The effect of market orientation on innovation speed and new product performance

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Abstract

Purpose – It has been argued that innovation speed has been inappropriately absent in models of market orientation. The present study seeks to provide new insights into whether and how market orientation's three main components: intelligence generation, intelligence dissemination, and responsiveness affect innovation speed and new product performance, and about the mediating role of innovation speed.

Design/methodology/approach – Data were collected from a sample of 247 firms in a variety of manufacturing industries. A mail survey was developed to collect the data.

Findings – The results indicate that intelligence generation has an indirect positive effect on innovation speed via intelligence dissemination and responsiveness. Intelligence dissemination influences innovation speed positively, both directly and indirectly through responsiveness. Findings report a curvilinear (*J*-shaped) relationship between responsiveness and innovation speed. With regard to the effect of the market orientation's components on new product performance, the findings indicate a positive relationship between responsiveness and new product performance. The parameter estimates for the direct paths linking intelligence generation and intelligence dissemination with new product performance were found to be not significant. Instead, the findings show that intelligence generation and intelligence dissemination influence new product performance indirectly through responsiveness. Finally, a positive relationship was found between innovation speed and new product performance.

Originality/value – The research makes three important contributions to the marketing strategy and new product development literatures. First, by splitting market orientation into the components of intelligence generation, intelligence dissemination and responsiveness, the study provides a closer examination into the effect of market orientation on innovation speed and new product performance. Second, the results indicate that the effects of intelligence generation and intelligence dissemination on innovation speed and new product performance are mediated by responsiveness to market intelligence. Third, findings support the argument that innovation speed partially mediates the effect of market orientation's three main components on new product performance.

Keywords Market orientation, Innovation, Product innovation, Marketing intelligence

Paper type Research paper

An executive summary for managers and executive readers can be found at the end of this article.

1. Introduction

In recent years, there has been an increased focus on the relationship between market orientation and new product performance. Studies of this issue have generally demonstrated that market orientation has a positive impact on new product performance (Baker and Sinkula, 2005; Kirca *et al.*, 2005). However, researchers have yet to determine how market orientation contributes to superior new product performance. To date, few studies have investigated the potential mediators of the market orientation/new product performance relationship. Such research is needed to understand the routes through which market orientation influences new product performance (Langerak *et al.*, 2004). As stated by Han *et al.* (1998), from a strategic standpoint, a market orientation remains incomplete if practitioners do not understand the modus operandi that gives rise to superior new product performance. Explicating the mediators of the market orientation-performance relationship will provide managers with more detailed insights into how market orientation works and how it may be beneficial as a strategic firm capability (Kirca *et al.*, 2005). Toward this objective, the present study examines the effect of market orientation on innovation speed and new product performance. Specifically, we propose that innovation speed is a mediator between market orientation and new product performance.

Innovation speed is considered a core element of an innovation strategy for three reasons. First, innovation speed results in superior new product performance. Carbonell and Rodriguez (2006) and Chen *et al.* (2005) have reported a positive association between speed-to-market and overall new product success. Second, innovation speed can provide a sustainable competitive advantage. Innovation speed is a

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valuable resource for the firm in that it enables firms to keep in close touch with customers and their needs (Tatikonda and Montoya-Weiss, 2001). It is also a team-embodied, socially complex capability that cannot be easily developed by project managers, nor can it be easily imitable by competitors (Slater, 1996). Third, the increasing rate of competition, technological developments in the marketplace and shorter product life cycles pressure companies to innovate faster (Lynn *et al.*, 2000).

In terms of research on the impact of market orientation on innovation speed, it is argued that innovation speed has been inappropriately absent in the models of market orientation. Despite the popular notion that market-oriented firms have an advantage in speed-to-market (Day, 1994; Slater and Narver, 1995), much of the evidence to date remains anecdotal or speculative (for exceptions, see Calantone *et al.*, 2003). At this time, the opportunity presents itself to advance understanding of the relationships among market orientation, innovation speed, and new product performance.

In this study, market orientation is conceived as a set of organizational behaviors and processes (i.e. a set of activities) related to:

- market intelligence generation;
- market intelligence dissemination; and
- responsiveness to such intelligence across departments (Kohli and Jaworski, 1990).

Innovation speed is defined as the pace of progress that a firm displays in innovating and commercializing new products. It describes a firm's capability to accelerate the activities and tasks that occur through the new product development process (Chen *et al.*, 2005; Kessler and Bierly, 2002). New product performance refers to the new product's outcomes in terms of sales, market share and profitability (Moorman and Miner, 1997; Cooper and Kleinschmidt, 1994).

2. Theoretical model and research hypotheses

Despite the multidimensionality of the market orientation construct, a review of the literature reveals that the primary emphasis on empirical research has been on the combined (versus individual) effects of the market orientation components. Yet, the study of market orientation as a composite construct might result in ignoring subtleties due to its multidimensionality. Indeed, such practice might lead to incomplete or misleading conclusions about the usefulness to firms of specific market orientation's components (Frambach *et al.*, 2003). The present study, therefore, follows a component-level approach and examines direct effects of each of market orientation's components – intelligence generation, intelligence dissemination and responsiveness – on innovation speed and new product performance (see Figure 1). By splitting market orientation into components, we are able to examine more closely the relationships between market orientation and innovation speed, and market orientation and new product performance. Specifically, we can determine whether and how each component affects innovation speed and new product performance. The current model also examines indirect effects of intelligence generation, intelligence dissemination and responsiveness on new product performance via innovation speed. This is in keeping with literature that suggests a positive relationship between market information processing and innovation speed (Zirger and Hartley, 1994; Moorman, 1995; Ottum and Moore, 1997), and between innovation speed and new product performance (Kessler and Bierly, 2002, Carbonell and Rodriguez, 2006). Finally, drawing from the literature on information use (Menon and Varadarajan, 1992; Maltz and Kohli, 1996; Homburg *et al.*, 2004; Akgün *et al.*, 2006) and organization learning (Adams *et al.*, 1998; Deeter-Schmelz and Ramsey, 2003), the model proposes causal links among the market orientation components.

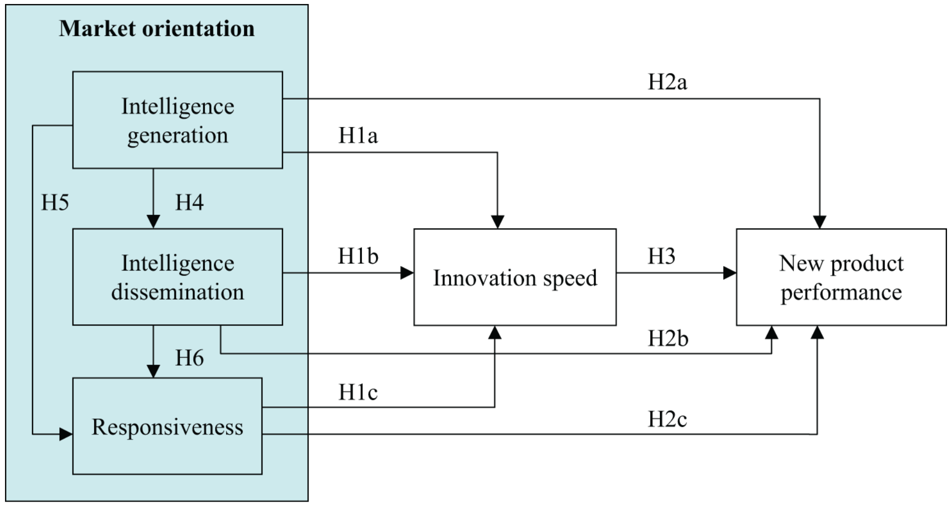
2.1 Intelligence generation, dissemination, responsiveness and innovation speed

In this study, intelligence generation refers to the extent to which a firm collects primary and secondary information from the organization stakeholders (i.e. competitors, suppliers, intermediaries) and market forces (i.e. social, cultural, regulatory and macroeconomic factors) (Matsuno *et al.*, 2000). Intelligence dissemination refers to the degree to which information is distributed, shared and discussed among relevant users within an organization by formal and informal means (Moorman, 1995; Akgün *et al.*, 2002).

Literature on new product development contends that intelligence generation can lead to shorter new product development cycle times. Information gathering gives new product development teams an opportunity to learn, and therefore and opportunity to act on that information more quickly (Lynn *et al.*, 2003). Slater and Narver (1995) have stated that the ability to gather information from customers and competitors gives companies an advantage in the speed and effectiveness of their responses to opportunities and threats. Intelligence dissemination is also critical to drive new products to launch more rapidly (Gupta *et al.*, 1986; Cooper and Kleinschmidt, 1991). Effective intelligence dissemination decreases development time by facilitating communication, cooperation and increasing goal congruence among the parties involved in the development process (Dougherty, 1992; Moorman, 1995). Open sharing of information across the parties involved in the development process leads to better understanding of the product requirements, and the range of each party's capabilities and limitations. A greater sharing of information allows each party to complete their activities with better knowledge of other groups' needs and constraints, thus reducing rework (Zirger and Hartley, 1994).

Despite the preceding arguments, it has been noted that high levels of information entering and moving within an organization could also have negative effects on innovation speed (Moorman, 1995; Zirger and Hartley, 1996; Barczak and Sultan, 2001; Blazevic *et al.*, 2003; Park *et al.* 2009). First, an information rich environment reduces the speed of sense-making, as analysts must sort through and assign meaning to data that often lack direct comparability (Jaworski *et al.*, 2002). Second, processing too much information during the development process can also overwhelm the decision-makers' cognitive capacities, thus in response they may conduct limited searches and make satisficing decisions (Cyert and March, 1963; Zirger and Hartley, 1994). Furthermore, because of the length of time spent in analyzing voluminous information, the information may be out of date by the time the data are synthesized. Without accurate information at critical junctures in the process, product development is prolonged as product and process designs are modified, reworked or re-created (Zirger and Hartley, 1994). On the basis of the preceding discussion, we

Figure 1 Theoretical framework



propose that intelligence generation and intelligence dissemination will have a positive impact on innovation speed. However, there is an upper limit to the amount of collected and shared information helpful to the process, beyond which new product development may actually be slowed. Thus:

H1a. There is an inverted U-shaped relationship between intelligence generation and innovation speed.

H1b. There is an inverted U-shaped relationship between intelligence dissemination and innovation speed.

Responsiveness is action taken in response to intelligence that is generated and disseminated (Jaworski and Kohli, 1993). It has been argued that responding to market intelligence is likely to require time to occur and therefore, can increase the time associated with new product development activities. The reasoning for this is that managers will require time to think about the information, question key assumptions about the markets, theorize about the effectiveness of alternatives approaches, and challenge one and another's ideas (Rich, 1981). Likewise, significant time is required for managers to gain an appreciation for market information (Barabba and Zaltman, 1991), and its providers (Moorman *et al.*, 1992). Against this perspective, it might be argued that, although initially responsiveness to market intelligence can have little or no positive impact on innovation speed, as the frequency with which a firm responds to market intelligence increases, responsiveness has greater impact on innovation speed. Literature on organization learning provides support for this argument. Thus, studies on organizational learning indicate that organizations learn through experience (Huber, 1991). Learning accumulated from experience helps create more effective organizational routines (Cohen and Levinthal, 1990). Sarin and McDermott (2003) noted that with experience, organizations become more proficient at assimilating and using market information. In particular, as organizations apply experiential-based knowledge to decision-making, they make fewer mistakes and quicker decisions (Eisenhardt, 1989; Jaworski *et al.*, 2002), leading to faster time to market (Zirger and Hartley, 1994; Meyer, 2001; Sarin and McDermott, 2003). On the basis of the above discussion, we argue that low levels of responsiveness to market intelligence are expected to have little or no positive impact on innovation speed. However, after a certain frequency threshold is reached, responsiveness to market intelligence will have greater effects on innovation speed. Therefore:

H1c. There is a curvilinear (J-shaped) relationship between responsiveness and innovation speed.

2.2 Intelligence generation, dissemination, responsiveness and new product performance

Intelligence generation is expected to have a positive influence on new product performance. Moorman (1995) emphasizes that information acquisition will lead to improved performance as it enables decision makers to better identify marketing opportunities and threats for better positioning in the marketplace. Cooper and Kleinschmidt (1986) found that the developers of successful new products had a deep understanding of user's needs and wants, did a thorough market and competitive analysis, and used frequent and in-depth customers' interactions. Ottum and Moore (1997), Lynn *et al.* (2000) and Brockman and Morgan (2003) found a positive association between information acquisition and new product performance. Therefore:

H2a. Intelligence generation has a positive effect on new product performance.

It is argued that intelligence dissemination can increase new product performance. Intelligence dissemination is likely to increase the degree to which organizational members share a vision of marketing strategy design and implementation (Sinkula, 1994). Having a clear vision positively influences new product success (Lynn *et al.*, 2000). In studying the organizational antecedents to new product success, Ayers *et al.* (1997) found a direct correlation between high interaction and information exchange between R&D and marketing personnel and new product success rates.

H2b. Intelligence dissemination has a positive effect on new product performance.

Responsiveness to market intelligence is expected to have a positive effect on new product performance. Literature argues that high level of information utilization increases the effectiveness of decision-making and implementation which, in turn, will result in greater new product performance (Ottum and Moore, 1997; Moorman, 1995). Empirical evidence supports a positive relationship between market information utilization and new product performance (Lynn *et al.*, 2000; Akgün *et al.*, 2006; Gotteland and Boulé, 2006).

H2c. Responsiveness to market intelligence has a positive effect on new product performance.

2.3 Innovation speed and new product performance

Research suggests innovation speed exerts a substantial positive impact on new product performance outcomes. Cooper and Kleinschmidt (1994) indicated that getting products to market on or ahead of schedule has a positive connection with financial performance of a new product project. Ali *et al.* (1995) reported that faster product development leads to shorter break-even time. Gupta and Souder's (1998) research showed that short cycle-time companies exhibit greater sales, profit and return on equity than longer cycle-time companies. According to Pearce (2002), the excellent revenues enjoyed by Hewlett-Packard in the laser printing technology, digital photography, wireless information distribution, and e-commerce imagining fields can be attributed to the company's emphasis on speed. Thus, we propose that:

H3. Innovation speed has a positive effect on new product performance.

2.4 Relationships among intelligence generation, dissemination and responsiveness

Intelligence generation is expected to exert a positive effect on intelligence dissemination and responsiveness (Akgün *et al.*, 2006). As noted by Zaltman (1986), if a firm has a proclivity to gathering information, it is more likely that the information will be shared and used (Zaltman, 1986). Homburg *et al.* (2004) argue that since intelligence generation is costly, managers who decide to collect information on customer and competitors could be under pressure to not hold back this information but rather disseminate and use it in the organization.

H4/H5.
Intelligence generation has a positive effect on intelligence dissemination and responsiveness.

Intelligence dissemination is expected to have a positive impact on responsiveness (Akgün *et al.*, 2006). As noted by Menon and Varadarajan (1992), as the amount of communication flows within an organization increases, information is viewed with less circumspection and hostility. Organizations with greater levels of information exchange will have less of the not-invented-here syndrome and therefore greater proclivity to use the information (Menon and Varadarajan, 1992). A different argument is that once the information is disseminated across different departments and employees, there will be pressure to respond to the knowledge (Homburg *et al.*, 2004). Disseminating intelligence leaves the receivers open to repercussion if the business results suffer because of their failing to act on the information (Maltz and Kohli, 1996).

H6. Intelligence dissemination has a positive effect on responsiveness.

3. Methodology

3.1 Sample and data collection

The target population for the study was drawn from the Dun & Bradstreet listing of Spanish manufacturing firms. We focused on the following manufacturing sectors: food, chemicals, plastics, machinery equipment, electrical equipment, and transportation. These industries exhibited higher levels of innovative activity than the average manufacturing industry, measured by proportion of innovative companies and expenditure on innovation, and emphasized product innovation over process innovation (Instituto Nacional de Estadística, 2002). From each industry, only firms with 50 or more employees were chosen on the basis that large firms are more likely to have established new product development procedures as opposed to smaller firms with more idiosyncratic practices (Kessler and Chakrabarti, 1999). A total of 1,650 firms made up the target population.

A questionnaire accompanied by a hand-signed cover letter and a postage-paid return envelope was mailed to the person in charge of new product development activities at each company. Of the 1,650 surveys originally mailed, 60 were returned by the post office as undeliverable. From the remaining pool, a total of 247 completed questionnaires were received, yielding a response rate of 15.3 percent. To test for non-response bias we compared early with late respondents as suggested by Armstrong and Overton (1977). No significant differences were found in the mean responses for any of the constructs of this study. Sample representativeness was also checked. Chi-square analyses revealed no significant differences between our sample and the population it was drawn from in terms of industry distribution, employee number and, company sales. Table I shows the sample and population distribution by industry, employee number, and company sales. On average, the participating firm had 200 employees and €33.85m annual revenue. Almost 70 percent of the responding firms were in the business-to-business sector. The respondents were 16 percent general managers, 20 percent marketing directors, and 64 percent technical or R&D directors. Results from analysis of variance and *post hoc* Tukey multiple comparison tests indicated no statistically significant differences on the mean responses on any of the constructs included in this study across respondents with different functional backgrounds and across firms from different industries.

3.2 Level of analysis

Innovation speed and new product performance are examined at the project level. Particularly, respondents were asked to base their answers on a new product project representative of the firm fully completed within the past three years. The new product must have been on the market for more than 12 months to ensure that the firm had sufficient data on the resulting performance. The core dimensions of market orientation were measured at the firm level. It is worth noting that the approach of relating market orientation to project-level variables is fairly common among studies attempting to discern how market orientation influences new product activities and outcomes (Atuahene-Gima, 1995; Moorman, 1995; Langerak *et al.*, 2004).

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Table I Sample and population distribution

	Percentage of firms in the sample	Percentage of firms in the population
SIC Code		
20: Food	14.1	18.9
28: Chemical	22.4	22.6
30: Plastic	10.9	11.8
35: Machinery equipment	19.2	15.6
36: Electrical equipment	22.4	18.6
37: Transportation	10.9	12.4
Number of employees		
50-75	9.9	16.6
76-100	13.2	15.1
101-150	17.0	17.6
151-200	10.4	12.8
201-300	17.1	13.8
301-500	11.5	11.2
>500	20.9	12.8
Sales, € (× 10^6)		
< 12.5	9.4	11.4
12.5-25.0	24.5	34.5
25.1-37.5	21.1	15.6
37.6-50.0	8.2	9.0
50.1-75.0	11.7	9.2
75.1-150	10.5	10.3
>150	14.6	10.0

3.3 Measures

New product performance was measured using four indicators from Lynn *et al.* (2000):

1 overall performance;
2 profits;
3 sales; and
4 market share.

These variables were measured relative to the objectives set for the project. Innovation speed was measured through three items borrowed from previous studies: time effectiveness (i.e. launching the product on or ahead of schedule), time efficiency (doing the project faster than it might have been done) and time compared to what was considered customary for the industry (Cooper and Kleinschmidt, 1994; Kessler and Bierly, 2002; Akgün and Lynn, 2002). The fact that relative measures were used enabled us to compare dissimilar product development projects. A subset of the measures from Matsuno *et al.*'s (2000) scale was used to determine market orientation. Intelligence generation was measured through five items: in our business unit information is periodically gathered on the quality of our products, customer satisfaction, the needs of our supplier and intermediaries, the activity of competitors and, changes in the market and the environment Four items tapped intelligence dissemination: the information gathered is shared among all the functional departments, captured in documents, transmitted rapidly to all functional departments, and discussed among all departments. Finally, four items pertained to responsiveness: the information collected is used to respond to changes in our consumers' needs, review our product development efforts, respond to competitors' actions, and deal with customers' complaints.

We include relative firm size, market potential and competitive intensity as control variables because of the potential to influence new product performance (Gatignon and Xuereb, 1997; Slater and Narver, 1994; Henard and Szymanski, 2001). Relative firm size was measured as the size of the business relative to that of its largest competitor (Slater and Narver, 1994). Competitive intensity and market potential were measured through multi-item scales borrowed from Ali (2000).

Two types of measures were used in this survey:

1 formative multi-item; and
2 reflective multi-item.

Following the recent work of Coltman *et al.* (2008), the scales for the dimensions of market orientation were considered to be formative. The reflective multi-item measures used were new product performance, innovation speed, market potential and competitive intensity.

To obtain unidimensionality for reflective multi-item variables, the item-to-total correlations were calculated for each item, taking one scale at a time. Items for which these correlations were lower than 0.35 were eliminated (Saxe and Weitz, 1982). Computing reliability coefficients explored the reliability of each purified, unidimensional scale. Alpha coefficients values were equal or greater than 0.70, which indicates good reliability. Internal consistency and convergent validity were investigated by performing a confirmatory factor analysis using AMOS. The results indicated that the measurement model fit the data well ($\chi^2 = 57.86$, df $= 39$, $p < 0.02$; normed fit index (NFI) $= 0.94$; comparative fit index (CFI) $= 0.98$; root mean square error of approximation (RMSEA) $= 0.04$). Composite reliabilities estimates were equal to or exceeded the standard of 0.6 suggested by Bagozzi and Yi (1988). Values of average variance extracted also provided satisfactory results. Standardized item loadings for all constructs were greater than 0.5 and significant ($p < 0.05$), which evidences good convergent validity (Bagozzi *et al.*, 1991). Together the results of the tests suggest that the reflective measures included in this study possess sufficient unidimensionality, reliability and validity.

Diamantopoulos and Winklhofer (2001) suggested that the suitability of the index construction for a formative scale should be assessed in terms of indicator collinearity. To assess indicator collinearity for each measure, we ran regression analysis of all items (as independent variables) on each single item (dependent variable). For the information generation scale, variance inflations factor (max VIF $= 2.0$) and condition numbers (max CN $= 22.5$) indicate that collinearity did not seem to pose a problem. In relation to the information dissemination and responsiveness measures, results offered no indication that collinearity was a concern (max VIF $= 2.6$; max CN $= 17.2$; max VIF $= 1.5$; max CN $= 16.5$, respectively). Typically, VIFs over 10 and CNs over 30 indicate serious multicollinearity problems. Hence, all items were retained.

The discriminant validity of the market orientation sub-dimensions can be questioned given their similar theoretical roots. To check the discriminant validity of these scales, we employed Anderson and Gerbing's (1988) procedure and checked whether the confidence intervals for the estimated correlation coefficients contained the value of 1. Results indicate that the confidence intervals for the correlation coefficients for intelligence generation-intelligence dissemination (0.49, 0.70), intelligence generation-responsiveness (0.57, 0.71), and intelligence dissemination-responsiveness (0.43, 0.62) did not include the value of 1, providing evidence for discriminant validity of the scales. A similar procedure was used for new product performance, innovation speed, market potential and competitive intensity with similar results.

For hypotheses testing analysis, scale items were averaged to create a single measure of each construct. Before testing the hypotheses, we examined the correlation matrix for the composite scales of the constructs. The signs of the bivariate correlations appear to be consistent with the hypothesized relationships (see Table II).

4. Analysis and results

We used path analysis with maximum likelihood estimation to provide parameter estimates for the structural equation system depicted in Figure 1[1]. The assumption of multivariate normality was tested using Mardia's (1970) multivariate kurtosis statistic. The large value of Mardia's statistic signals the presence of non-normality. In this case, a bootstrap simulation was performed for purposes of estimating confidence interval around the parameter estimates (Stine, 1989). Quadratic terms of intelligence generation, intelligence dissemination and responsiveness were included in the model to test for curvilinear relationships. Intelligence generation, intelligence dissemination and responsiveness were mean-centered prior to the creation of the squared terms.

A series of *post hoc* power analyses were completed using the G*POWER 3 computer software (Faul *et al.*, 2007) to determine the *p*-values for the statistical analyses included in the study. We calculated power values for each dependent variable in the path model. In all instances, power values for a medium effect size and Type I error (α) of 0.05 exceed Cohen's (1988) recommended criterion of 0.80. Hence, an α value of 0.05 seems to be appropriate to judge the statistical significance of the parameter estimates in the path analysis.

Path estimates and confidence intervals are shown in Table III. The initial model was a fully saturated model, a typical case of a path analysis. However, since several paths appeared non-significant, we re-estimated the model by dropping the insignificant paths one at a time in order to reach a more parsimonious model. The revised model produced a good fit to the data ($\chi^2/\text{df} = 27.35/19$, $\text{NFI} = 0.94$, $\text{CFI} = 0.98$, $\text{RMSEA} = 0.04$). The model explained 38 percent, 45 percent, 14 percent and 17 percent, respectively, of the variance in intelligence dissemination, responsiveness, innovation speed, and new product performance. The amount of variance explained implies that firms have several other avenues to improve innovation speed and new product performance.

4.1 Direct effects

H1a suggested an inverted U-shaped relationship between intelligence generation and innovation speed. To support the presence of an inverted U-shaped curvilinear relationship the quadratic term of intelligence generation must be negative and significant. As shown in Table III, both the linear and the quadratic terms of intelligence generation are not significant, failing to support *H1a*. Regarding *H1b*, results show that the linear term of intelligence dissemination is positive and significant ($\beta = 0.21$, $p < 0.01$), but the quadratic term is not. Hypothesis H1b is, thus, rejected. *H1c* predicted that responsiveness would have a J-shaped relationship with innovation speed. J-curves are convex because their graphs bend upward, away from the origin. Convex curves are identified by a positive second derivative (Bers and Karal, 1976). A J-curve also has an endpoint that is higher than its beginning. As shown in Figure 2, *H1c* is supported. The second partial derivative of innovation speed with respect to responsiveness is positive (δ^2 innovation speed/δ responsiveness $= 0.13$), and the effect of responsiveness on innovation speed is greater for firms with higher levels of responsiveness than for firms with lower levels.

No support was found for hypotheses *H2a* and *H2b*, which predicted a positive effect of intelligence generation and intelligence dissemination on new product performance, respectively. *H2c* posited a positive relationship between responsiveness and new product performance. The results support this hypothesis ($\beta = 0.19$, $p < 0.05$). Consistent with *H3*, innovation speed is related positively to new product performance ($\beta = 0.32$, $p < 0.01$).

Support was found for *H4* and *H5*, which predicted a positive effect of intelligence generation on intelligence dissemination and responsiveness ($\beta = 0.59$, $p < 0.01$; $\beta = 0.51$, $p < 0.01$, respectively). As predicted in *H6*, there was a positive relationship between intelligence dissemination and responsiveness ($\beta = 0.21$, $p < 0.01$).

4.2 Indirect effects

To examine the role of innovation speed as a partial mediator of the relationships between market orientation's three main

Table II Descriptives and Pearson correlations

	Mean	SD	Range	1	2	3	4	5	6	7
1. NP performance	5.15	1.15	1.0-7.0							
2. Innovation speed	4.33	1.14	1.3-7.0	0.37**						
3. Intelligence generation	5.46	0.85	2.6-7.0	0.20**	0.24**					
4. Intelligence dissemination	4.90	1.19	1.8-7.0	0.19**	0.30**	0.61**				
5. Responsiveness	5.41	0.94	3.2-7.0	0.28**	0.28**	0.65**	0.53**			
6. Firm size	4.50	1.40	1.0-7.0	0.04	0.05	0.21**	0.14*	0.15*		
7. Market potential	4.61	1.39	1.0-7.0	0.06	0.07*	0.18**	0.19**	0.21**	0.18**	
8. Competitive intensity	3.68	1.59	1.0-7.0	-0.04	-0.14*	0.01	0.01	0.01	0.05	0.04

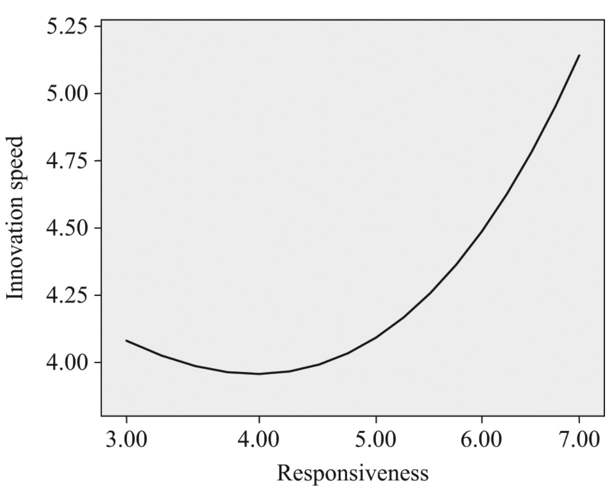
Notes: Significance levels: $^{*}p < 0.05$; $^{**}p < 0.01$ (two-tailed test)

Table III Path analysis results: standardized parameter estimates

	Hypothesized model		Revised model	
Hypothesized relationships				
Intelligence generation → Intelligence dissemination	0.58	(0.48, 0.67)**	0.59	(0.49, 0.67)**
Intelligence generation → Responsiveness	0.51	(0.42, 0.59)**	0.51	(0.42, 0.59)**
Intelligence dissemination → Responsiveness	0.21	(0.11, 0.31)**	0.21	(0.11, 0.31)**
Intelligence generation → speed	−0.05	(−0.19, 0.10)		
Intelligence generation^2 → speed	−0.00	(−0.13, 0.11)		
Intelligence dissemination → speed	0.19	(0.07, 0.31)**	0.21	(0.09, 0.32)**
Intelligence dissemination^2 → speed	−0.07	(−0.19, 0.04)		
Responsiveness → speed	0.19	(0.05, 0.33)*	0.17	(0.05, 0.28)*
Responsiveness^2 → speed	0.15	(0.05, 0.25)*	0.13	(0.05, 0.22)*
Intelligence generation → NP performance	−0.06	(−0.22, 0.09)		
Intelligence dissemination → NP performance	0.06	(−0.10, 0.21)		
Responsiveness → NP performance	0.18	(0.04, 0.32)*	0.19	(0.08, 0.29)*
Speed → NP performance	0.30	(0.18, 0.39)**	0.32	(0.20, 0.41)**
Control relationships				
Firm size → Intelligence dissemination	0.07	(−0.03, 0.16)		
Market potential → Intelligence dissemination	0.08	(−0.01, 0.18)	0.09	(0.00, 0.19)*
Competitive intensity → Intelligence dissemination	−0.03	(−0.11, 0.06)		
Firm size → Responsiveness	0.01	(−0.07, 0.08)		
Market potential → Responsiveness	0.08	(−0.02, 0.18)	0.08	(0.00, 0.19) *
Competitive intensity → Responsiveness	0.06	(−0.02, 0.13)		
Firm size → Innovation speed	−0.02	(−0.13, 0.09)		
Market potential → Innovation speed	0.08	(−0.02, 0.19)		
Competitive intensity → Innovation speed	−0.14	(−0.25, −0.04)*	−0.14	(−0.24, −0.03)*
Firm size → NP performance	0.05	(−0.06, 0.14)		
Market potential → NP performance	0.07	(−0.03, 0.18)		
Competitive intensity → NP performance	−0.04	(−0.13, 0.06)		
R^2 of intelligence dissemination	0.38		0.38	
R^2 of responsiveness	0.46		0.45	
R^2 of innovation speed	0.15		0.14	
R^2 of new product performance	0.18		0.17	

Note: Confidence intervals are given in parentheses. Significance levels: $^*p < 0.05$; $^{**}p < 0.01$ (one-tailed test)

Figure 2 Relationship between responsiveness to market intelligence and innovation speed



components and new product performance, an alternative model which did not include the innovation speed → new product performance path was tested. Results from the χ^2 difference test showed that the hypothesized model fit the data significantly better than the alternative model ($\Delta\chi^2 = 26.12$, $\Delta df = 1$, $p < 0.00$). Further insight is provided by using the Akaike Information Criterion (AIC) and the consistent version of AIC (CAIC) (Byrne, 2001). The model with the smallest AIC and CAIC values is the best approximation for the information in the data, relative to other models considered. The AIC and CAIC values for the hypothesized model (AIC = 75.5, CAIC = 161.2) are smaller than for the rival model (rival model: AIC = 99.6, CAIC = 180.7). Overall, these results provide support for the role of innovation speed as a partial mediator in the market orientation-new product performance relationship.

A similar procedure was used to test for the indirect effects of intelligence generation and intelligence dissemination on innovation speed and new product performance via

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intelligence dissemination and responsiveness. In this case, a model excluding the relationships among the market orientation components – generation → dissemination, generation → responsiveness, and dissemination → responsiveness – was compared with the hypothesized model. Results from the χ^2 difference test reveal that the hypothesized model fits the data significantly better than the alternative model ($\Delta\chi^2 = 243.96$, $\Delta df = 3$, $p < 0.00$).

5. Discussion

The current study adds new evidence about the interdependences among intelligence generation, intelligence dissemination and responsiveness. In keeping with formerly referenced studies, our results show intelligence generation has a positive impact on intelligence dissemination and responsiveness. Intelligence dissemination is, in turn, positively correlated with responsiveness.

Contrary to our expectations, the current findings do not support inverted U-shaped relationships between intelligence generation and innovation speed, and intelligence dissemination and innovation speed. Alternatively, the results show that intelligence dissemination directly, and intelligence generation indirectly (via dissemination and responsiveness), have a positive effect on innovation speed. The finding pointing out that intelligence generation influences innovation speed indirectly rather than directly is consistent with extant literature that argues that the mere fact of information availability does not necessarily lead to quicker innovation speed. If market intelligence is collected but not disseminated or used, then the act of information generation has little, if any, effect on cycle time or other measures of performance (Barczak and Sultan, 2001). According to our results, high levels of information generation and information dissemination appear not to have negative effects on innovation speed. The explanation may lie in the organization's own strategies to cope with information overload. For example, management practices such as supporting employees in identifying the right information, handling it efficiently, distinguishing what is relevant from what is not and evaluating quality, where information overload conditions exist, are said to mitigate the negative performance effects of information overload (Klausegger *et al.*, 2007).

In keeping with our expectations, it appears that responsiveness to market intelligence improves innovation speed, but only after a certain threshold is reached. Low levels of responsiveness appear to have little or no impact on innovation speed. However, as the frequency with which a firm responds to market intelligence increases, responsiveness has greater impact on innovation speed. This supports the argument that it takes some time, experience and knowledge to be able to get to the point where market utilization processes result in time savings for the firm. Expert decision makers, guided by their more elaborate and detailed scheme, are more likely to make faster decisions. This is also consistent with the argument that operating in the firm's experience domain leads to new combinations and re-combinations of information and knowledge that enhance product development effectiveness (Atuahene-Gima *et al.*, 2005).

In relation to the effect of the market orientation's components on new product performance, our findings indicate a positive relationship between responsiveness to market intelligence and new product performance. This finding is consistent with the studies of Moorman (1995), Lynn *et al.* (2000) and Akgün *et al.* (2006), which suggest that utilizing market-related information during the new product development process is a key determinant of the new product's marketplace success. The parameter estimates for the direct paths linking intelligence generation and intelligence dissemination with new product performance were found not significant. Instead, our findings show that intelligence generation and intelligence dissemination influence new product performance indirectly through the mediating role of responsiveness. This is in keeping with previous research claiming that information gathered and/or shared is of no consequence, if it is not used to make decisions (Moorman, 1995; Ottum and Moore, 1997, Lynn *et al.*, 2000; Homburg *et al.*, 2004; Akgün *et al.*, 2006). It is also consistent with Hult *et al.*'s (2005) assertion that intelligence generation and intelligence dissemination do not directly influence performance. Instead, the activities associated with intelligence generation and dissemination allow the firm to enact better actions, which in turn enhance performance. Hence, unless an organization responds to information, neither the acquisition nor the dissemination of information will result in externally oriented actions that will lead to greater new product performance (Pentland, 1995; Homburg *et al.*, 2004).

Finally, the study supports the claim that innovation speed partially mediates the relationship between market orientation and new product performance. In other words, market oriented firms achieve superior new product performance, at least in part, because of their advantage in the speed at which new products are developed and brought to the market.

6. Managerial and academic implications

A number of important managerial implications follow from these results. First, findings from our study point out that, among the three components of market orientation, responsiveness to market intelligence has the greatest impact on innovation speed and new product performance. Therefore, it is particularly important that firms encourage the use of market intelligence in their organizations. Extant research provides several suggestions about the factors that foster responsiveness to market intelligence in organizations. For one thing, senior managers must themselves be convinced of the value of responsiveness to market intelligence and communicate their commitment to junior employees. Also, a market orientation is almost certain to lead to a few projects or programs that do not succeed. To this respect, supportive reaction to failures is critical for promoting responsiveness to market intelligence. Finally, senior managers can help foster responsiveness by changing reward systems from being completely finance based (e.g. sales, profits) to being at least partly market based (e.g. customer satisfaction, intelligence obtained) (Kohli and Jaworski, 1990).

Second, the correlations between intelligence generation, intelligence dissemination and responsiveness were reasonably high. From a managerial perspective, this suggests that companies should focus on their intelligence generation and dissemination processes to increase responsiveness to market intelligence. Concerning intelligence generation activities, an important idea is that market intelligence pertains, not just, to current needs, but to future needs as well. Also, the

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generation of market intelligence relies on a host of complementary mechanisms including informal discussions with customers and trade partners, analysis of sales reports and customer databases and formal market research (Kohli and Jaworski, 1990). In relation to intelligence dissemination, literature emphasizes that formal intelligence dissemination mechanisms should be complemented with informal mechanisms. Informal dissemination mechanisms provide greater openness and clarification opportunities, where formal communications tend to be more credible and verifiably, therefore encouraging the use of intelligence particularly if it is contrary to receiver's prior beliefs. This is particular relevant for managers interested in ensuring that market intelligence is acted on by its receivers (Maltz and Kohli, 1996).

Third, our findings indicate that responsiveness to market intelligence improves innovation speed, but only after a certain level of responsiveness has been reached. That is, it takes some time, experience and knowledge for a firm to be able to get to the point where it can quickly evaluate information, understand it and relate to it. It therefore seems appropriate that knowledge differences, due to experience in using market intelligence to drive market strategies, be exploited to accelerate and direct novices' learning (Weitz *et al.*, 1986).

Fourth, from a managerial perspective, the explication of the routes through which market orientation influences performance is vital. Our findings suggest that time-to-market measures may be useful from tracking the impact of marketing orientation on new product performance for managers who implement strategic process-measurement frameworks, such as the Balanced Scorecard (see Kaplan and Norton, 1992).

From an academic point of view, this research makes three important contributions to the marketing strategy and new product development literatures. First, by splitting market orientation into the components of intelligence generation, intelligence dissemination and responsiveness, the study provides a closer examination into whether and how each of the components of market orientation affects innovation speed and new product performance. To this respect, clearly different effects were found for each of the three components of market orientation. Second, the results indicate that the effects of intelligence generation and intelligence dissemination on innovation speed and new product performance are mediated by responsiveness to market intelligence. Third, findings support the argument that innovation speed partially mediates the relationship between market orientation's three main components and new product performance.

7. Limitations and future research

We note several limitations of the present study. First, given the diversity of industries involved in the study, we based our analysis on perceptual data. Objective values can only be interpreted within the framework of a particular type of industry or product. Kirca *et al.* (2005) recent meta-analytic review, however, found that subjective measures of performance yield higher market orientation-performance correlations than those obtained when objective measured are used. Future research introducing objective measures is suggested. Second, a single key informant provided the data in each company for independent and dependent variables. While it is not our intent to minimize the potential effect of response bias, it is believed that this bias was not a major problem in our sample. Thus, the study provided evidence of discriminant validity between the constructs. Moreover, results from the Harman's one-factor test (Podsakoff *et al.*, 2003) showed that there were five factors with an eigenvalue greater than 1 and that the first factor only accounted for 32.9 percent of the total variance explained. Nevertheless, it is important that futures studies validate these findings using multiples data sources. Third, our respondents assessed new product development projects after their completion, which raises concerns about retrospective justification bias. Since our informants provided their assessment of the firm's level of market orientation in the context of other measures, it is less likely that they paid attention to the congruence of their assessments with their knowledge of the new product outcomes (Moorman and Miner, 1997). Finally, the empirical study was conducted in one cultural setting (Spain). While Grinstein (2008) recent meta-analytic study of the effect of market orientation on innovation consequences suggests no significant moderating effects of Hofstede's cultural dimensions of masculinity, long-term orientation and uncertainty avoidance, his study pointed out a significant moderating effect of Hofstede's power-distance dimension. Specifically, Grinstein (2008) found market orientation to be more positively associated with new product performance in countries that are high rather than low on power distance. To ensure the generalizability of our findings beyond the Spanish context, additional research is needed in countries with different levels of power distance.

Apart from the necessary improvements in the measurement process, some other lines of further research can be suggested. First, it could be interesting to investigate the mediating effect of other variables such as product quality, customer satisfaction or new product creativity (Kirca *et al.*, 2005). Second, empirical evidence suggests that firm-specific factors such as managerial processes, and organizational structures and capabilities can affect the organization's utilization of the market intelligence (Menon and Varadarajan, 1992). Finally, this study does not examine the issue of variations in the quality of market orientation (Jaworski and Kohli, 1996). Firms may have a market orientation, but the quality of their market-oriented behaviors may be weak relative to other firms (Day, 1994). Resources that influence the quality of market-oriented behaviors are arguably as necessary as a market orientation itself (Baker and Sinkula, 1999); which leaves an interesting topic for future research.

Note

1 Two alternative models were run in which potential direct and moderating effects of the variables 'type of product' (1, consumer; 2,) and "functional background of the respondent" (1, R&D manager; 2, marketing manager; 3, general manager), respectively, were added. Specifically, these models considered the direct effects of the above-mentioned variables on innovation speed and new product performance, and their moderating effects on the relationships between the three dimensions of market orientation and innovation speed, between the three dimensions of market orientation and new product

performance, and between innovation speed and new product performance. For the first alternative model, only one of the 12 proposed effects was significant at $p < 0.10$. A negative interaction effect was found between information dissemination and type of product ($b = -0.10$, $p = 0.07$) indicating that information dissemination has a more positive impact on innovation speed for consumer products than for industrial products. As to the second alternative model, none of the proposed effects were significant. Overall, these models produced a worse fit to the data than the model excluding the effects of the variables "type of product" and "functional background of the respondent".

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Executive summary and implications for managers and executives

This summary has been provided to allow managers and executives a rapid appreciation of the content of the article. Those with a particular interest in the topic covered may then read the article in toto *to take advantage of the more comprehensive description of the research undertaken and its results to get the full benefit of the material presented.*

When Cicero said "It is not by muscle, speed, or physical dexterity that great things are achieved, but by reflection, force of character, and judgment" what he said was right for the times. But the traders and manufacturers of ancient Rome didn't have quite the same pressures as we do these days for getting a flow of innovative new products to customers faster than the competition can. Reflection, force of character and judgment are all essential characteristics for good business management, but speed cannot be sidelined. Speed to market is key – as is the process of creating that rapid response to eager consumers constantly clamouring for something new.

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That process involves the correct market orientation mix of intelligence generation, intelligence dissemination and responsiveness – in other words the extent to which the firm collects information from stakeholders (competitors, suppliers, intermediaries) and market forces (social, cultural, regulatory and macroeconomic factors), the degree to which information is distributed, shared and discussed among relevant users within an organisation by both formal and informal means, and the responsiveness to such intelligence across departments.

There's a popular notion that market-oriented firms have an advantage in speed to market. But why? And how? Isn't there a risk that organisations displaying great skills at intelligence generation could suffer negative effects on innovation speed as analysts are overwhelmed with "information overload" and consequently spend far too long disseminating the data?

In "The effect of market orientation on innovation speed and new product performance" Pilar Carbonell and Ana I. Rodriguez Escudero say the study of market orientation as a composite construct might result in ignoring subtleties due to its multi-dimensionality, possibly leading to incomplete or misleading conclusions about the usefulness to firms of a specific market orientation's components. Consequently, in a study of firms in a variety of manufacturing industries, they take a component-level approach and examine direct effects of each of market orientation's components – intelligence generation, intelligence dissemination and responsiveness – on innovation speed and new product performance. By splitting market orientation into components, they examine more closely the relationships between market orientation and innovation speed, and market orientation and new product performance. Specifically, they can determine whether and how each component affects innovation speed and new product performance. They also examine indirect effects of intelligence generation, intelligence dissemination and responsiveness on new product performance via innovation speed.

Their findings indicate that, among the three components of market orientation, responsiveness to market intelligence has the greatest impact on innovation speed and new product performance. Therefore, it is particularly important that firms encourage the use of market intelligence in their organisations. Senior managers must themselves be convinced of the value of responsiveness to market intelligence and communicate their commitment to junior employees. Also, a market orientation is almost certain to lead to a few projects or programs that do not succeed. This being so, supportive reaction to failures is critical for promoting responsiveness to market intelligence. Additionally, senior managers can help foster responsiveness by changing reward systems from being completely finance based (e.g. sales, profits) to being at least partly market-based (e.g. customer satisfaction, intelligence obtained).

In the study the correlations between intelligence generation, intelligence dissemination and responsiveness were reasonably high. This suggests that companies should focus on their intelligence generation and dissemination processes to increase responsiveness to market intelligence. Concerning intelligence generation activities, an important idea is that market intelligence pertains, not just, to current needs, but to future needs as well. The generation of market intelligence relies on a host of complementary mechanisms including informal discussions with customers and trade partners, analysis of sales reports and customer databases and formal market research. In relation to intelligence dissemination, literature emphasises that formal intelligence dissemination mechanisms should be complemented with informal mechanisms. Informal dissemination mechanisms provide greater openness and clarification opportunities.

Findings also indicate that responsiveness to market intelligence improves innovation speed, but only after a certain level of responsiveness has been reached. That is, it takes some time, experience and knowledge for a firm to be able to get to the point where it can quickly evaluate information, understand it and relate to it. It therefore seems appropriate that knowledge differences, due to experience in using market intelligence to drive market strategies, be exploited to accelerate and direct novices' learning.

From a managerial perspective, the explication of the routes through which market orientation influences performance is vital. Time-to-market measures may be useful from tracking the impact of marketing orientation on new product performance for managers who implement strategic process-measurement frameworks, such as the Balanced Scorecard.

(A précis of the article "The effect of market orientation on innovation speed and new product performance". Supplied by Marketing Consultants for Emerald.)