

INTERNET RESOURCES, CAPABILITIES AND THEIR COMPLEMENTARITY AS SOURCE OF BUSINESS VALUE

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Abstract

Recently, much debate about the value of e-business and information technology (IT) has been raised. Although the macro-level effect of IT is undisputed, a question remains on whether IT can provide differential benefits to individual firms. In this sense, information systems researchers face pressure to answer the question of whether and how e-business creates value. To respond to this challenge, this paper develops a conceptual model, grounded in the resource-based theory, in order to analyze the complementarity of Internet resources and e-business capabilities as source of business value. This model posits three relationships: Internet resources and e-business value, internal e-business capabilities and e-business value, and the complementarity of Internet resources and internal e-business capabilities as source of e-business value. To test hypotheses, a sample comprising 1,010 Spanish firms is employed. The results show that, as hypothesized, Internet resources per se are not positively related to e-business value and that internal e-business capabilities have a positive significant impact on e-business value. In addition, the results offer support for the complementarity of Internet resources and internal e-business capabilities as a source of business value.

Keywords: *e-Business, Resource-based theory, Internet, Business value, Information technology*

1 INTRODUCTION

The relationship between information technology (IT) and business value has been the subject of much research over the past decade. The results of these studies were varied and the term “productivity paradox” was coined to describe such findings. Nonetheless, recent studies have found positive and stronger linkages, and have attributed the productivity paradox to variation in methods and measures (Devaraj and Kohli, 2003).

Today IT is surpassing its traditional “back office” role and is evolving toward a “strategic” role with the potential not only to support chosen business strategies, but also to shape new business strategies (Henderson and Venkatraman, 1999). However, much debate about the value of IT and e-business has been raised, due to the gap between e-business and the lack of empirical evidence on e-business value. Although showing recent signs of advance, much of the existing e-business literature still relies, to a great extent, on case studies, anecdotes, and conceptual frameworks, with little empirical research directed to assessing the impact of IT on firm performance – especially in traditional companies (Brynjolfsson and Kahin, 2002). Case studies on firms such as eBay and Amazon show e-business can create business value, but there is a question as to whether the lessons learned from these “Internet giants” are more

widely applicable. At the same time, Carr's assertions (2003), in his article "IT Doesn't Matter", have raised the discussion about the value of IT. Carr's argument, in a few words, is that because every firm can purchase IT in the marketplace and because IT is now a commodity based on standards that all companies can freely use, IT is no longer a differentiating factor in organizational performance. What makes a resource truly strategic – what gives it the capacity to be the basis for a sustained competitive advantage - is not ubiquity but scarcity. Carr argues that no firm can use IT to achieve a competitive advantage over its competitors. Therefore, Carr concludes, firms should reduce spending on IT, follow rather than lead IT in their industry, and avoid deploying IT in new ways.

Most management information systems experts disagree with Carr's assertions. However, Carr argument is appropriate when he says that not all IT investments have strategic value. Some IT investments only allow firms to stay in business. The technology itself will rarely create superiority. For that reason, some research studies found that IT spending rarely correlates to superior financial results (Hoffman, 2002). However, even though competitors may copy an IT innovation, relative advantage can be created and sustained where the technology leverages some other critical resource. Kettinger et al. (1994) draw a number of such complementary resources, such as size, structure, culture, and so on, that could make it difficult for competitors to copy the total effect of the technology. This complementarity of resources is a corner stone of the resource-based theory and has been offered as an explanation of how IT has largely overcome its paradoxical nature and is contributing to business value (Bhatt and Grover, 2005; Clemons and Row, 1991).

Consequently, to respond to these challenges, this paper develops a conceptual model, grounded in the resource-based view (RBV) firms, in order to analyze the complementarity of Internet resources and e-business capabilities as source of business value at the level of an individual firm. The analysis employs a large sample of companies from different industries for hypothesis testing. Moreover, although recent studies (Zhu, 2004; Zhu and Kraemer, 2005) have analyzed the relationship between e-business capabilities and firm performance, very little work has been undertaken to identify Internet resources and e-business capabilities. Similarly, the complementarity of Internet resources and e-business capabilities has not been studied. The present study attempts to cover these gaps in the research.

The paper consists of six sections and is structured as follows: The next section reviews the relevant literature. In Section 3, hypotheses and research models are specified. Following that, the methodology used for sample selection and data collection is discussed. Then, data analysis and results are examined. Finally, the paper ends with a discussion of research findings, limitations and concluding remarks.

2 LITERATURE REVIEW

2.1 The RBV: conceptualization of e-business capabilities

The RBV has been used to answer one of the most extensively researched questions in the management strategy field, related to understanding the sources of sustained competitive advantages (Porter, 1985; Rumelt et al., 1991). At the same time, the RBV has become one of the standard theories to explain why firms in the same industry vary in performance over time (Hoopes et al. 2003). This suggests that the effects of individual, firm-specific resources on performance can be significant (Mahoney and Pandian, 1992). In this regard, the RBV is

based on two underlying assertions: resource heterogeneity and resource immobility. Resources and capabilities possessed by competing firms are heterogeneously distributed and may be a source of competitive advantage when they are valuable, rare, difficult to imitate, and not substitutable by other resources (Barney, 1991; Schulze, 1992; Wernerfelt, 1984). At the same time, resources and capabilities are a source of sustained competitive advantage, that is, differences may be long lasting (resource immobility) when protected by barriers to imitation (Mahoney and Pandian, 1992) or isolating mechanisms (Rumelt 1984) such as time-compression diseconomies, historical uniqueness, embeddedness and causal ambiguity (Barney, 1991; Dierickx and Cool, 1989; Peteraf, 1993).

The RBV generally tends to define resources broadly and include assets, infrastructure, skills, and so on. While resources serve as the basic units of analysis, firms create competitive advantage by assembling resources that work together to create organizational capabilities. Grant (1991) suggests that the capabilities of a firm are what it can do as a result of teams of resources working together. Teece et al. (1997) argued that capabilities cannot easily be bought; they must be built. Thus, building capabilities is not only a matter of combining resources; capabilities are rooted in processes and business routines. Also capabilities involve complex patterns of coordination between people and between people and other resources (Grant, 1991), and between an organization and other organizations. In this respect, Day (1994) describes capabilities as complex bundles of skills and accumulated knowledge, exercised through organizational processes, which enable firms to coordinate activities and make use of their assets. Day argues that capabilities and organizational processes are closely entwined, because capabilities enable the activities in a business process to be carried out. More recently, Makadok (2001) considers capability as a special type of resource. More specifically, he defines capability as an organizationally embedded non-transferable firm-specific resource whose purpose is to improve the productivity of the other resources possessed by the firm.

For the purposes of the present study, the above definitions of capability permit the identification of three important characteristics:

- Capabilities are rooted in processes and business routines, because it is capability that enables the activities in a business process to be carried out.
- Capabilities are firm-specific, while an ordinary resource is not. Because of this embeddedness, ownership of a capability cannot easily be transferred from one organization to another.
- The primary purpose of a capability is to enhance the productivity of the other resources that the firm possesses.

Extending the traditional notion of organizational capabilities to e-business, a firm's e-business capability is defined here as its ability to mobilize and deploy Internet-based resources, in combination with or in the presence of other valued resources. E-business capabilities are firm-specific (or interfirm-specific) and rooted in processes and business routines. In this sense, a distinction can be drawn between external and internal e-business capabilities. The former refers to the ability to mobilize Internet-based resources and other corporate resources with external business agents (e.g. supplier and customers), while the latter represents the ability to mobilize Internet-based resources and other corporate resources within a firm's boundaries. The present study focuses merely on internal e-business capabilities.

2.2 Internet resources and e-business capabilities

The RBV provides a solid foundation to differentiate between IT resources and IT capabilities and to study their separate influences on performance (Santhanam and Hartono, 2003). Based on this analysis, Bharadwaj (2000) suggested that if firms can combine IT related resources to create unique IT capabilities, they can improve their performance. IS researchers have followed this consideration of IT capability because competition may easily result in the duplication of investment in IT resources, and companies can purchase the same hardware and software to remove competitive advantage (Santhanam and Hartono, 2003). In this respect, IS research offers a useful distinction between IT resources and IT capabilities. The former is asset-based, while the latter comprises a mixture of assets formed around the productive use of IT.

In general, IT resources are not difficult to imitate; physical technology is by itself typically imitable. If one firm can purchase these physical technologies and thereby implement some strategies, then other firms should also be able to purchase these technologies, and thus such tools should not be a source of competitive advantage (Barney, 1991). However, firms may obtain competitive advantages from exploiting their physical technology in a better (and/or different) way than other firms, even though competing firms do not vary in terms of the physical technology they possess. IT resources are necessary, but not a sufficient condition, for competitive advantages (Clemons and Row, 1991). IT resources rarely contribute directly to competitive advantage. Instead, they form part of a complex chain of assets (IS capabilities) that may lead to better performance. Thus, some researchers have described this in terms of IT capabilities and argue that IT capabilities can create uniqueness and provide organizations a competitive advantage (Bhardwaj, 2000, Bhatt and Grover, 2005; Mata et al., 1995; Ross et al., 1996; Santhanam and Hartono, 2003). For instance, Ross et al. (1996) provide illustrative case examples to underscore the idea that IT capabilities can provide competitive advantage and enhance the performance of firms. Within the e-business literature, although there is very limited research here, recent studies have found a significant positive relationship between e-business capabilities and firm performance (Zhu, 2004; Zhu and Kraemer, 2005). However, very little work has been undertaken to identify Internet resources and e-business capabilities and study their separate influences on performance.

Consequently, the present study seeks to demonstrate that although Internet resources (considered as physical IT) are not responsible for the creation business value, their complementarity with e-business capabilities is critical to firm value.

2.3 E-business value from a process approach

Although much research using the RBV has focused on an aggregated dependent variable, namely, firm performance, this may not be the best way to test the RBV (Ray et al., 2004). For example, because firms can have competitive advantage in some business activities and competitive disadvantage in others, examining the relationship between resources and capabilities associated with different processes within a firm and its overall performance can lead to misleading conclusions. Ray et al. (2004) proposed examining the effectiveness of business processes as a way to test the RBV logic. Another issue is that some IT investments may provide benefits after a certain period but increase operating costs in the short term (Kauffman and Kriebel, 1988). Thus, using firm performance at the macro level is meaningless and can again lead to misleading conclusions. Researchers suggest a process-

oriented approach to overcome these confounding problems. Kauffman and Weill (1989) hold that the locus of impact, that is, the business process, should be the primary level of analysis. Within the literature on e-business, recent research also suggests a perspective based on processes to overcome these problems (Subramaniam and Shaw, 2002). These arguments lead to the conclusion that a process approach should be used to explain the generation of e-business value within the RBV, and this is the approach adopted in the present study. The present research uses the effectiveness of online procurement to measure e-business value. The business value of this process is discussed below.

E-procurement, or buying online, can potentially provide distinct value propositions to the firm. These come from the reduction of procurement and inventory costs, as well as strategic networks with suppliers that allow effective and efficient supply chain management (SCM). With regard to procurement costs, Kaplan and Sawhney (2002) indicated that buying in e-marketplaces considerably reduces transaction costs. With regard to strategic links and SCM, Internet technologies can enhance SCM decision making by enabling the collection of real-time information, and access to and analysis of this data in order to facilitate collaboration between trading partners in a supply chain. In this sense, Frohlich and Westbrook (2002) showed the importance of linking customers and suppliers together in tightly integrated networks. As a result of e-procurement, the collection of real-time information on demand is possible and, more importantly, products and services are delivered quickly and reliably when and where they are needed (Frohlich, 2002).

In sum, e-business value may lead to improved performance on the part of the firm in procurement. Although it could be argued that customers, suppliers and/or the firm's wider value network can benefit from online procurement, this study focuses on analyzing business value at the level of an individual firm.

3 DEVELOPMENT OF HYPOTHESES

This section develops hypotheses for the present study, drawing on the existing information systems and e-business literature. Three relationships will be explored: Internet resources and e-business value, internal e-business capabilities and e-business value, and the complementarity of Internet resources and internal e-business capabilities as source of e-business value (see Figure 1).

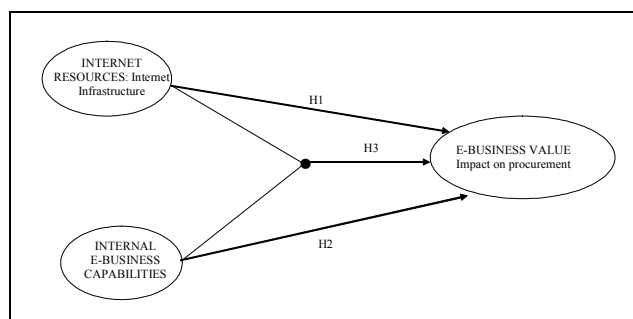


Figure 1. Research model

3.1 Internet resources and e-business value

Barney (1991) argued that firms could obtain competitive advantages on the basis of corporate resources that are firm specific, valuable, rare, imperfectly imitable, and not strategically substitutable by other resources. IT resources are easy to duplicate, and, hence, IT resources per se do not provide competitive advantages (Santhanam and Hartono, 2003). Although IT infrastructure is argued to be valuable, it is not a source of competitive advantage (Bhatt y Grover, 2005). Thus, IT infrastructure will rarely lead to superior performance. Similarly, Internet resources – as defined above – are not difficult to imitate. In general, Internet technology is by itself imitable. If one firm can purchase certain Internet technologies and thereby implement some strategies, then other firms should also be able to purchase these technologies, and thus such tools should not be a source of competitive advantage. Furthermore, as the diffusion of the Internet continues, the ability of proprietary IT to be a source of competitive advantage continues to be eroded. These arguments suggest that Internet resources may not be responsible for value creation in e-business. Thus, the following hypothesis is proposed:

Hypothesis 1: There is no relationship between Internet resources and e-business value

3.2 Internal e-business capabilities and e-business value

Engaging in IT investment is not a necessary nor sufficient condition for improving firm performance, since IT investments might be misused (Tallon et al., 2000). In this sense, IT assets cannot improve organizational performance if they are not used appropriately. However, when used appropriately IT is expected to create intermediary effects, such as IT being embedded in products and services, streamlined business processes, and improved decisions, which can be expected to have an influence on the performance of the firm (Ravichandran and Lertwongsatien, 2005).

Grant (1991) and Makadok (1991) emphasize that while resources by themselves can serve as basic units of analysis, firms create competitive advantage by assembling these resources to create organizational capabilities. Makadok states that these firm-specific capabilities, embedded in organizational processes, provide economic returns because that firm is more effective than its rivals in deploying resources. IS researchers have adopted this capability logic of resources by arguing that competitors may easily duplicate investments in IT resources by purchasing the same hardware and software and, hence, IT resources per se do not provide competitive advantages. Rather, it is the manner in which firms leverage their IT investments to create unique capabilities that impact firm performance (Clemons and Row, 1991; Mata et al, 1995). Thus, it is expected that internal e-business capabilities have the potential to create business value. The following hypothesis incorporates these expectations:

Hypothesis 2: There is a positive relationship between internal e-business capabilities and e-business value

3.3 The complementarity of Internet resources and internal e-business capabilities

Although there is research that posit a direct relationship between IS resources/capabilities and firm performance (Bharadwaj, 2000; Feeny and Willcoks, 1998; Santhanam and Hartono, 2003), others have questioned the direct-effect argument and emphasized that IS

resources/capabilities are likely to affect firm performance only when they are deployed to create unique complementarities with other firm resources (Clemons and Row, 1991; Powell and Dent-Micallef, 1997).

Firm resources are considered complementary when the presence of one resource enhances the value or effect of another resource (Ravichandran y Lertwongsatien, 2005; Zhu, 2004). For example, the complementarity between online offerings and offline assets is the essence of “clicks-and-mortar” companies. Customers who buy products over the Internet value the possibility of getting support and service offered through bricks-and-mortar retail outlets, including the convenience of in-store pickup and return. Hence the RBV highlights the role of complementarity as a source of value creation in e-business, though is not the only source as suggested by Amit and Zott (2001). As mentioned earlier, Internet resources are not difficult to imitate and per se do not provide competitive advantages. However, having a proper Web infrastructure may facilitate the internal processing of online operations and this way influence positively firm performance. That is, the fact of possessing an adequate Web infrastructure can be critical for e-business capabilities influence on e-business value. Thus, the following hypothesis is proposed:

Hypothesis 3: The complementarity between Internet resources and internal e-business capabilities explains variations in e-business value

4 METHODOLOGY

4.1 Data

The data source for the present study is the e-business W@tch survey 2003, an initiative launched by the European Commission for monitoring the adoption of IT and e-business activity. Telephone interviews with decision-makers in enterprises were conducted in March and November 2003. The decision-maker targeted by the survey was normally the person responsible for IT within the company, typically the IT manager. Alternatively, particularly in small enterprises without a separate IT unit, the managing director or owner was interviewed.

The population considered in this study was the set of all enterprises which are active at the national territory of Spain and which have their primary business activity in one of ten sectors considered (see Table 1). The sample drawn was a random sample of companies from the respective sector population with the objective of fulfilling strata with respect to business size. A share of 10% of large companies (250+ employees), 30% of medium sized enterprises (50-249 employees) and 25% of small enterprises (10-49 employees) was intended. The number of firms totalled 1,010. As shown in Table 1, 91.1% of firms were small and medium-sized enterprises (less than 250 employees) and each sector considered had a share of around 10% of the total sample.

With regard to respondents' titles, 54.4% were IS managers, nearly 20% were managing directors, and 12.1% were owners. The dataset was examined for potential bias in terms of the respondents' titles. Since respondents included both IT managers and non-IT managers, one could argue that IT managers may overestimate e-business value. To test this possible bias, the sample was divided into two groups: IS managers (head of IT/DP and other IT senior managers) versus non-IS managers (owner, managing director, strategy development and others). One-way ANOVA was used to compare the means of factor scores between the two

groups. No significant differences were found, suggesting that the role of the respondents did not cause any survey biases.

Sample characteristics by sector, size and respondent					
<i>Sector Name</i>	<i>%</i>	<i>N</i>	<i>Number of employees</i>	<i>%</i>	<i>N</i>
Manufacture of textiles and leather	10	101	1-9	38.4	338
Manufacture of chemicals	9.9	100	10-49	25.8	261
Manufacture of electrical machinery	9.9	100	50-249	26.8	271
Manufacture of transport equipment	9.9	100	More than de 249	8,9	90
Crafts and Trade	10.7	108	<i>Respondent title</i>	<i>%</i>	<i>N</i>
Retail	9.9	100	Owner/proprietor	12.1	122
Tourism	9.9	100	Managing director	19.6	198
Business services	9.9	100	Strategy development	1.9	19
Telecommunications & computer services	9.9	100	Head of IT/DP	22	222
Health and social services	10	101	Other IT senior member	32.4	327
			Others	12.1	122

Table 1. Sample characteristics (N= 1,010).

4.2 Measures of variables

The measurement model was developed after successive stages which included theoretical specification, and statistical testing and refinement as indicated by Straub (1989). Measurement items were introduced on the basis of a careful literature review. Confirmatory factor analysis (CFA) was used to test the constructs. Based on the CFA assessment, the measurement models were further refined and then fitted again. Constructs and associated indicators in the measurement model, as well as prior research support, are listed in the Appendix and discussed below.

Internet resources construct. This construct represents the adoption of physical Internet technologies. In this sense, respondents were required to assess the presence of four Internet tools: website, Intranet, Extranet and LAN (local area network).

Internal e-business capabilities. This construct represents the use of online technologies for supporting internal business processes.

E-business value. As discussed earlier in section 2.3, the present research uses the effectiveness of e-procurement for measuring e-business value. That is, e-business value is assessed through the business impact of purchasing online.

4.3 Instrument validation

CFA using AMOS 4.0 was conducted to assess empirically the constructs theorized. Multiple tests on construct validity and reliability were performed. Model fit was evaluated using the

maximum likelihood (ML) method. The measurement properties are reported below (Table 2).

Construct reliability. Construct reliability measures the degree to which measures are free from random error, and therefore yield consistent results. In the measurement model (Table 2), all constructs had a composite reliability over the cut-off of 0.70 (Straub, 1989), and also the average variance extracted for all exceeded the preferred level of 0.5 (Churchill, 1979).

Content and construct validity. Content validity is the degree to which items in an instrument reflect the content universe to which the instrument will be generalized (Boudreau et al. 2001). This validity was verified by checking the meanings of indicators and by a careful literature review. Construct validity is the extent to which a construct measures the concepts that it purports to measure (Straub, 1989). It has two components: convergent and discriminant validity. Convergent validity assesses consistency across multiple constructs. After dropping insignificant items, all estimated standard loadings were significant (see Table 2), suggesting good convergent validity. To assess the discriminant validity – the extent to which different constructs diverge from one another – Forell and Larcker's (1981) criterion, that average variance extracted for each construct should be greater than the squared correlation between constructs, was used. All constructs met this criterion.

<i>Construct</i>	<i>Indicators</i>	<i>Loadings</i>	<i>CV value</i> (t-)	<i>Reliability</i>
<i>Internet Resources: Internet Infrastructure</i>	IR2	0.666	--	SCR =
	IR3	0.548	5.283***	0.882
	IR4	0.523	5.238***	AVE = 0.751
<i>Internal Business Capabilities</i>	IC1	0.570	--	SCR =
	IC2	0.534	6.435***	0.916
	IC3	0.812	6.458***	AVE = 0.790
<i>e-Business Value: Impact on Procurement</i>	IP1	0.775	--	SCR =
	IP2	0.704	8.550***	0.844
	IP3	0.684	8.436***	AVE = 0.644
p<0.1*; p<0.05**; p<0.01*** Insignificant factors are dropped (IR1 and IC4) CV: Convergent validity; SCR: Scale composite reliability AVE: Average variance extracted; (--): Fixed items in the scale				

Table 2. Factor loadings, reliability and validity of measures

Goodness-of-Fit Indices	
Chi-Square	29.92 5
<i>p</i> -value	0.187
RMSEA	0.029
<i>Incremental Fit</i>	
Normed Fit Index (NFI)	0.993
Relative Fit Index (RFI)	0.986
Incremental Fit Index (IFI)	0.999
Tucker-Lewis Index (TLI)	0.997
Comparative Fit Index (CFI)	0.999

Table 3. Measurement Model Fit indices

Table 3 lists several goodness-of-fit statistics to assess how well specified models explain the observed data. The insignificant *p*-value ($p = 0.187$) for the chi-square statistics implied good absolute fit. The root mean square error of approximation (RMSEA) is the square root of the mean of the population discrepancy per degree of freedom. Small RMSEA values mean low residual variance and, therefore, a good fit in the model. RMSEA was below the cut-off value 0.08 suggested by Browne and Cudeck (1993). Five incremental fit indices were all above the preferred level of 0.9 (Gefen et al., 2000).

In conclusion, the overall fit statistics, validity, and reliability measures allow the confirmation of the proposed constructs.

5 EMPIRICAL RESULTS

Hypotheses were tested using hierarchical regression analysis. Table 4 shows Internet resources construct is not statistically significant, whereas e-business internal capabilities construct is positive and significant (regression 1), as predicted. Regression 2 includes both main and the interaction effect. The interaction effect between Internet resources and internal e-business capabilities was found significant, thus, supporting H3. To further test the significance of the interaction effect, the incremental R² between the full model (with interaction term) and the partial model (without the interaction terms) was compared. The result is reported in the lower rows of table 7. In regression 2, the incremental R² was 0.026, meaning that approximately an additional 3 percent of explained variance has resulted from the inclusion of the interaction effect with respect to regression 1. To compare the partial model against the full models, a Wald test was performed and the differences were found to be statistically significant. Based on this, the partial model was rejected in favour of the full model (Greene, 2000).

	Regression 1	Regression 2
<i>Independent variables</i>		
Internet resources	0.083	0.099
Internal EB capabilities	0.196***	0.151**
Internet resources * Internal EB capabilities		0.167**
F	6.595***	6.633***
R²	0.047	0.069
ΔR²		0.026**

p<0.1*; p<0.05**; p<0.01***

Table 4. Results

Through this analysis, hypotheses H1, H2 and H3 found support.

6 CONCLUSIONS, LIMITATIONS AND FUTURE RESEARCH

This paper develops a conceptual model, grounded in the resource-based view (RBV) firms, in order to analyze the complementarity of Internet resources and e-business capabilities as source of business value at the level of an individual firm. Moreover, it is intended to offer results more widely applicable than studies of Internet leaders or IT industry companies. In this sense, this study attempts to offer an explanation to why there are cases where firms engage in e-business without deriving any benefits.

The results showed, as hypothesized, that Internet resources are not positively related to e-business value. This finding is not surprising, since competitors may easily duplicate investments in IT resources by purchasing the same hardware and software, and hence IT resources per se do not provide better performance (Santhanam and Hartono, 2003). This can be explained through the RBV, because IT is not considered a resource that is difficult to imitate; IT is by itself typically imitable. This result supports the findings of recent research (Batt and Grover, 2005) that did not find evidence of a positive link between IT quality and firm performance. Similarly, Powell and Dent-Micallef (1997) showed that IT by itself cannot be a source of competitive advantage. Thus, our results confirm that Internet technology by itself will rarely create e-business value.

Furthermore, results demonstrate that there is a positive relationship between e-business capabilities and e-business value. Our findings confirm the existing empirical literature. Bharadwaj (2000) and Santhanam and Hartono (2003) found that firms with superior IT capability do indeed exhibit superior firm performance. Ravichandran and Lertwongsatien (2005) showed that an organization's ability to use IT to support its core competences depends on IS capabilities. Thus, even though competing firms do not vary in terms of the IT they possess, IS capabilities are rooted in processes and business routines and provide competitive advantage. In this sense, the results of the present study support the proposition that external and internal e-business capabilities are key drivers of e-business value.

Finally, the empirical results offer support for the complementarity of Internet resources and internal e-business capabilities. The RBV highlights the role of complementarities between resources as a source of business value. Researchers such as Steinfield et al. (1999) suggest

that e-business value can come from synergies between online and offline presence. In this sense, using case studies, they showed the lack of exploitation of these synergies in SMEs. Zhu (2004) developed a study which evaluates the impact of e-commerce and IT on firm performance (financial measures), studying both the main effects and the interaction effect of e-commerce and IT on firm performance. His results are consistent with the RBV, and provide empirical evidence to the complementary synergy between e-commerce and IT. Our results support the RBV and e-business literature, therefore, it can be concluded that having an adequate Internet infrastructure can be critical for the impact of internal e-business capabilities on e-business value.

While the contributions of the present study are significant, it has some aspects which can be addressed in future research. First, the sample used was from Spain. It may be possible that the findings could be extrapolated to other countries, since economic and technological development in Spain is similar to other OECD Member countries. However, in future research, a sampling frame that combines firms from different countries could be used in order to provide a more international perspective on the subject. Second, the e-business value measure is subjective in the sense that it was based on Likert-scale responses provided by managers. Thus, it could also be interesting to include objective performance data for measuring e-business value. Third, this research takes a static, cross-sectional picture of capabilities, which makes it difficult to address the issue of how capabilities are created over years. A longitudinal study could enrich the findings. Fourth, the key informant method was used for data collection. This method, while having its advantages, also suffers from the limitation that the data reflects the opinions of one person.

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Appendix. Measures

Constructs & Description	Literature support
<i>Internet</i>	
<i>Resources</i>	
IR1 Does your company have a website? (Y/N)	Grandon & Pearson (2004); Zhu et al. (2004); Zhu & Kraemer (2005)
IR2 Does your company use an Intranet? (Y/N)	Kowtha & Choon (2001); Zhu et al. (2003); Zhu et al. (2004); Zhu & Kraemer (2005)
IR3 Does your company use an Extranet? (Y/N)	
IR4 Does your company use a LAN? (Y/N)	Kowtha & Choon (2001); Zhu et al. (2004); Zhu &

		<i>Kraemer (2005)</i>
		<i>Zhu (2004); Zhu & Kraemer (2005)</i>
<i>Internal business capabilities</i>	<i>e-</i>	
IC1	Do you use online technologies to share documents between colleagues or to perform collaborative work in an online environment? (Y/N)	<i>Gold et al. (2001); Wu et al. (2003)</i>
IC2	Do you use online technologies to track working ours and production time? (Y/N)	<i>Brews & Tucci (2003, 2004); Powell & Dent-Micallef (1997)</i>
IC3	Do you use online technologies to support human resources management? (Y/N)	
IC4	When an online order comes, is the order fully integrated with the back-end system? (Y/N)	<i>Brews & Tucci (2003, 2004); Pflughoeft et al. (2003); Powell & Dent-Micallef (1997)</i>
		<i>Stratman & Roth (2002); Zhu (2004); Zhu & Kraemer (2005)</i>
<i>E-business value:</i>		
<i>Impact on Procurement</i>		
IP1	What effect has online procurement on the procurement costs? (1-5)	<i>Wu et al. (2003); Zhu et al. (2004); Zhu & Kraemer (2005)</i>
IP2	What effect has online procurement on your relations to suppliers? (1-5)	<i>Kuan & Chau (2001); Lederer et al. (2001); Tallon et al. (2000); Teo y Pian (2003); Wu et al. (2003);</i>
	What effect has online procurement on the costs of logistics and inventory? (1-5)	<i>Zhu et al. (2004); Zhu & Kraemer (2005)</i>
IP3		<i>Wu et al. (2003); Zhu & Kraemer (2005)</i>

Note. Y/N, dummy variable; 1-5, five-point Likert-type scale.

