“The promise and perils of speed: an investigation of product development and alliance formation”

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The promise and perils of speed: an investigation of product development and alliance formation

Abstract

Speed is one of the most popular and highly recommended business principles. However, its impact on firm performance has received surprisingly little attention. We propose a framework that discusses potential positive and negative effects of speed on firm performance. We develop and validate a set of metrics that measure two aspects of a firm's operating speed: product development and alliance speed, and a measure of change in a firm's competitive environment or competitive dynamics. We use these speed metrics to empirically examine claims commonly made in the business press that faster speed improves firm performance. We find that faster product development and alliance speed relative to the firm's competitors are associated with higher revenue growth and faster customer acquisition. However, we do not find a relationship between speed and profitability.

Keywords: product development, alliances, speed, firm performance.

Introduction

Speed is one of the most popular and highly recommended business principles (e.g., D'Aveni, 1995). Executives across business functions use speed-based metrics, such as speed-to-market, customer response time, lead time, and production ramp-up time, to assess firm performance (Stalk and Hout, 1990). Business consultants routinely claim that speed in business activities is important because it leads to higher profitability and greater market share (Jennings and Haughton, 2000; Stalk and Hout, 1990).

However, a strong belief in the beneficial impact of speed on firm performance has developed with surprisingly little academic research, and whatever evidence does exist paints a mixed picture. A number of researchers have addressed speed in new product development (NPD). They assert, but do not empirically demonstrate, that accelerated product development improves the developer's profitability (Karagozoglu and Brown, 1993) and market share (Kessler and Chakrabarti, 1996). These performance claims in the NPD literature are commonly supported by models developed by consulting firms, such as the oft-cited study by McKinsey & Co. Their model shows that a product that is six months late to market will miss out on one third of the potential profit over the product's lifetime (Dumaine, 1989).

However, the only empirical study directly examining the link between profitability and speed in NPD does not find a relationship between return-on-investment and shorter development cycle times (Ittner and Larcker, 1997). Nevertheless, one small-scale empirical study of three firms in a single industry finds that product development speed is associated with higher market share (Datar et al., 1997).

More broadly, some researchers have noted that speed can have both positive and negative effects on firm performance. Managers commonly have to make trade-offs between time-to-market, quality, innovativeness and cost when pressed to accelerate product development (e.g., Bayus, 1997; Lukas and Menon, 2004). Crawford (1992) identifies numerous hidden costs of speed that can eat away at current and future profits. For example, incremental innovation tends to drive out potentially more profitable radical innovation; skipping steps sacrifices necessary information gained in market studies or concept testing and leads to mistakes; teams working quickly can have high personnel costs and tie-up a firm's support resources.

Currently, there are several limitations in research on speed. To begin with, there is little research that operationalizes speed in the areas of product development and alliance formation. Even in terms of product development, most studies focus on organizational approaches that enhance performance once the decision to accelerate development has been made (e.g., Griffin, 1997; Jayaram and Narasimhan, 2007). Most importantly, there is almost no empirical evidence that addresses the relationship between speed in multiple activities and firm performance.

To fill these gaps in the literature, we compile data from a range of industries: manufacturing, services, industrial, and consumer so as to address three primary objectives:

- to operationalize speed in product development and alliance activities as the first step towards developing measures of speed across a broader range of a firm's activities;
- to present a framework with potential positive and potential negative effects of speed on firm performance;
- to empirically examine the relationship between speed and multiple measures of firm performance.

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The rest of this paper is organized as follows. We begin by presenting our conceptual framework. Then we describe our method followed by model development and validation. Here, we also describe our operational measures of speed and performance. Afterward, we present our analyses investigating the relationship between multiple measures of firm performance and our measures of speed. We conclude by summarizing our key findings, discussing their implications, and suggesting directions for future research.

1. Conceptual framework

In developing our measures of speed, we build on conceptual ideas formulated by Fine (1998). According to Fine, industries can be characterized by a rate of evolutionary change – Fine called it clockspeed – specific to each industry. Although Fine envisioned gauging clockspeed in almost any aspect of a firm's operations, he proposed to measure clockspeed on three dimensions: product, process, and organization. Fine offered a number of suggestions in this direction, however, he stopped short of developing specific measures of clockspeed.

Subsequently, Mendelson and Pillai (1999) report that industry clockspeed can be reflected by three dimensions: product line freshness, product life, and change in prices of input materials. They find that faster speed is associated with faster product development, shorter manufacturing ramp-up time, and more frequent organizational change. However, they do not examine the impact of faster speed on firm performance.

In our study, we conceptually define operating speed as the rate of change in a firm's operations. The average operating speed across all firms in an industry is the industry operating speed. Later in the paper, we propose two measures of operating speed: product development speed and alliance speed. Additionally, we evaluate the rate of change in a firm's competitive environment, or competitive dynamics, as a control variable. By controlling for competitive dynamics, we can more properly evaluate the impact of the other two measures of a firm's operating speed on firm performance. In this research, we focus on two measures of operating speed. However, other speed measures deserve attention in future studies.

Most of our analyses focus on how firms might benefit from faster operating speed relative to the industry average, as opposed to comparing fast and slow industries. In Figure 1, we present our conceptual framework of operating speed along with its expected impact on four measures of firm performance: revenue growth rate, market share, customer acquisition rate, and return-on-investment (ROI).

1.1. Product development speed. Researchers generally view product development as a crucial element in a firm's effort to create value and serve customer needs (e.g., Kotler and Armstrong, 2007). Since product sales drive revenues, decisions pertaining to the frequency of product redesigns and new product introductions may have a direct and lasting impact on a firm's financial performance and competitive position.

Firms exist by creating and selling products that satisfy customer needs. However, customer requirements and tastes change over time. Other customer needs can only be satisfied with entirely new products. Therefore, firms must continually modify existing products and introduce new ones in order to survive and grow. Insofar as firms accelerate their product-related activities to keep pace with customer needs or even anticipate them, there may be a positive relationship between speed in a firm's product-related activities and firm performance.

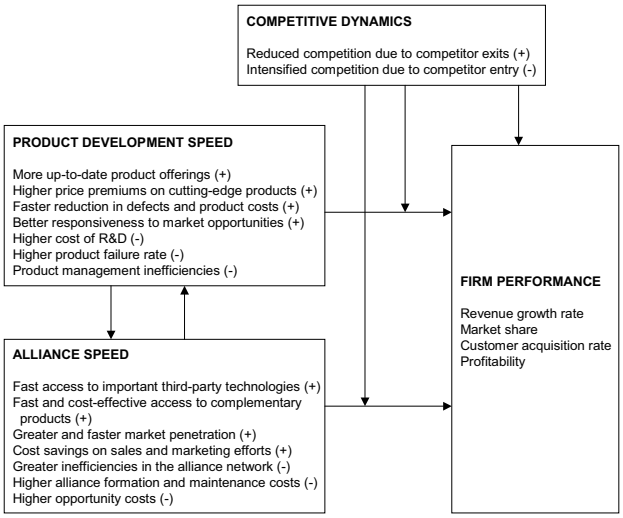

Fig. 1. Potential positive and negative impacts of speed on firm performance

More specifically, there are several reasons why faster product development relative to competitors might positively affect firm performance. First, higher frequency of product changes may allow a firm to offer the most up-to-date products. This can lead to higher unit sales and better overall competitive position relative to slower competitors. A firm's strategy to frequently update its offerings may be particularly beneficial in product categories in which customers put a premium on leading edge products.

Second, a firm with the most up-to-date products may be able to achieve higher profitability than its slower competitors. All else equal, a firm with the most current products may be able to have higher average selling prices across its product offerings, compared with competitors who are slower to build the latest features into their products. Third, higher frequency of product changes may allow the developer to improve its products faster to correct defects or to lower costs. Speed in this context can increase

a product's profit margin, thus improving the firm's overall profitability. Fourth, more frequent new product introductions may allow the developer to take advantage of market opportunities ahead of competitors. A speedy developer may successfully gain market share and derive revenue from these new opportunities.

Therefore, we formally state our hypotheses as follows:

H1a: Faster product development speed relative to competitors is associated with a higher revenue growth rate.
H1b: Faster product development speed relative to competitors is associated with higher market share.
H1c: Faster product development speed relative to competitors is associated with a higher customer acquisition rate.
H1d: Faster product development speed relative to competitors is associated with higher ROI.

Although we view speed in a firm's product development activities as generally beneficial, we anticipate that it may have several negative consequences that must be offset through superior execution of business strategies and close monitoring of results.

1.2. Alliance speed. Alliances figure prominently in a firm's strategic decisions. To begin with, strategic linkages between firms are now commonplace (Kalaignanam et al., 2007). Firms enter alliances in order to tap external resources (Robinson and Fornell, 1985), to enhance organizational learning (Khanna, Gulati and Nohria, 1998; Rindfleisch and Moorman, 2001), or to achieve distribution and marketing objectives (Bucklin and Sengupta, 1993; Rao, Qu and Ruekert, 1999). Not surprisingly, alliance formation is broadly regarded as a key dynamic capability that firms use to achieve competitive advantage (Eisenhardt and Martin, 2000).

Over time, as a firm's objectives change, so does its network of alliances (Madhavan, Koka and Prescott, 1998). Sometimes firms outgrow alliances as they develop their own capabilities to compete with their former partners. Firms also dissolve unsuccessful alliances. At other times, successful alliances are expanded and new alliances are formed to take advantage of new opportunities. Thus, alliance activity is rather dynamic, and fast change on this dimension may have a positive impact on firm performance.

In this research, we conceptually define alliance speed as the rate of change in a firm's network of alliances, as reflected both by new alliance formation and dissolution of current alliances. We believe there are a number of reasons why faster alliance speed relative to competitors may benefit a firm's overall performance. First, a firm's capability to rapidly select and ally itself with the right partners may allow it early, or even exclusive access to critical technologies, skills, and other knowledge-based assets.

Second, a firm's ability to rapidly partner with strategically complementary businesses may give it fast and cost-effective access to products that complement its own product line and enhance its revenue stream. Furthermore, this access to complementary products does not entail the risks typically associated with in-house R&D.

Third, faster alliance formation may allow the developer faster access to larger markets, because marketing alliances will enable it to achieve greater market coverage in less time by distributing its products through partners' channels. Sales to previously inaccessible customer segments can increase both a firm's profitability and market share.

Fourth, speed in alliance formation may allow a firm to achieve substantial cost savings on sales and marketing efforts when it relies heavily on strategic partners to sell its products. However, complete reliance on a partner's sales force is probably more frequently practiced by smaller firms that lack resources to maintain their own sales and marketing functions.

Successful use of alliances must also include dissolving them at the appropriate time. As market conditions change, some alliances may no longer produce benefits commensurate with their costs. Thus, faster alliance dissolution can have a positive impact on a firm's performance insofar as it reflects the firm's ability to rapidly change its alliance network in response to changes in its competitive environment or skill set. We state our hypotheses formally as follows:

H2a: Faster alliance speed relative to competitors is associated with a higher revenue growth rate.
H2b: Faster alliance speed relative to competitors is associated with higher market share.
H2c: Faster alliance speed relative to competitors is associated with a higher customer acquisition rate.
H2d: Faster alliance speed relative to competitors is associated with higher ROI.

As a caveat to the benefits of fast alliance speed, we see a possibility of decreasing returns to speed in alliance formation because multiple alliances may be difficult to manage effectively. More specifically we see three reasons why fast alliance speed might have a negative impact on firm performance. First, new alliances require investments and may be low in trust and communication. In contrast, stable long-term alliances may contribute more to performance. Thus, faster alliance speed may lead to greater inefficiency in a firm's alliance network. Second, alliances may be costly to establish, maintain and dissolve. Therefore, faster alliance speed may result in higher

operating costs for a firm. Third, frequent changes in a firm's network of alliances can result in substantial opportunity costs for the firm. Even when no additional personnel are required, a firm's management will have to devote some time to frequently evaluate existing and prospective strategic partnerships.

1.3. Competitive dynamics. The competitive environment strongly affects a firm's strategic decisions, tactical moves, and performance outcomes (Miller, 1987; Porter, 1980). Some of the key strategic decisions influenced by a firm's competitive environment involve product development, alliances and joint ventures, entry into new markets, market exit, product pricing, and positioning.

An important characteristic of a firm's competitive environment is its continual change. The biggest changes occur through competitive entry, exit, and mergers. In fact, Porter (1980) conceptualizes the threat of competitive entry as one of the five fundamental forces driving competition. Similarly, high rates of exit are likely to impact competitive dynamics.

We conceptually define competitive dynamics as the rate of change in a firm's competitive environment, as reflected in competitor entries and exits. Our empirical analysis indicates that industries with a large number of entries also have a large number of exits. Low numbers of entries and exits are also related highly. We do not propose any hypotheses for the direct effect of competitive dynamics on firm performance, because high rates of competitive entry are likely to have a negative effect on firm performance and high rates of exit are likely to have a positive impact on firm performance.

A high rate of competitor entry is likely to have a negative impact on firm performance (Baumol, 1982; Ravenscraft, 1983) for two reasons. First, a higher rate of competitor entry is likely to lead to a loss of incumbents' market share. Second, a higher rate of competitor entry may also result in decreased profitability of firms in the industry because of intensified competition. New market entrants commonly use price and non-price promotions to gain market share. Incumbents can choose either to ignore the entrant's discounts and risk market share declines or match the entrant's price and promotions and accept lower profit margins. In either case, incumbents will face profitability pressures. In contrast, a higher rate of competitor exit is likely to have a positive impact on firm performance because of reduced competition in the market. Additionally, the remaining firms will divide the market shares of exiting firms.

2. Method

2.1. Measures of speed. We sought to develop metrics that are applicable in a wide range of industries. We base our metrics on quantitative measures that are comparable across respondents and industries. Our dimensions of speed and their composition are shown in Table 1.

Table 1. Measures of operating speed

	Individual measures (units)
Product development speed	Frequency of minor product changes (months) Frequency of major product redesigns (months) Frequency of new product introductions (months) Frequency of change in key technologies (months)
Alliance speed	Alliance formation rate (number/year) Alliance dissolution rate (number/year)
Competitive dynamics	Competitor entry rate (number/year) Competitor exit rate (number/year)

2.1.1. Product development speed. This measure is based on four components: the frequency of minor product changes, the frequency of major product redesigns, the frequency of new product introductions, and the frequency of change in key technologies. The second component of product development speed – the frequency of major redesigns – specifically measures the duration of each product generation. To accurately reflect speed, duration measures are reverse-coded. We conceptualize technology as part of this speed measure because new technologies are often part of new products. For example, product technology considerations, such as radio frequency vs. infrared, analog vs. digital, CD-R vs. CD-RW, figure prominently in product development choices.

2.1.2. Alliance speed. This measure of speed is based on two components: alliance formation rate and alliance dissolution rate. The first item can also be viewed as a proxy for alliance intensity, because firms that form many alliances are likely to rely heavily on external resources.

2.1.3. Competitive dynamics. Competitive dynamics speed is based on two components: competitor entry rate and competitor exit rate. This measure reflects the height of barriers to entry and exit that firms face in their product-markets. Competitor entry and exit compose a single speed dimension because we expect industries with high rates of entry to also have high rates of exit. This is because we have in our sample mature industries that have passed the growth stage and the shake-out stage of industry life cycle. Therefore, industries with high barriers to entry and exit will have low entry and exit rates. Conversely, industries with low barriers to entry will exhibit both higher entry and higher exit rates.

Barriers to entry and exit are generally regarded as an industry-level measure. However, we examine business units competing in broadly defined industries, based on the standard industrial classification (SIC). For example, the MS Windows business unit of Microsoft faces very different barriers to entry and competitive environment than, say, Electronic Arts,

even though both firms are classified in the same industry. Therefore, we compute the competitive dynamics speed score as a business unit level measure in our analysis. This approach is justified, because the competitive dynamics speed enters our analysis as a control variable and not a decision variable.

Table 2. Sample composition (number of firms)

	Product	Service
Industrial	Pumping equipment (103) Telephone equipment[a] (71) Plastic bottles (38) Computer software[a] (149)	Data processing (59) Management consulting (79) Heavy equipment rental (89)
Consumer	Household furniture[a] (97) Ice cream & frozen desserts (61) Women's dresses[b] (70)	Amusement parks (57) Resort hotels (77) Security brokerage[a] (75)

Notes: [a] These industries include firms that serve both industrial and consumer markets. We classify industries into industrial or consumer based on the orientation of the majority of firms in those industries. [b] Women's dresses industry was not used in scale development and other analyses because of missing data in 3 questionnaires and low response rate – only 4 responses were received.

2.2. Sample of industries and firms. We use a selective sample of industries in order to assess the generalizability of our metrics and findings. Table 2 provides a detailed breakdown of our sample by each criterion we used in sample selection. We used two criteria to select 13 industries. First, we sought a mixture of product and service industries. Second, both industrial and consumer firms are represented.

We used Dun & Bradstreet's Million Dollar Directory as our sampling frame. We selected a sample of 1,025 U.S.-based firms from the 13 industries. Since we sought a mixture of large and small firms, half of the firms in each industry have sales above the industry average and half have sales below the industry average. We telephoned each firm to obtain the name and mailing address of the key informant, the firm's chief marketing officer. Preliminary interviews indicated that this person was familiar with the measures we used to construct the speed metrics as well as the measures of firm performance.

We used the business unit as our unit of analysis. All selected firms were either single-industry firms or single-industry subsidiaries of multi-industry firms. To further assure comparability across firms, we asked questions about each firm's *core* product or service in the specified industry.

2.3. Survey design and data collection. We used a questionnaire to collect data on each dimension of speed. We ascertained face validity of the individual measures and their relevance to practitioners in interviews with four qualified academics and five chief marketing officers. Subsequently, we pre-tested the questionnaire on five chief marketing officers and made revisions based on their comments.

One hundred sixty eight firms responded for the overall response rate of 16.4%. This response rate is within the range of other surveys of senior marketing executives (e.g., Achrol and Stern, 1988; Gatignon and Robertson, 1989). In 16% of the businesses that responded, the chief marketing officer was the firm's president, CEO or owner. We used the standard approach (Armstrong and Overton, 1977) to evaluate non-response bias and concluded that it was not a problem.

2.4. Model development and validation. We used the PROC CALIS procedure in SAS to perform a confirmatory factor analysis (CFA). Prior to fitting our model, we normalized the variables using log and square root transformations to satisfy the CFA assumption of normality. The proposed 8-item, 3-construct measurement model exhibited good fit on all the customary fit measures, above the benchmark of .90 recommended by Kline (1998). Also, this model had a root mean squared error of approximation (RMSEA) = .044. Browne and Cudeck (1993) suggest that values of RMSEA below .05 indicate close fit. Table 3 shows the standardized parameters on each measure.

2.4.1. Assessment of unidimensionality. Because the measures of speed were conceptualized as multidimensional scales, we assessed unidimensionality of both speed dimensions and competitive dynamics. As stated earlier, the model displayed a good fit with all the individual measures loading onto the pre-specified dimensions. An examination of residuals did not reveal anything unusual. Our standardized residuals were within the recommended cutoff of 2.6 (Jöreskog and Sörbom, 1989). These results indicate that unidimensionality is achieved.

Table 3. Parameter estimates and reliabilities based on confirmatory factor analysis

Measures of speed	Standardized parameter[a]	Cronbach's alpha
Product development		.73
Frequency of minor product changes	.53	
Frequency of major product redesigns	.77	
Frequency of product introductions	.84	
Frequency of major technological changes	.44	
Alliance		.70
Alliance formation rate	.99	
Alliance dissolution rate	.58	
Competitive Dynamics		.73
Competitor entry rate	.94	
Competitor exit rate	.58	

Note: [a] Tests of significance on raw parameters showed that all were significant at $p < .01$.

2.4.2. Assessment of reliability. Table 3 shows reliability (Cronbach's alpha) for each of the dimensions. The coefficients alpha on all the measures satisfy the cutoff of .70 recommended by Nunnally (1978). Overall, these results suggest acceptable reliability of our scales.

2.4.3. Assessment of convergent validity. We assessed convergent validity of each dimension by examining whether each indicator's pattern coefficient was significant (Anderson and Gerbing, 1988). All raw parameter coefficients are significant at the .01 level. These results indicate that our measures appear to have convergent validity.

2.4.4. Assessment of discriminant validity. We assessed discriminant validity by constraining the phi value for a pair of dimensions to unity and then estimating the resulting measurement model (Anderson and Gerbing, 1988). The unconstrained model produced significantly better fit than any of the constrained models. This result indicates that the traits are not highly correlated, and discriminant validity is achieved.

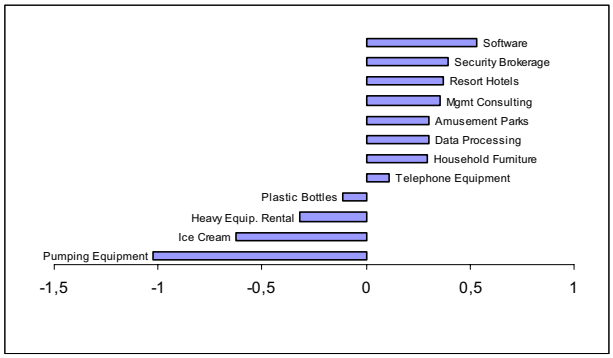

Fig. 2. Mean industry speed on the product development dimension

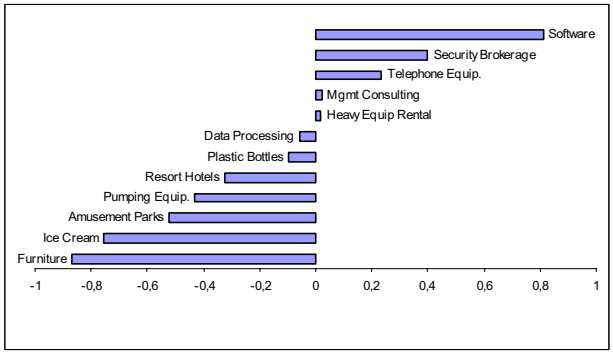

Fig. 3. Mean industry speed on the alliance dimension

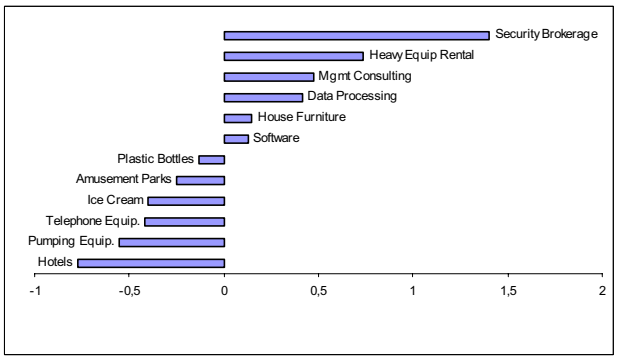

Fig. 4. Mean industry speed on the competitive dynamics dimension

2.4.5. Assessment of nomological validity. To assess nomological validity of our measures, we computed factor scores for each firm for two measures of speed and competitive dynamics. Next, we averaged these factor scores by industry and evaluated the industry means. Figures 2, 3 and 4 show how the 12 industries compare on the proposed measures of speed. For example, as one would expect, the computer software industry is generally ranked the fastest industry in our sample. Software developers continually modify their products to add features, improve functionality, or correct bugs. New product versions and brand new products are released with regularity to keep up with improving technologies and changing customer needs. Conversely, the ice cream and frozen desserts industry is ranked close to the bottom on our speed scales. There is substantially less change in this industry, because

consumer preferences and the underlying technology are more stable over time. It is interesting to note that no industry in our sample is consistently the slowest or the fastest on all dimensions. Finally, Table 4 shows that our metrics capture much variation across firms within industries. Therefore, we conclude that our scales appear to have nomological validity.

Table 4. Intra-industry variation on speed measures[1]

Industry	Product development			Alliance			Competitive dynamics		
	S.D.	Min	Max	S.D.	Min	Max	S.D.	Min	Max
Amusement parks	0.78	-1.75	0.52	1.23	0.60	3.00	0.68	-1.21	0.5
Data processing	1.05	-1.68	1.63	1.10	-1.45	1.68	1.23	-1.69	2.42
Security brokerage	1.25	-1.39	1.83	1.23	-1.71	1.77	1.19	-1.94	1.33
Heavy equip. rental	1.24	-1.82	1.41	1.14	-0.97	2.22	1.09	-1.66	2.37
Household furniture	0.96	-2.03	1.81	1.01	-0.61	2.95	1.08	-1.48	1.98
Ice cream	1.10	-1.72	1.77	0.60	-0.41	1.74	0.88	-2.00	1.55
Mgmt consulting	0.87	-1.55	1.51	1.06	-1.31	1.69	1.09	-1.81	3.04
Plastic bottles	1.12	-1.00	1.37	1.26	-0.99	1.97	1.17	-1.47	1.75
Pumping equipment	1.12	-2.00	2.79	1.11	-0.83	3.79	0.95	-1.60	1.41
Resort hotels	1.19	-1.41	1.67	1.19	-1.04	1.90	0.55	-0.79	0.79
Computer software	0.99	-2.38	1.94	0.96	-2.02	2.26	1.11	-1.35	3.88
Telephone equip.	0.95	-2.07	1.66	0.94	-1.57	1.40	1.15	-1.91	1.67

2.5. Construction of speed and competitive dynamics variables. Now that we have validated our conceptual model with two measures of operating speed and a measure of competitive dynamics, we evaluate their impact on performance. We used the following procedure in constructing speed and competitive dynamics variables for each firm. First, we standardized the 8 components of the metrics within each industry by subtracting industry mean and dividing by industry standard deviation. This is a critical step because it allows evaluation of firms that operate at different speeds relative to industry average and each other, as opposed to just comparing fast and slow industries. Then, we computed factor scores for each firm on our speed and competitive dynamics measures. We use these factor scores in all subsequent analyses. Table 4 summarizes descriptive statistics on inter-firm variation within industries on each speed measure. Firms within industries appear to differ substantially in terms of speed. These results indicate that our dimensions of speed seem to capture the rate of change in a firm's product development and alliance activities, as well as its competitive environment.

2.6. Model of firm performance. To examine the relationship between firm speed, relative to competitors, and firm performance, we regressed our performance variables on factor scores on the product development speed, alliance speed, and competitive dynamics. We also controlled for firm type by including two dummy variables, one for product vs. service firms and one for industrial vs. consumer firms. Our baseline model is as follows:

$$Performance_i = \beta_0 + \beta_1 M_i + \beta_2 I_i + \beta_3 P_i + \beta_4 A_i + \beta_5 C_i + e_i,$$

where: M_i = dummy variable taking on the value of 1 if a firm manufactures or sells a physical product, including software, and 0 otherwise; I_i = dummy variable taking on the value of 1 if a firm caters to industrial markets and 0 otherwise; P_i = factor score for firm *i*'s product development speed; A_i = factor score for firm *i*'s alliance speed; C_i = factor score for firm *i*'s competitive dynamics.

We used ordinary least squares (OLS) to estimate the model. All the dependent variables were logged to correct for heteroscedasticity. Table 5 shows regression coefficients for this model for each dependent variable.

Table 5. Results of regressions evaluating the relationship between operating speed and firm performance

Predictor/control	Dependent variable[a]			
	Revenue growth	Market share	Customer acquis. rate	ROI
Constant	-.50 (-7.1)***	-2.63 (-8.5)***	-1.66 (-10.6)***	-1.04 (-7.7)***
Product development	.06 (1.88)*	0 (-.02)	.13 (1.75)*	.04 (.56)
Alliance	.08 (2.24)**	-.04 (-.28)	.20 (2.70)***	-.03 (-.48)
Competitive dynamics	.04 (0.99)	-.30 (-2.14)**	.10 (1.33)	.10 (1.45)
Product/service	-.02 (-.36)	.81 (2.73)***	-.44 (-2.80)***	.05 (.47)
Industrial/consumer	.12 (1.73)*	.04 (.14)	0 (.02)	.10 (.96)
R-square	9%	10.5%	13.3%	4.2%
F-statistic	2.76**	2.60**	4.48***	.70
No. of observations	146	117	152	85

Notes: [a] The values in parentheses are *t*-statistics. [b] To reduce heteroscedasticity, we transformed our dependent variables using a logarithmic transformation. [c] The differences in the number of observations are due to missing values in our data. * Significant at the .10 level. ** Significant at the .05 level. *** Significant at the .01 level.

[1] All firms within industries were standardized to zero mean.

3. Results

3.1. Revenue growth rate. We found two significant relationships between revenue growth rate and firm speed. First, the coefficient on product development is positive and significant (.06, $p < .1$), suggesting that faster product development speed relative to competitors is associated with a higher revenue growth rate. This result lends support to H1a. Second, the direct effect of alliance speed is also positive and significant (.08, $p < .05$). It suggests that greater alliance speed relative to competitors is associated positively with revenue growth. This result supports H2a.

3.2. Market share. We observe a negative relationship between greater competitive dynamics and market share (-.30, $p < .05$). This result indicates that controlling for the effect of product development and alliance speeds, greater competitive dynamics is associated with less industry concentration. (There is an average of 3.8 entries and 1.9 exits per year in our sample of firms and industries.) However, we fail to find support for H1b and H2b. These results indicate that faster alliance or product development speed do not have an effect on market share, at least in our data.

3.3. Customer acquisition rate. This regression produced two notable relationships between the dependent variable and our measures of speed. First, the coefficient on product development is positive and significant (.13, $p < .1$). Thus, faster product development speed relative to competitors is associated with a higher customer acquisition rate. This result supports H1c. Second, the direct effect of alliance speed relative to competitors is also positively associated with faster customer acquisition (.20, $p < .01$). Thus, H2c is also supported.

3.4. Return-on-investment. We failed to find any significant relationship between ROI and our measures of speed and competitive dynamics. Thus, we find no support for H1d or H2d. This result suggests that higher costs of speed may be offsetting revenue benefits firms derive from operating faster. However, it is possible that the costs of speed are incurred in the short run while the revenue benefits are enjoyed for much longer.

Discussion and conclusion

Our study had three primary objectives. First, we propose, develop and validate two speed-based metrics: product development speed and alliance speed. We show that firms and industries differ substantially on these measures, as well as competitive dynamics (see Table 4). Second, we present a conceptual framework that discusses the possible positive and negative effects of speed on firm performance. This framework helps provide a broader understanding of our results. The third objective of our study was to examine the relationship between multiple measures of performance and our measures of speed, controlling for competitive dynamics. We expected firms that operate faster than their competitors to have an advantage. Therefore, we specifically compared firms that operate at different speeds relative to their industry's average speed. We summarize our main findings on the speed-performance relationship.

We find that, compared with slower competitors, firms that have faster product development speed achieve higher revenue growth and customer acquisition rates.

We find that faster alliance speed relative to competitors is also associated with higher revenue growth and customer acquisition rates.

We fail to find evidence that faster product development or alliance speeds are generally associated with higher market share.

In our data, faster product development and alliance speeds do not affect ROI.

Managerial implications

In this research, we develop and validate a set of speed-based metrics that can be useful for classifying industries. Information on the relative speed of industries may help managers identify important similarities and differences between their core industry and other industries. For example, a firm considering expansion into another industry may benefit from knowing in advance how it would need to adjust its R&D schedules to be more in sync with the target industry's practices. Furthermore, our metrics can be useful for classifying firm strategies within industries. As Table 4 shows, firms within industries differ substantially on these measures of speed.

Our study provides initial evidence to support claims in the business press and academic literature that faster operating speed improves at least some measures of firm performance. However, our results imply that the relationship between speed and performance is likely to be more complex than the business press purports it to be.

The lack of association between speed and ROI also suggests a potentially negative consequence of faster speed. For example, the high costs of accelerated R&D, shorter planned shelf life, customer acquisition, rapid growth and other costs seem likely to offset most revenue benefits a firm may derive from speed. In this respect, our findings can have a profound impact on how managers select, schedule,

and monitor new projects. Our findings reinforce the need for balance between speed, cost control, and optimal resource allocation in a firm's activities.

However, it is possible that the costs of speed are incurred in the short run while the revenue benefits are enjoyed for much longer. If this is the case, then speed could have a long-term positive impact on profitability. To shed some preliminary light on this issue, we surveyed respondents to our original questionnaire two years later, in 2002. A one-page survey collected current speed and ROI measures. We obtained 23 complete responses. A two-sample t-test of ROI in 2002 for firms that were fast and slow in 2000 did not show significant differences between the means. Similarly, an OLS regression of current ROI on current and lagged values of operating speed found no significant relationships. These small-sample results tentatively suggest that speed may not have a positive effect on profitability even over the long term.

Limitations and directions for future research

Our study's two main limitations provide opportunities for future research. First, we evaluate only two measures of speed and four measures of performance. Fine (1998) indicates that there may be multiple measures of strategic activities that affect firm performance. Second, except for the small follow-up study, our measures of speed reflect change during a single year. It may be insightful to evaluate a longer-term impact of speed on performance.

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