefully evaluate the trade-off between the development of specialised and generic capabilities. In today's hypercompetitive markets, the development of multiple capabilities may dilute the firm's core competences and, ultimately, erode its sources of competitive advantage. Firms in this industry have developed a variety of different capabilities and have historically followed different paths to become integrated solutions providers (Davies et al., 2006, 2007; Kapletia and Probert 2010; Singla, 2009). Different and often contradictory approaches to the provision of integrated solutions coexist, none of which has yet been identified as clearly superior (Ceci and Masini, 2011). For these reasons, the integrated solution business model represents an ideal context where to explore the trade-off between specialised and generic capabilities and the role of fit.

The reminder of the paper is organised as follows: Section 2 summarises the relevant literature. Section 3 proposes a testable hypothesis. Section 4 describes our methodological approach. Section 5 discusses the results, while Section 6 summarises the main conclusions.

2 The evolution of the contingency approach

The contingency approach has been applied to two major research areas: organisational research and relationship approach. These research streams are not mutually exclusive,

nor are they in opposition. Both of them, in fact, view the firm as a complex system operating in a dynamic and changing environment. The application of contingency principles to the study of organisational issues focuses on understanding the way that organisational structures combine the resources and capabilities of firms with other external factors (Child, 1975; Fredericks, 2005; Govindarajan, 1988). The relationship approach, in contrast, analyses the links existing among leadership styles, decision processes and situational factors (Ashour, 1973; Graen and Uhl-Bien, 1995; Lo et al., 2009; Van Slyke and Alexander, 2006; Vroom and Yetton, 1973).

The use of a contingency approach to study organisational phenomena was pioneered in the late 1960s. In this period, scholars analysed interactions between different contingencies (or factors) as a reaction to the failure of the existent theories. Until this time, managerial scholars [following Weber (1968) and Taylor (1911)] explained reality with a bureaucratic approach. These studies aimed to obtain a solution adequate for every situation through the combination of different elements (economies of scale, pricing, organisational design, and so forth), paying no attention to the differences present in each firm. The failure of these studies to predict the best strategy and to adequately explain the failure and the success of firms led to the development of alternative approaches. The contingency approach was largely adopted in research areas related to organisational studies (Miles and Snow, 1978; Pugh et al., 1969), including those looking at environmental uncertainty (Duncan, 1972) and managerial practices (Siggelkow, 2002). The first important contribution to this approach was by Burns and Stalker (1961) that pointed out the importance of contingency factors in shaping organisations and also argued that it impossible to design a successful organisation without taking into account environmental contingencies. A milestone in this research stream is the work of Lawrence and Lorsch (1986). In their book 'Organisation and Environment' they focus on the way that characteristics of the external environment (e.g., turbulence or stability) determine different organisational decisions. The innovative aspect of this contribution resides not only in the identification of the external environment as a crucial factor, as important as the internal elements, but also in the development of a systemic view of the firm.

An important question that has been addressed by contingency scholars is why firms choose one specific path toward a configuration rather than another. It is particularly interesting to identify the most influential environmental contingencies and the way that these determine the adoption of a given firm's configuration (Siggelkow, 2001). Contingency scholars taking such an approach must be aware of its limitations. One pitfall is represented by the search for the one best fit. For obvious reasons, this view is subject to the same objections that have been raised for the one-best-way approach: the search for the one best fit does not take into account the complexity of the environment nor the specificity of the firm's characteristics. Another risk that researchers have to be aware of is represented by the converse of the one-best-fit search: the complexity of the context can lead to the formulation of a 'no model' in which the unique value of each situation leads not to any theoretical and generalisable model but only to an accurate description of many unique situations without any predictive application or practical implications. These represent two extremes of a continuum, and scholars would be wise to position their research in the middle, avoiding the pitfalls of both extremes.

3 A conceptual model of fit between capabilities and environmental variables for integrated solutions

The contingency perspective offers a useful theoretical lens to analyse the strategic decisions of integrated solution providers. First, this theory suggests that a firm should match its internal organisational complexity with its environmental complexity (Thompson, 1967). By choosing their markets, their target customers, and the appropriate mix of products and services, integrated solutions providers affect the degree of heterogeneity of their operational environment. We suggest that rationally managed firms should frame their product/market/customer choices so that the resulting environmental heterogeneity is consistent with the organisational capabilities they possess. Integrated solutions providers that operate in a large number of different industrial sectors will tend to develop a wider range of capabilities than firms specialising in one industry. Likewise, companies that target customers of different sizes and manage different projects will tend to develop multiple capabilities and more flexible organisations than solutions providers that specialise in a specific market niche.

The contingency theory also suggests that the selection of coherent combinations of organisational capabilities and operational environments have performance implications (Child, 1972; Mihm et al., 2010; Tallon and Pinsonneault, 2011). We expect that firms possessing specialised capabilities should obtain greater benefits when they operate in homogeneous environments. The possession of specific knowledge about a restricted number of customers in a given industry, as well as the development of dedicated products and services, should give these organisations a competitive advantage that cannot be easily matched by firms with generic capabilities. The specialised firms can customise their offers to match specific customers' needs and achieve greater economies of scale in doing so.

On the other hand, integrated solutions providers may find heterogeneous environments more profitable, because these contexts offer greater opportunities to access new customers and markets and decrease the risk of being affected by changes in one particular market (Hitt et al., 1997; Keats and Hitt, 1988). However heterogeneity requires multiple capabilities; firms must address a broader set of customer needs.

To investigate these research issue, we adopt the following definitions:

1 Specialisation: integrated solutions providers display specialised capabilities when they concentrate their resources on a limited set of core activities. Integrated solutions providers display generic capabilities when they spread their resources evenly among a wide range of activities;

2 Homogeneity: integrated solutions providers operate in homogeneous environments when they offer a limited range of product and services, serve similar customers, and develop projects of similar size and value. Integrated solutions providers operate in heterogeneous environments when they offer a wide range of products and services, serve many different customers, and develop projects of different sizes and values.

Accordingly, based upon the above definition and building upon the contingency theory perspective, we propose the following hypothesis:

Hypothesis firms displaying fit between the degree of 'specialisation' of their capabilities and the degree of 'homogeneity' of the environment in which they operate have higher performance than their counterparts.

4 Methods

4.1 Data collection: sample selection and questionnaire administration

The data for this study were obtained via a survey of a sample of integrated solution providers operating in the IT sector. In the first phase of data collection, extant literature and empirical evidence were used to generate valid items to measure the constructs in our theoretical model. The literature review focused on four topics: integrated solutions, systems integration, project-based organisation, and firm boundaries (Cerasale and Stone, 2004; Davies and Hobday, 2005; Prencipe et al. 2003; Williamson, 1975). This review was then supplemented with a multiple case study analysis. Ten IT solutions firms operating in Italy were examined through an analysis of documentary and archival data and interviews with project managers, marketing directors, and sales directors. Together with the analysis of the literature, this allowed for the establishment of a taxonomy of integrated solutions capabilities and the identification of items describing the characteristics of these solutions (Ceci and Prencipe, 2008).

In the second phase of data collection, the items were coded into a questionnaire and submitted to a sample of IT solution providers in Europe. To assure homogeneity in the sample, the survey was restricted to four countries that were representative of the overall population of IT solution providers in Europe and offered favourable opportunities for data collection: Italy, Spain, the UK, and Sweden. To maximise the accuracy of responses, the questionnaire was prepared in the native language of the respondents (with the exception of Sweden, where English was used). The survey was written initially in English and was then translated into Spanish and Italian. The Italian and Spanish versions were then translated back into English by a second translator to check their accuracy and to eliminate inconsistencies (Bensaou and Venkatraman, 1995).

Table 1 Distribution of firms providing integrated solutions

No. of employees	*% of firms offering integrated solution*
20 to 99	47%
100 to 499	50%
500+	100%

The sample selection was based on an ad hoc sampling procedure. As there was no extant database of integrated solution providers, we developed a procedure to estimate this population and from that population extracted a sampling frame. We used the Amadeus database of European Companies to construct the population of generic IT firms. Since firms that provide integrated solutions are former software houses, hardware producers, and consultancy firms, we considered the following NACE codes: 3,001 and 3,002 (manufacture of office machinery and computers), and 7,210, 7,221, 7,222, 7,230, 7,240, 7,250, and 7,260 (computer and related activities). We then selected a random sample of 200 firms from the population and examined their websites to ascertain whether they provided integrated solutions. In this way, we obtained the percentage of generic IT firms that moved into the integrated solution business, stratified by number of employees (Table 1), and computed the population of IT integrated solution providers. Finally, to select the sampling frame from this population of 3,042 firms (Table 2), we randomly chose 40 firms from each country, yielding a final sampling frame of 160 firms. We obtained contacts for these firms from IT professional associations, alumni databases

from business schools and universities, and distribution lists from specialised newspapers and from the Chamber of Commerce.

Table 2 Population and sample characteristics

	Location	*No. of employees*			
		20 to 99	*100 to 499*	*500+*	*Total*
Firms operating in the IT sector (Source: Amadeus database)	Italy	895	293	65	1,253
	UK	1,791	792	202	2,785
	Sweden	610	131	29	770
	Spain	813	301	56	1,170
	Total population	*4,109 (69%)*	*1,517 (25%)*	*352 (6%)*	*5978*
Firms offering integrated solutions	Italy	421	147	65	632
	UK	842	396	202	1,440
	Sweden	287	65	29	381
	Spain	382	150	56	588
	Total population	*1,932 (63%)*	*758 (25%)*	*352 (12%)*	*3,042*
Sample	Italy	20	6	4	30
	UK	16	4	7	30
	Sweden	12	7	4	23
	Spain	11	5	3	19
	Total	*62 (61%)*	*23 (22%)*	*17 (17%)*	*102*

Because respondents needed to have a direct and personal involvement in an integrated solution project in order to answer the questionnaire, the ideal respondent was identified as a project manager. In order to guarantee that the data collected at the project level could be used as a reliable proxy for all of the firm's activities, project managers were asked to refer to a project that was highly representative of the activities of the company (i.e., within the class of projects that generated the largest proportion of revenue for the organisation) (Subramaniam and Venkatraman, 2001). To increase the response rate, we guaranteed that all the data would remain absolutely confidential and would be used only for academic purposes; we also promised to provide personalised feedback benchmarking the respondent's firm against a representative sample.

Telephone interviews were chosen as the preferred mode of data collection. This administration method yielded a 64% response rate, which is higher than other studies of this nature (Bensaou and Venkatraman, 1995; Miller and Roth, 1994). The final sample contained 102 firms (Table 2). Of the firms that participated in the survey, 75% completed the questionnaire during the phone interviews and 10% during face-to-face interviews. For the remaining 15% of firms, the survey was self-administered, with the researcher making follow-up calls to clarify the responses as needed. A Wilcoxon signed-rank test on the firm size confirmed that the sample distribution was not significantly different from the population ($p = 0.019$).

4.2 Operationalisation of variables

The independent variable that measures environmental homogeneity was constructed aggregating the scores of six indices measuring the homogeneity in:

1 offer

2 clients served

3 projects.

Homogeneity in the offer was calculated using two indicators (RANGE_PROD and RANGE_SERV) reflecting the range of products and services included in the offer and developed internally. To that end, project managers were given a list of activities and asked to indicate whether and how the firm provided these activities. The list of activities was based on the results of the analysis of the data collected in (Ceci and Prencipe, 2008). The two indicators were then constructed as follows:

$$\text{RANGE\_PROD} = \Sigma_i \left(x_i * a_i \right) / N$$

$$\text{RANGE\_SERV} = \Sigma_i \left(x_i * b_i \right) / N$$

where x_i is the activity score reported in the questionnaire and coded as follows: 3 if the activity was included in the offer and managed in-house; 2 if included in the offer and managed both in-house and externally; 1 if included in the offer but managed by external providers only; and 0 if not included. a_i is the product-specific weight of activity i based on its product content. b_i is the service-specific weight of activity i based on its service content. N is the number of activities examined.

Customer homogeneity was measured using two Herfindahl-Hirschman concentration indices, one for the percentage of clients of different sizes, and one for clients operating in different industries. The homogeneity of projects was also measured by means of two Herfindahl-Hirschman indices applied to the length and the value of integrated solution projects. Low values for these indices indicate heterogeneous environments, whereas low values of the product and service range indices, in contrast, indicate homogeneous environments.

The second independent variable, i.e., the degree of specialisation of organisational capabilities, was computed as the variance of seven capability indices. Low levels of variance across the seven indices constitute evidence of firms with generic capabilities that allocate resources evenly among various activities. Conversely, high levels of variance are associated with specialisation, as they indicate uneven resource allocation profiles across the seven capabilities. The seven capability indices were measured using multi-item scales. For each of the seven activities, respondents were asked to assess through 5-point Likert scales its importance for the business; the frequency of provision of the activity; the involvement of external suppliers; and the percentage of work conducted internally. To operationalise the capability variables we first performed a factor analysis on the 28 items using varimax orthogonal rotation, which supported the retention of the seven factors suggested in the literature (Ceci and Masini, 2011; Ceci and Prencipe, 2008). The capability variables was then formed by aggregating the items tapping into each construct, weighted by their respective factor scores. We conducted several tests to assess the psychometric properties of the measures. Cronbach's alpha values varied from 0.84 to 0.96 for each measure, thus providing strong evidence of construct reliability. To establish convergent and discriminant validity, we performed a confirmatory factor analysis (Hair et al., 1998). The results provided strong evidence of convergent validity: the Average Variance Extracted (AVE) exceeded the recommended cutoff value of .50 for all scales. Factor loadings also exceeded the recommended cutoff

value of .60. In addition, the results provide evidence of discriminant validity. The squared root of the AVE value of each construct was larger than the correlation between that construct and all other constructs. In Table 3 we report the factor loadings, Cronbach's alpha values, and AVE values for the seven capabilities.

Table 3 Measurement scales for the seven capabilities

Construct and questionnaire items	*Loading*	*t-stat.*
Hardware and infrastructure Mfg. (CR = 0.95; AVE = 0.82)		
Importance for the business	0.89	20.22
Frequency of provision	0.93	40.94
Involvement of external suppliers	0.94	55.33
Percentage of work done internally	0.88	21.30
Software development (CR = 0.97; AVE = 0.89)		
Importance for the business	0.97	118.65
Frequency of provision	0.9	41.9
Involvement of external suppliers	0.95	84.02
Percentage of work done internally	0.96	74.38
Consulting (CR = 0.93; AVE = 0.78)		
Importance for the business	0.88	26.56
Frequency of provision	0.84	23.36
Involvement of external suppliers	0.89	42.13
Percentage of work done internally	0.91	45.85
Financial (CR = 0.97; AVE = 0.88)		
Importance for the business	0.94	52.97
Frequency of provision	0.95	57.96
Involvement of external suppliers	0.97	111.63
Percentage of work done internally	0.89	24.59
Delivery (CR = 0.89; AVE = 0.68)		
Importance for the business	0.83	17.83
Frequency of provision	0.77	12.23
Involvement of external suppliers	0.82	18.11
Percentage of work done internally	0.85	25.45
Post sales (CR = 0.89; AVE = 0.69)		
Importance for the business	0.81	9.36
Frequency of provision	0.77	8.41
Involvement of external suppliers	0.82	25.84
Percentage of work done internally	0.89	39.89
Systems integration (CR = 0.91; AVE = 0.71)		
Importance for the business	0.86	11.17
Frequency of provision	0.77	9.95
Involvement of external suppliers	0.85	26.46
Percentage of work done internally	0.90	35.71

To assess the value generated by the different configurational arrangements, we used four dependent variables to evaluate performance of firms. Two of them are the following productivity measures:

1 revenue per employee (revenue from the integrated solutions business divided by the number of employees)

2 revenue per project.

Furthermore, to reflect the customer's perspective we also assessed project performance by means of two variables:

3 the degree of goal achievement

4 customer satisfaction index calculated using a self-reported, 5-point Likert scale.

Data to compute financial measures of performance were obtained from public databases (Amadeus). Other project-based performance measures were self-reported. For all the self-reported measures, we tested for common method variance (CMV) using Harman's single factor test (Podsakoff et al., 2003; Podsakoff and Organ, 1986). Results showed no evidence of CMV.

4.3 Analytical approach

To determine the value of specialisation we estimated the direct model (1) and the moderated model (2). The hypothesis was tested by assessing the significance of the coefficient b_5 and the significance of the increase in the adjusted R^2 between the direct and moderated models. The test was replicated for each of the four performance variables mentioned above. We estimated the models using OLS because evidence of neither multicollinearity nor heteroscedasticity was found: the largest correlation among regression variables was 0.34, while c^2 values in a White test ranged between 20.22 and 29.71, with p between 0.78 and 0.28 for the four models tested.

$$\begin{aligned}\text{Performance} = {} & \alpha + \beta_0\ \text{firm size} + \beta_1\ \text{project size} + \beta_2\ \text{project value} \\ & + \beta_3\ \text{homogeneity} + \beta_4\ \text{specification} + \varepsilon\end{aligned} \tag{1}$$

$$\begin{aligned}\text{Performance} = {} & \alpha + \beta_0\ \text{firm size} + \beta_1\ \text{project size} + \beta_2\ \text{project value} \\ & + \beta_3\ \text{homogeneity}\beta_4\ \text{specification} \\ & + \beta_5\ \text{specialization*homogeneity} + \varepsilon\end{aligned} \tag{2}$$

5 Fit between specialisation and homogeneity

The results of the moderated analysis provide support for the Hypothesis (see Table 4). Models 1.1, 1.2, 2.1 and 2.2 suggest that while specialisation has only a moderately positive effect on labour and project productivity, this positive effect becomes significantly greater for firms that operate in homogeneous environments. The interaction term Specialisation*Homogeneity has a positive and significant impact on both revenue per employee and revenue per project, and the increase in R^2 is also statistically

significant in both models. Revenue per employee and revenue per project measure the performance of the firms in terms of labour productivity.

This suggests that firms that have specialised their capabilities in a few narrowly defined core activities are better able to achieve competitive advantage. This explains the moderated but positive effects that specialisation of capabilities has on labour and project productivity. The 'focused factory' approach (Skinner, 1974) gives the best performance because it forces firms to concentrate on just a few capabilities, externalising or simply not offering those activities that are non-core. The positive effects of specialisation are moderated by the impact of the homogeneity variable. Operating in homogeneous markets leads firms to develop a deeper understanding of clients' specific needs and to develop industry-specific tools and routines that increase labour and project productivity.

Table 4 Moderated regression analysis

Dependent variable: revenue per employee						
	Direct model (1.1)			*Moderated model (1.2)*		
	Par. Est.		*St. error*	*Par. Est.*		*St. error*
Firm size	−0.07		0.11	−0.06		0.10
Project size	0.09		0.12	0.10		0.11
Project value	0.39	***	0.12	0.40	***	0.12
Homogeneity	0.14		0.11	−0.26		0.18
Specialisation	0.22		0.14	0.26	**	0.13
Specialisation* Homogeneity				0.69	***	0.25
R2	*0.18*			*0.25*		
Model F	*3.75*	***		*4.63*	***	
DR2				*0.07*		
Hierarchical F				*8.97*	***	
N	*91*			*91*		
Dependent variable: revenue per project						
	Direct model (2.1)			*Moderated model (2.2)*		
	Par. Est.		*St. error*	*Par. Est.*		*St. error*
Firm size	−0.12		0.08	−0.11		0.08
Project size	0.12		0.09	0.12		0.09
Project value	0.56	***	0.10	0.56	***	0.09
Homogeneity	0.08		0.08	−0.13		0.15
Specialisation	0.09	*	0.11	0.12	*	0.11
Specialisation*Homogeneity				0.34	*	0.20
R2	*0.37*			*0.39*		
Model F	*9.82*	***		*8.83*	***	
DR2				*0.02*		
Hierarchical F				*3.34*	***	
N	*91*			*91*		

Notes: *Significant at the 0.1 level; **Significant at the 0.05 level; ***Significant at the 0.01 level

Table 4 Moderated regression analysis (continued)

Dependent variable: degree of goal achievement						
	Direct model (3.1)			*Moderated model (3.2)*		
	Par. Est.		*St. error*	*Par. Est.*		*St. error*
Firm size	−0.03		0.10	−0.04		0.10
Project size	−0.01		0.12	−0.02		0.11
Project value	−0.12		0.12	−0.13		0.11
Homogeneity	0.25	**	0.11	0.61	***	0.18
Specialisation	0.13		0.13	0.09		0.13
Specialisation* Homogeneity				−0.61	**	0.25
R2	*0.09*			*0.15*		
Model F	*1.71*			*2.54*	**	
DR2				*0.06*		
Hierarchical F				*7.25*	***	
N	*91*			*91*		
Dependent variable: customer satisfaction						
	Direct model (4.1)			*Moderated model (4.2)*		
	Par. Est.		*St. error*	*Par. Est.*		*St. error*
Firm size	−0.03		0.10	−0.04		0.10
Project size	0.01		0.11	0.00		0.11
Project value	−0.13		0.12	−0.14		0.11
Homogeneity	0.19	*	0.10	0.49	***	0.18
Specialisation	0.15		0.13	0.12		0.13
Specialisation* Homogeneity				−0.52	**	0.24
R2	*0.07*			*0.12*		
Model F	*1.31*			*1.89*	*	
DR2				*0.05*		
Hierarchical F				*5.31*	**	
N	*91*			*91*		

Notes: *Significant at the 0.1 level; **Significant at the 0.05 level; ***Significant at the 0.01 level

The analysis of models 3.1, 3.2, 4.1 and 4.2 provides a different picture. First, the results suggest that in homogeneous environments firms find easier to achieve higher customer satisfaction and meet project objectives. Firms know their customers better, they have specific knowledge of the internal processes typical of the industry, and they know the types of problems that are frequently encountered and how to solve them. Moreover, given their deeper understanding of clients' characteristics, they are able to provide solutions that are tailored to customers' specific needs. They can exploit economies of scale, providing solutions developed for the niche in which many of their clients operate.

However, in sharp contrast to the results of the productivity analysis, the benefits of specialisation decrease with an increase in the degree of environmental homogeneity. A plausible interpretation of this effect is that homogeneous environments favour specialisation and software customisation. In turn, overly customised solutions may be too complex to use and may create compatibility problems with existing platforms, thereby dissatisfying clients. Solutions developed ad hoc may be difficult to manage, after-sales activities may become costly and ineffective, and in the development and delivery phases of the solution delays are likely to occur. Empirical evidence shows that firms trapped in these situations find it difficult to keep time and costs within budget, and this negatively affects customer satisfaction. On the other hand, firms working in heterogeneous markets offer comprehensive, highly standardised solutions. Generally, integrated solutions providers adopt the following strategy: they offer products and services that involve a defined core architecture that can be slightly customised to meet customer requests, with specific customisation modules and options ready for implementation. This reduces implementation time and cost, allowing firms to stay within budgetary and schedule constraints, and increases customer satisfaction.

6 Conclusions

The aim of this paper was to examine the role of fit in the context of dynamically changing environments such as the industry of integrated solutions. The importance of matching strategic choices with the environment has been investigated by a number of scholars from the contingency approach, who identified fit between the characteristics of the internal and external environment as a source of competitive advantage. While the contingency approach has been applied in different contexts to explore different business models, no previous studies explored its applicability in rapidly changing industries such as the integrated solutions context. In fact, a correct alignment of internal capabilities and external markets is especially important in the business of integrated solutions because of the central role played by customers in shaping the firms offer.

To shed light on these issues we examined a sample of 102 integrated solution providers, analysing the interaction among internal and external variables and their impact on four performance indicators. We hypothesised that firms displaying fit between the degree of ‘specialisation’ of their capabilities and the degree of ‘homogeneity’ of their environment would achieve superior performance. Our results only partially support the fit hypothesis. The results pertaining to productivity and project-efficiency performance variables are in line with the hypothesis, while performance indicators based on customer satisfaction contrast with previous findings. Data show that no one best configuration of fit can be easily identified. The use of different performance measures suggest that different optimal configurations exist, each of which contribute to the achievement of a different organisational or operational goal. Customer satisfaction cannot be guaranteed by focusing on standardised systems, which in turn allow for greater control of time and costs that allow the maximisation of labour and project productivity. From the latter viewpoint, the ‘focused factory’ appears to be a successful model for the solutions business while prioritising the efficiency of the process. Obviously, the selection of the most appropriate objective, which will guarantee the success of the business model and the firm’s survival in the competitive arena, is largely

based on the beliefs and perceptions of the managers that are called to decide between the maximisation of labour productivity or customer satisfaction.

Our findings contribute to the debate about the existence of equifinality in organisational design, that is, the possibility of 'multiple, equally effective designs to support a given strategy' [Gresov and Dazin, (1997), p.404]. The present investigations illustrate that the final operational state in the integrated solutions business model can be achieved by following different paths: this enlarges our understanding of the role of equifinality in economic systems, by challenging its existence.

On a final note, this work suggests interesting avenues for future research. First, this work aim to test the effectiveness of contingency mechanisms in fast evolving industries. However, we tested our hypothesis in one single sector. Follow-up empirical studies are called for to confirm our hypotheses, extending the study to different industry sectors. Another direction is represented by the role played by managers in selecting the strategic goals. We have seen that if firms decide to pursue labour and project productivity, it is better to operate in homogeneous environments with few specialised capabilities. However, analysing the impact on customer satisfaction, the benefits of specialisation decrease with an increase in the degree of environmental homogeneity. This suggests that different strategic goals can require different configurations of internal and external factors. In fast evolving industries this is particularly relevant since managers, on the basis of the fast evolution of the environment, are called to take quick decisions. The managerial process behind the definition of strategies in integrated solutions context deserves further attention and represents an interesting area for further exploration.

References

Aksin, Z.O. and Masini, A. (2008) 'Effective strategies for internal outsourcing and offshoring of business services: an empirical investigation', *Journal of Operations Management*, Vol. 26, No. 2, pp.239–256.

Ashour, A. (1973) 'The contingency model of leadership effectiveness: an evaluation', *Organizational Behavior and Human Decision Processes*, Vol. 9, No. 3, pp.339–355.

Bensaou, M. and Venkatraman, N. (1995) 'Configurations of interorganizational relationships: a comparison', *Management Science*, Vol. 41, No. 9, pp.1471–1492.

Brusoni, S., Prencipe, A. and Pavitt, K.L.R. (2001) 'Knowledge specialization and the boundaries of the firm: why do firms know more than they make?', *Administrative Science Quarterly*, Vol. 46, No. 4, pp.597–621.

Burns, T. and Stalker, G. (1961) *The Management of Innovation*, London, Tavistock.

Ceci, F. (2009) *The Business of Solutions*, Cheltenham, UK, Edward Elgar.

Ceci, F. and Masini, A. (2011) 'Balancing specialized and generic capabilities in the provision of integrated solutions: empirical evidence from the IT sector', *Industrial and Corporate Change*, Vol. 20, No. 1, pp.91–132.

Ceci, F. and Prencipe, A. (2008) 'Configuring capabilities for integrated solutions: evidence from the IT sector', *Industry & Innovation*, Vol. 15, No. 3, pp.277–296.

Cerasale, M. and Stone, M. (2004) *Business Solutions on Demand*, London, Kogan Pages.

Child, J. (1972) 'Organizational structure, environment and performance: the role of strategic choice', *Sociology*, Vol. 6, No. 1, pp.1–22.

Child, J. (1975) 'Managerial and organizational factors associated with company performance – part II. A contingency analysis', *Journal of Management Studies*, Vol. 12, Nos. 1–2, pp.12–27.

Cusumano, M., Kahl, S. and Suarez, F. (2008) Services and the business models of product firms: an empirical analysis of the software industry *e-business Papers.* e-business MIT Sloan School of Management.

Davies, A. (2004) 'Moving base into high-value integrated solutions: a value stream approach', *Industrial and Corporate Change*, Vol. 13, No. 5, pp.727–756.

Davies, A. and Hobday, M. (2005) *The Business of Projects*, Cambridge University Press, Cambridge.

Davies, A., Brady, T. and Hobday, M. (2006) 'Changing a path toward integrated solutions', *MIT Sloan Management Review*, Vol. 47, No. 3, pp.39–48.

Davies, A., Brady, T. and Hobday, M. (2007) 'Organizing for solutions: Systems seller vs. Systems integrator', *Industrial Marketing Management*, Vol. 36, No. 2, pp.183–193.

De Clercq, D., Thongpapanl, N. and Dimov, D. (2011) 'The moderating role of organizational context on the relationship between innovation and firm performance', *Engineering Management, IEEE Transactions on***,** Vol. 58, No. 3, pp.1–14.

Dolbeck, A. (2007) 'Valutation of the custom software and IT services industry', *Weekly Corporate Growth Report***,** pp.1–4.

Drazin, R. and Van De Ven, A. (1985) 'Alternative forms of fit in contingency theory', *Administrative Science Quarterly*, Vol. 30, No. 4, pp.514–539.

Duncan, R. (1972) 'Characteristics of organizational environments and perceived environmental uncertainty', *Administrative Science Quarterly***,** Vol. 17, No. 3, pp.313–327.

Fredericks, E. (2005) 'Infusing flexibility into business-to-business firms: a contingency theory and resource-based view perspective and practical implications', *Industrial Marketing Management*, Vol. 34, No. 6, pp.555–565.

Gager, R. (2006) 'Intergration: the integrators' perspective', *SDM*, Vol. 36, No. 6, pp.56–62.

Gerstner, L. (2002) *Who Says Elephants Can't Dance? Inside IBM Historic Turnaround*, Collins, New York.

Govindarajan, V. (1988) 'A contingency approach to strategy implementation at the business-unit level: integrating administrative mechanism with strategy', *Academy of Management Journal,* Vol. 31, No. 4, pp.828–853.

Graen, G.B. and Uhl-Bien, M. (1995) 'Relationship-based approach to leadership: development of leader-member exchange (LMX) theory of leadership over 25 years: applying a multi-level multi-domain perspective', *The Leadership Quarterly*, Vol. 6, No. 2, pp.219–247.

Gresov, C. and Drazin, R. (1997) 'Equifinality: functional equivalence in organization design', *Academy of Management Review*, Vol. 22, No. 2, pp.403–428.

Hair, J., Tatham, R., Anderson, R. and Black, W. (1998) *Multivariate Data Analysis*, Prentice Hall, New Jersey, USA.

Hitt, M., Hoskisson, R. and Kim, H. (1997) 'International diversification: effects on inovation and firms performance in product diversified firms', *Academy of Management Journal*, Vol. 40, No. 4, pp.767–798.

Huang, L.K. (2009) 'The contingent role of innovation between IT management sophistication and strategic alignment', *Journal of Global Information Management*, Vol. 17, No. 2, pp.60–92.

Kapletia, D. and Probert, D. (2010) 'Migrating from products to solutions: an exploration of system support in the UK defense industry', *Industrial Marketing Management*, Vol. 39, No. 4, pp.582–592.

Keats, B. and Hitt, M. (1988) 'A casual model of linkages among enviromental dimensions, macro organizatiola characteritics and performance', *Academy of Management Journal*, Vol. 31, No. 3, pp.570–598.

Lawrence, P. and Lorsch, J. (1986) *Organization and Environment; Managing Differentiation and Integration*, Harvard Business School Press, Cambridge, MA.

Lo, M.C., Ramayah, T. and Min, H.W. (2009) 'Leadership styles and organizational commitment: a test on Malaysia manufacturing industry', *African Journal of Marketing Management*, Vol. 1, No. 6, pp.133–139.

Masini, A. and Van Wassenhove, L.N. (2009) 'ERP competence-building mechanisms: an exploratory investigation of configurations of ERP adopters in the European and US manufacturing sectors', *Manufacturing & Service Operations Management*, Vol. 11, No. 2, pp.274–298.

Mayorga, M.E. and Subramanian, R. (2010) 'Factoring environmental concerns in supply chain decision making', *International Journal of Business and Systems Research*, Vol. 4, No. 4, pp.469–487.

Mihm, J., Loch, C.H., Wilkinson, D. and Huberman, B.A. (2010) 'Hierarchical structure and search in complex organizations', *Management Science*, Vol. 56, No. 5, pp.831–848.

Miles, R.E. and Snow, C.C. (1978) *Organizational Strategy, Structure and Process*, McGraw-Hill, New York.

Miller, J. and Roth, A. (1994) 'A taxonomy of manufacturing strategies', *Management Science*, Vol. 40, No. 3, pp.285–304.

Miozzo, M. and Grimshaw, D. (2011) 'Capabilities of large services outsourcing firms: the 'outsourcing plus staff transfer model' in EDS and IBM', *Industrial and Corporate Change*, Vol. 20, No. 3, pp.909–940.

Oliva, R. and Kallenberg, R. (2003) 'Managing the transition from products to services', *International Journal of Service Industry Management*, Vol. 14, No. 2, pp.160–172.

Pelham, A.M. and Lieb, P. (2011) 'Industry environment and business strategy: a comparison of contingency theory expectations and relationships between small manufacturing firm manager‚Äôs perceptions of environment and strategy', *International Business & Economics Research Journal (IBER)*, Vol. 1, No. 8.

Pertusa-Ortega, E.M., Molina-Azorìn, J.F. and Claver-Cortès, E. (2010) 'Competitive strategy, structure and firm performance: a comparison of the resource-based view and the contingency approach', *Management Decision*, Vol. 48, No. 8, pp.1282–1303.

Podsakoff, P., Mackenzie, S., Lee, J-Y. and Posakoff, N. (2003) 'Common method biases in behavioural research: a critical review of the literature and recommended remedies', *Journal of Applied Psychology*, Vol. 88, No. 5, pp.879–903.

Podsakoff, P.M. and Organ, D.W. (1986) 'Self-reports in organizational research: problems and prospects', *Journal of Management*, Vol. 12, No. 4, pp.531–544.

Prencipe, A., Davies, A. and Hobday, M. (2003) *The Business of Systems Integration*, Oxford University Press, Oxford.

Pugh, D.S., Hickson, D.J., Hinings, C.R. and Turner, C. (1969) 'The context of organization structures', *Administrative Science Quarterly*, Vol. 14, No. 1, pp.91–114.

Pynnonen, M., Hallikas, J. and Savolainen, P. (2008) 'Mapping business: value stream-based analysis of business models and resources in Information and communications technology service business', *International Journal of Business and Systems Research*, Vol. 2, No. 3, p.305.

Sandstrom, C. and Osborne, R-G. (2011) 'Managing business model renewal', *International Journal of Business and Systems Research*, Vol. 5, No. 5, pp.461–474.

Sato, C.E.Y. (2010) 'Building the network as a platform for integrated solutions and service innovations in the transition to the next generation of telecommunications: the case of BT', Doctoral thesis, University of Sussex.

Siggelkow, N. (2001) 'Change in the presence of fit: the rise, the fall, and the renaissance of liz claiborne', *The Academy of Management Journal*, Vol. 44, No. 4, pp.838–857.

Siggelkow, N. (2002) 'Evolution toward fit', *Administrative Science Quarterly*, Vol. 47, No. 1, pp.125–159.

Singla, A.R. (2009) 'Enterprise resource planning systems implementation: a literature analysis', *International Journal of Business and Systems Research*, Vol. 3, No. 2, pp.170–185.

Skinner, W. (1974) 'The focused factory', *Harvard Business Review***,** Vol. 52, No. 3, pp.113–121.

Subramaniam, M. and Venkatraman, N. (2001) 'Determinants of transnational new product development capability: testing the influence of transferring and deploying tacit overseas knowledge', *Strategic Management Journal*, Vol. 22, No. 4, pp.359–378.

Tallon, P.P. and Pinsonneault, A. (2011) 'Competing perspectives on the link between strategic information technology alignment and organizational agility: insights from a mediation model', *MIS Quarterly*, Vol. 35, No. 2, pp.463–484.

Taylor, F. (1911) *The Principles of Scientific Management*, Harper, New York.

Thompson, J. (1967) *Organizations In Action*, McGraw Hill, New York.

Van Slyke, D.M. and Alexander, R.W. (2006) 'Public service leadership: opportunities for clarity and coherence', *The American Review of Public Administration*, Vol. 36, No. 4, p.362.

Venkatraman, N. (1989) 'The concept of fit in strategy research: toward verbal and statistical correspondence', *Academy of Management Review*, Vol. 14, No. 3, pp.432–444.

Vroom, V. and Yetton, P. (1973) *Leadership and Decision Making*, University of Pittsburgh, Pittsburgh.

Weber, M. (1968) *Economy and Society: An Outline of Interpretive Sociology*, Wiley Online Library, New York.

Williamson, O. (1975) *Markets and Hierarchies: Analysis and Antitrust Implications*, Free Press, New York.

Windhal, C. and Lakemond, N. (2006) 'Developing integrated solutions: the importance of relationships within the network', *Industrial Marketing Management*, Vol. 35, No. 3, pp.806–818.

Windhal, C., Andersson, P., Berggren, C. and Nehler, C. (2004) 'Manufacturing firms and integrated solutions: characteristics and implications', *European journal of Innovation Management*, Vol. 7, No. 7, pp.218–228.

Wise, R. and Baumgartner, P. (1999) 'Go downstream: the new profit imperative in manufacturing', *Harvard Business Review*, Vol. 77, No. 5, pp.133–141.

Zott, C. and Amit, R. (2008) 'The fit between product market strategy and business model: implications for firm performance', *Strategic Management Journal*, Vol. 29, No. 1, pp.1–26.