

sStrategic Alignment and New Product Development:

Drivers and Performance Effects

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ABSTRACT

Strategic alignment is widely accepted as a prerequisite for a firm's success, but insight into the role of alignment in, and its impact on, the new product development (NPD) process and its performance is less well developed. Most publications on this topic either focus on one form of alignment or on one or a limited set of NPD performance indicators. Furthermore, different and occasionally contradictory findings have been reported.

NPD scholars have long argued for the importance of fit between context and NPD activities. However, this body of literature suffers from the same weakness: most publications have a limited scope and the findings are not always consistent with results reported previously. This study addresses these deficiencies by examining (1) the effects of various internal and external factors on different forms of alignment, and (2) the effects of these forms of alignment on a set of NPD performance indicators.

Strategic planning and innovativeness appear to affect technological, market, and NPD-marketing alignment positively. Environmental munificence is negatively associated with NPD-marketing alignment, but has no effect on the two other forms of alignment. Technological change has a positive effect on technological alignment, a negative effect on NPD-marketing alignment, but no effect on market alignment. These findings suggest that internal capabilities are more likely to be associated with the development of strategic alignment than environmental factors are. Furthermore, technological and NPD-marketing alignment affect NPD performance positively, while market alignment does not have any significant performance effects.

INTRODUCTION

Strategic alignment, also referred to as consistency or fit, is an important concept in various management fields (Miles and Snow, 1978; Powell, 1992; Venkatraman, 1989; Venkatraman and Prescott, 1990). Rooted in contingency theories (Miller and Friesen, 1984), the primary proposition is that the alignment between a firm's strategy and its context has important implications for its performance (Venkatraman, 1989; Venkatraman and Prescott, 1990). Context refers both to the firm's external environment (Anderson and Zeithaml, 1984; Bourgeois, 1981) and to its internal environment, which includes the firm's competencies and resources (Andrews, 1971), as well as its structure (Chandler, 1962; Rumelt, 1974) and administrative systems (Galbraith and Nathanson, 1978).

Strategic management (Powell, 1992; Venkatraman and Prescott, 1990; Yin and Zajac, 2004) and marketing (Kabadayi, Eyupoglu, and Thomas, 2007; McKee, Varadarajan, and Pride, 1989; Olson, Slater, and Hult, 2005; Vorhies and Morgan, 2003) studies present empirical evidence for the positive effects of fit among a firm's strategy, structure, processes and context, on firm performance, including the success of new products. New product development (NPD) scholars, too, have noted the impact of fit, for example, between a firm's way of organizing and conducting its NPD activities and external and internal demands, on NPD performance (Hsieh, Tsai, and Hultink, 2006; Laugen, Boer, and Acur, 2006; Olson, Walker, and Ruekert, 1995). Other studies have examined the effects of strategy (or strategic orientation), organizational structure and environment on NPD performance (Dröge, Calantone, and Harmancioglu, 2008; Gatignon and Xuereb, 1997; Im and Workman, 2004; Jeong, Pae, and Zhou, 2006; Zhou, Yim, and Tse, 2005). However, the focus of these studies has been limited to either the direct effect of strategy on new product performance (Gatignon and Xuereb, 1997; Im and Workman, 2004) or the process/structure by which firms decide on and implement strategy (Langerak, Hultink, and Robben, 2007; Zhou, Yim, and Tse, 2005). While this stream of research notes that a firm's strategy is a significant indicator of its new product success, it lacks an explanation of the effects of capabilities emanating from strategic choice on NPD performance.

Located within the domain of NPD theory, our study aims at providing a systematic investigation of strategic alignment and developing two contributions. First, by operationalizing the capabilities mentioned above as three forms of strategic alignment, namely technological, market and NPD-marketing alignment, we fill a knowledge gap by providing empirical support for the effects of a number of factors (drivers) internal and external to a firm on strategic alignment. Second, we investigate the effects of the three forms of strategic alignment on NPD performance.

After a brief overview of the literature on strategic alignment and its application to NPD, we present our conceptual model and propose a set of hypotheses that pertain to the drivers and performance outcomes of strategic alignment. Then, we describe the research design and report the results of our empirical study aimed at testing these hypotheses. We conclude by discussing the theoretical contributions and practical implications of our findings and proposing directions for further research.

BACKGROUND

Strategic Alignment and its Application to NPD

Strategy can be viewed as the process of aligning functional strategies to each other and

to corporate strategy, as well as corporate strategy to the demands, opportunities and risks created by a firm's external environment (Andrews, 1971; Miles and Snow, 1978; Mintzberg, 1979; Hayes and Wheelwright, 1984). This contingency approach to strategy is consistent with the open systems perspective (Katz and Kahn, 1966; Thompson, 1967), which views organizations as social systems composed of interactions within the organization as well as between the organization and its external environment. Miles and Snow's (1978) typology identifies four strategic types of organizations (i.e. reactor, defender, analyzer, and prospector) based on a firm's rate (McKee, Varadarajan, and Pride, 1989; Vorhies and Morgan, 2003) and focus (Laugen, Boer, and Acur, 2006) of innovation. With each type developing its own way to approach its product-market domains and constructing different structures and processes for developing new products and bringing them to the market place (Olson, Slater, and Hult, 2005; Vorhies and Morgan, 2003), the four differ in terms of their strategic alignment capabilities.

NPD is the process of initiating, coordinating and accomplishing the product and related production process development activities of a business unit. The NPD process may be organized in many different ways, using functions or departments such as R&D, product development, design or engineering, and process planning or engineering. Similarly, the marketing function or department is responsible for the marketing activities of a business unit.

Applied to the NPD process, strategic alignment can be conceptualized as a multidimensional construct consisting of market alignment, technological alignment, and NPD-marketing alignment (Gatignon and Xuereb, 1997; Voss and Voss, 2000; Zhou, Yim, and Tse, 2005). While technological and market alignment are important for formulating a firm's NPD strategy in accordance with its external environment, NPD-marketing alignment is necessary to effectively implement the strategy.

Technological alignment is a firm's ability to monitor technological developments and integrate new technologies into its new products (Gatignon and Xuereb, 1997; Voss and Voss, 2000; Zhou, Yim, and Tse, 2005). *Market alignment* is a firm's ability to identify and analyze the current and future needs of its target markets and integrate market information into its NPD activities to continuously create greater customer value (Deshpandé, Farley, and Webster, 1993; Jaworski and Kohli, 1993; Narver and Slater, 1990; McKee, Varadarajan, and Pride, 1989). *NPD-marketing alignment* facilitates the degree of communication, interaction and collaboration between the NPD and marketing functions (e.g. Gatignon and Xuereb, 1997; Im and Workman, 2004; Narver and Slater, 1990; Song, Xie, and Dyer, 2000). As NPD-marketing alignment allows for communicating and exchanging information about technological and market developments, it enables technological and market alignment to work jointly, and thus enhances the potential of strategic alignment (Gatignon and Xuereb, 1997).

CONCEPTUAL FRAMEWORK AND HYPOTHESES

The conceptual framework shown in Figure 1 proposes that firms can enhance their NPD performance by achieving better strategic alignment. Furthermore, the framework includes internal and external drivers of strategic alignment. These drivers are determined based on the environment-firm behavior-performance paradigm suggested by strategy and marketing scholars (Lawrence and Lorsch, 1967; Day and Wensley, 1988; Venkatraman and Prescott, 1990). This paradigm proposes that a firm's internal characteristics and external conditions are dynamic, and that the effectiveness of a firm's behavior is contingent on the changes taking place (Li and Calantone, 1998; McKee, Varadarajan, and Pride, 1989). Thus, the adaptation of a firm's

technological, market and NPD-marketing alignment to its internal and external environments has important implications for its NPD performance (Gatignon and Xuereb, 1997; Li and Calantone, 1998; Wheelwright and Clark, 1992).

 Insert Figure 1 about here

To represent internal factors, we consider a firm's resources pertaining to strategic planning and innovativeness, which are critical for NPD activities (Brown and Eisenhardt, 1995; Calantone, Garcia, and Dröge, 2003; Cooper and Kleinschmidt, 1995a; Han, Kim, and Srivastava, 1998). An innovative climate and planning provide a firm with cohesiveness and focus in organizing its NPD activities. On the other hand, environmental munificence and technological change are commonly accepted as factors that strongly influence the success of a firm's new product activities (Im and Workman, 2004; Li and Calantone, 1998; Narver and Slater, 1990).

Internal Drivers of Strategic Alignment

Strategic Planning

The importance of firms to have an unambiguously clear new product strategy backed up by sufficiently detailed action plans has been widely acknowledged by NPD scholars. Also, the effect of strategic planning on NPD performance has been empirically examined (Calantone, Garcia, and Dröge, 2003; Cooper and Kleinschmidt, 1995a; Langerak, Hultink, and Robben, 2004; Rauniar et al., 2008; Salomo, Weise, and Gemünden, 2007; Slater, Olson, and Hult, 2006). In this study, we further investigate this relationship, and argue that strategic planning indirectly influences NPD performance through achieving better strategic alignment.

A firm's NPD strategy describes what the firm desires to achieve from its new products, and provides strategic direction for its NPD activities (Brews and Hunt, 1999; Song and Montoya-Weiss, 1998) by planning the role and goals of, and allocating adequate resources to, that function (Brown and Eisenhardt, 1995; Cooper and Kleinschmidt, 1995a, 2007). As strategic planning involves defining new product goals, identifying target markets and examining the fit between the intended new products and a firm's strategy (Brown and Eisenhardt, 1995; Salomo, Weise, and Gemünden, 2007), it enables the firm to align its NPD efforts with technological developments and market requirements. Moreover, establishing a clear link between NPD and business goals can lead to reduced role ambiguity within the organization. Thus, NPD strategic planning can improve communication, increase integration (Moenaert et al., 1994) and reduce potential conflicts between NPD and marketing (Song and Thieme, 2006). Hence, strategic planning is expected to have a positive effect on all three forms of strategic alignment.

Hypothesis 1: The better the strategic planning of a firm,

- (a) the stronger will be its technological alignment.*
- (b) the stronger will be its market alignment.*
- (c) the stronger will be its NPD-marketing alignment.*

Innovativeness

Innovative firms are open to new ideas, products and processes (Zaltman, Duncan, and Hulbek, 1973) and are more willing to change and to adapt to emerging technologies and

market trends (Calantone, Cavusgil, and Zhao, 2002; Hult, Snow, and Kandemir, 2003; Hurley and Hult, 1998). Innovative firms encourage employees to work together (Zhou, Yim, and Tse, 2005), give them the freedom to make their own decisions and promote creativity, inventiveness and active use of all their skills and knowledge about technologies and markets to enhance new product success. Though the relationship between innovativeness and NPD performance has been established (Han, Kim, and Srivastava, 1998), existing research does not provide an explanation of *why* innovativeness should enhance NPD performance. We attempt to develop that explanation and argue that innovativeness enables firms to achieve better strategic alignment.

Innovativeness is concerned with a firm's "strategic intent for developing new products or entering new markets with existing products" (Worren, Moore, and Cardona, 2002). Innovative firms are willing to devote the necessary NPD-related efforts and resources to new market opportunities, even though these efforts might be risky and result in costly failures (Naman and Slevin, 1993). Such firms can easily recognize and proactively scan their environment for technological opportunities, and align their NPD activities with the changing technological environment (Grupp, 1998; Siguaw, Simpson, and Enz, 2006). As innovative firms have highly active boundary spanning functions, they are able to find and exploit new market opportunities (e.g. Moorman, 1995; Slater, Olson, and Hult, 2006; Wei and Morgan, 2004). Innovativeness should also enhance the firm's internal alignment between NPD and marketing. Marketing and NPD usually have different objectives, and might therefore value different forms of information (e.g. technological vs. market) for developing new products differently (Brown and Eisenhardt, 1995; Griffin and Hauser, 1992). As innovativeness is based on a shared vision, support for new ideas and risk-taking behavior, it reduces cross-functional communication barriers and supports coordination between NPD and marketing (Brown and Eisenhardt, 1995).

Hypothesis 2: The stronger the innovativeness of a firm,

- (a) the stronger will be its technological alignment.
- (b) the stronger will be its market alignment.
- (c) the stronger will be its NPD-marketing alignment.

External Drivers of Strategic Alignment

Environmental Munificence

Munificent environments offer high growth opportunities (Dess and Beard, 1984; Porter 1980). In response to environmental pressures arising from decreases in munificence, firms can survive by achieving better strategic alignment (Achrol and Etzel, 2003; Bantel, 1998; Miller and Friesen, 1982; Yasai-Ardekani, 1989). As munificence represents the abundance of resources available to firms (Aldrich, 1979; Dess and Beard, 1984; McArthur and Nystrom, 1991; Starbuck, 1976), it increases the range of strategic options available to them and thus enhances their adaptive capacity (Bantel, 1998; Hambrick and Finkelstein, 1987; Tushman and Anderson, 1986). The question is how environmental munificence affects a firm's choice of different strategic alignments associated with its NPD activities.

There are opposing views on how environmental munificence affects technological alignment. One stream of research argues that hostile environments force companies to focus on technological developments, introduce product changes and seek risks (Bantel,

1998). Successful firms in munificent environments pursue conservative strategies and adopt 'product follower' approaches (Covin and Slevin, 1989). A second stream of research argues that firms become more willing to lead technological developments and invest in product innovations in munificent environments because the accumulation of slack resources enables them to experiment with new product strategies (Bourgeois, 1981). In hostile environments, firms avoid risk-taking behavior and put more emphasis on the conservation of resources (Goll and Rasheed, 1997). Miller and Friesen (1983) show that firms respond to increasing environmental hostility by reducing their level of innovation. Consistent with the first stream of research, we expect firms operating in munificent environments to decrease their technological alignment as there is no need to respond quickly to environmental changes.

Hypothesis 3a: The greater the munificence of a firm's environment, the weaker will be its technological alignment.

Similarly, firms are expected to exhibit low levels of market alignment in munificent environments. Munificence supports the growth of resources within firms and thus protects them from competitive and environmental threats (Baum and Wally, 2003). If provided with maximum strategic options and minimal competitive pressures (Castrogiovanni, 1991; Dess and Beard, 1984), firms put less emphasis on market information. However, when resources become scarce and competition intensifies, making the right choice becomes very important due to increased costs of failure (Slevin and Covin, 1995). As customers have many options to satisfy their needs in hostile environments (Kohli and Jaworski, 1990), firms need to understand their target markets better and carefully integrate customer-related information in the development of new products.

Hypothesis 3b: The greater the munificence of a firm's environment, the weaker will be its market alignment.

Though previous studies have focused on the effects of environmental munificence on organizational structure (Yasai-Ardekani, 1989), there is no empirical evidence of its relationship with NPD-marketing alignment. In less munificent environments, firms must engage in more rigid problem-solving (Hambrick and Finkelstein, 1987; Yasai-Ardekani, 1989). Competitive pressures necessitate an active role from top management and involving fewer people in the decision-making process (Smart and Vertinsky, 1977), as well as shorter lines of communication (Yasai-Ardekani, 1989). Thus, we expect lower levels of alignment between NPD and marketing due to a need for fast responses when environmental munificence is low.

Hypothesis 3c: The greater the munificence of a firm's environment, the weaker will be its NPD-marketing alignment.

Technological Change

Technological change is the rate of technological development in a product market (Aldrich, 1979; Dess and Beard, 1984; Li and Calantone, 1998; Tan and Litschert, 1994).

If technology changes rapidly, products may become obsolete quickly. Hence, firms are forced to enhance their NPD strength to survive in the market place (Li and Calantone, 1998). To cope with rapid changes, it is important for firms faster to collect and process technological information, align their new product strategy with those technological changes and bring product innovations to the market (Bantel, 1998; Ettlie, Bridges, and O'Keefe, 1984; Kohli and Jaworski, 1990; Li and Atuahene-Gima, 2001). In addition, Jeong, Pae, and Zhou (2006) showed technological turbulence to be positively associated with technology orientation.

Hypothesis 4a: The greater the rate of technological change, the stronger will be a firm's technological alignment.

Previous research has found ambiguous results for the relationship between technological change and market alignment. Li and Calantone (1998) did not find any significant results. Other researchers found a negative effect of technological change on market alignment and argued that technological alignment becomes more desirable than market alignment in environments where technologies are changing rapidly (Jaworski and Kohli, 1993; Zhou, Yim, and Tse, 2005). Listening to the voice of the customer in product markets undergoing rapid technological change might lead firms to develop products that lag behind technologically. Thus, under conditions of technological dynamics, technological alignment is more important than market alignment (Jaworski and Kohli, 1993; Zhou, Yim, and Tse, 2005). On the other hand, market alignment might become important when technology changes rapidly because knowledge about market trends and customer needs and preferences guide firms in creating new products (Day and Wensley, 1988; Narver and Slater, 1990). To research the existing ambiguity, we hypothesize:

Hypothesis 4b: The rate of technological change affects a firm's market alignment.

To our knowledge, there is no evidence of the direct impact of technological change on NPD-marketing alignment. We propose that technological change reduces the alignment between the NPD and marketing functions. As rapid technological advances and shorter product life cycles require firms to create stronger product development capabilities and innovate faster and more effectively, acquiring and integrating new technological knowledge becomes more critical to a firm's NPD activities (Li and Calantone, 1998). In such situations, a looser coupling between NPD and marketing reduces difficulties relating to reaching a consensus, difficulties which otherwise would lead to reduced NPD performance in the form of lower quality and/or longer NPD lead times, and thus time and timing to market.

Hypothesis 4c: The greater the rate of technological change, the weaker will be a firm's NPD-marketing alignment.

Strategic Alignment and NPD Performance

In this study, we define NPD performance as the operational effectiveness of a firm's NPD activities (i.e. quality, timeliness and customer responsiveness) and examine the

link between strategic alignment and NPD performance (Tatikonda and Montoya-Weiss, 2001; Venkatraman and Ramanujam, 1986; Zhou, Yim, and Tse, 2005).

Firms with a good level of technological alignment develop or acquire the latest technologies (Cooper, 1985), which results in improved NPD performance (Voss and Voss, 2000; Gatignon and Xuereb, 1997). Such firms systematically monitor trends in existing technologies, identify emerging technologies and allocate resources to their NPD activities accordingly (Chiesa, Coughlan, and Voss, 1996). Thus, technological alignment enables firms to rapidly integrate new technologies and create better solutions and/or applications to fulfill customer expectations of high-quality products in a timely manner (Gatignon and Xuereb, 1997; Zhou, Yim, and Tse, 2005).

Hypothesis 5: The stronger a firm's technological alignment, the higher will be its NPD performance.

There is strong empirical evidence for the positive effect of market alignment on new product performance (Atuahene-Gima, 1995, 1996; Baker and Sinkula, 2005; Henard and Szymanski, 2001; Langerak, Hultink, and Robben, 2004; Paladino, 2007; Pelham and Wilson, 1996; Slater and Narver, 1994; Wei and Morgan, 2004). Market alignment involves identifying and creating opportunities in product markets. Firms emphasizing market alignment learn about the marketplace quickly and accurately, are responsive to customer needs and are likely to develop quality products, i.e. products that meet or even exceed customer expectations (Day and Nedungadi, 1990; Narver and Slater, 1990; Kohli and Jaworski, 1990) relatively quickly and in a timely manner (Cooper, 1979; Li and Calantone, 1998). As a result, aligning NPD activities with the market should increase the operational effectiveness of a firm's NPD activities.

Hypothesis 6: The stronger a firm's market alignment, the higher will be its NPD performance.

Many studies have demonstrated that cross-functional alignment increases NPD performance (Atuahene-Gima and Evangelista, 2000; Ayers, Dahlstrom, and Skinner, 1997; Cooper and Kleinschmidt, 1987; Hoopes and Postrel, 1999; Leenders and Wierenga, 2002; Li and Calantone, 1998; Song and Montoya-Weiss, 2001). As cross-functional alignment reduces language, thought and physical barriers, it allows for more information to be disseminated across and utilized by different functions more quickly, and so supports the construction of shared mental models. A study by Song and Parry (1999) showed cross-functional alignment to be positively related to proficiency in the various stages of the NPD process, such as during idea development and screening, opportunity analysis, technical development and product testing and commercialization. In the interaction between product developers and marketers, shared mental models help create a shared understanding of particular situations (Day and Nedungadi, 1994; Griffin and Hauser, 1992; Senge, 1990) and decrease the level of conflict. For example, the exchange of information about potential market demands allows NPD staff to better anticipate current and latent needs in a firm's target markets. Likewise, NPD can provide marketing with information regarding technological developments that might provide solutions for customer demands. Higher levels of information exchange and blending of skills enable firms to develop a better understanding of problems and potential solutions, and thereby solve complex problems (Ayers, Dahlstrom and Skinner, 1997; Song and

Montoya-Weiss, 2001). In effect, NPD-marketing alignment should reduce development time (Menon and Lukas, 2004), enhance the quality of new products and increase responsiveness to customer requirements.

Hypothesis 7: The stronger a firm's NPD-marketing alignment, the higher will be its NPD performance.

METHODOLOGY

The data used in this study were drawn from the international 'Patterns in NPD' survey, which was designed to collect information about NPD practices and performance. Using Dillman's (1978, 2000) total design method, both an e-mail- and an internet-based form of the questionnaire were developed. Ten NPD managers and six academics reviewed the draft questionnaire to improve clarity and resolve any unfamiliar or unclear wording.

For the purpose of this study, we used data collected in Denmark, Finland, Norway and the Netherlands. Our sample consisted of food, automotive, electronics and bio-technology industries. In all four countries, an English version of the questionnaire was used. The e-mail list was obtained from the EPO database (European Patent Office), the FME database (Federation for the Metal and Electro-technical Industries) in the Netherlands, the Danish Nærhverv database (~ Industry Names and Numbers) and the Finnish Voitto database.

The primary unit of analysis was independent firms and strategic business units of larger firms. The survey was administered to NPD or R&D managers of companies with at least five or more full-time-equivalent product development employees. The respondents were contacted by telephone, invited to participate in the survey and offered a report with findings from the study. Only those willing to participate were sent the questionnaire. Two reminder e-mails were sent at two-week intervals and follow-up telephone calls were conducted. As a result, the number of responses from Denmark, Finland, Norway and the Netherlands were 31, 10, 8, and 49 respectively. Thus, the response rate for the total sample was approximately 12%. Annual sales of the participating firms ranged from 1 million to 4.5 billion Euros. Firm size measured by the number of full-time employees varied from 6 to 30,000.

As previous research has shown the four countries to be similar in their NPD practices (e.g. Leten, Belderbos, and van Looy, 2007; Souder and Jenssen, 1999; van Riel, Lemmink, and Ouwersloot, 2004), data collected from the 98 sample companies were pooled and used to test the hypotheses proposed in this study.

Measures

Multiple-item scales were developed based on the literature on NPD and strategic management. When existing scales were unavailable, we developed new scales and measures. To develop reflective scales, we used the framework proposed by Churchill (1979). We defined constructs, generated an item pool and decided on the measurement format. A list of potentially useful measures was developed from the literature. The initial item pool was reviewed by a number of experts in academia and industry. On the basis of this review, some statements were dropped and a few were modified.

Strategic planning was measured using five items adopted from Cooper and Kleinschmidt's (1995b) and Cooper, Edgett and Kleinschmidt's (2004) best practices scales. Innovativeness was measured using five items adopted from Glick's (1985) description, and Ekvall's (1996) definition and operationalization, of organizational climate. Measures for environmental munificence and technological change were adopted from Dess and Beard (1984) and Bantel (1998). We used three and two items to measure environmental munificence and

technological change, respectively. As we viewed environmental munificence and technological change as formative constructs, we calculated the average of these items and developed summated scores for each environmental factor.

Technological and market alignment were measured using three modified items from existing NPD strategy-technology alignment and NPD strategy-market alignment scales (Albright and Kappel, 2003; Cooper and Kleinschmidt, 1995b; Cooper, Edgett, and Kleinschmidt, 2004). NPD-marketing alignment was measured using three items adopted from Leenders and Wierenga (2002), Swink (1999) and Yam et al. (2004). Finally, NPD performance was measured using four items adapted from Chiesa, Coughlan, and Voss (1996).

The Measurement Model

We evaluated the psychometric properties of measures using a confirmatory factor analysis (CFA) that combined each factor measured by reflective scales (Bagozzi, Youjae, and Phillips, 1991; Gerbing and Anderson, 1988). This resulted in a CFA that included six factors: strategic planning, innovativeness, technological, market and NPD-marketing alignment and NPD performance. As we operationalized environmental munificence and technological change as formative scales, they were not included in the CFA analysis. The CFA was fitted using the maximum likelihood estimation procedure with the raw data as input in EQS 6.1 (Bentler, 1995). After we dropped some items that had low factor loadings or high cross loadings, the confirmatory model fit the data satisfactorily. The Appendix presents key results of the CFA.

We assessed the convergent and discriminant validity of the constructs. Each measurement item loaded only on its latent construct. The chi-square test for our theoretical variables was statistically significant ($\chi^2_{(104)} = 127.03, p < .05$). The Bentler-Bonett nonnormed fit index (NNFI), the comparative fit index (CFI), Bollen's fit index (IFI) and the root mean square error of approximation (RMSEA) indicated a good fit with the hypothesized measurement model (NNFI = .95, CFI = .96, IFI = .96, and RMSEA = .048) (Hu and Bentler, 1999). Furthermore, all the factor loadings were statistically significant ($p < .01$) and the composite reliabilities of all constructs were equal to or exceeded the threshold value of .7 (Nunnally, 1978). Thus, the measures demonstrated adequate convergent validity and reliability. Discriminant validity was examined by calculating the shared variance between all possible pairs of constructs, verifying that they were lower than the average variance extracted for the individual constructs (Fornell and Larcker, 1981a, b). The average variance extracted by the measure of each factor was larger than the squared correlation of that factor's measure with all measures of other factors in the model (see Appendix). Thus, all the factors in the measurement model possess strong discriminant validity. In light of this evaluation, we can conclude that all factors in the measurement model possess both convergent and discriminant validity, and that the CFA model fits the data adequately.

Results of Hypothesis Testing

We tested the model depicted in Figure 1 using structural equation modeling with the EQS 6.1 program. The results are summarized in Table 1, along with the parameter estimates, their corresponding t-values and the fit statistics. Although the chi-square test is statistically significant ($\chi^2_{(151)} = 200.59, p < .05$), the Bentler-Bonett nonnormed fit index (NNFI), the comparative fit index (CFI), Bollen's fit index (IFI) and the root mean square error of approximation (RMSEA) indicate that the theoretical model fits the data well. (NNFI = .90, CFI = .92, IFI = .92, and RMSEA = .058) (Hu and Bentler, 1999) (Table 1).

 Insert Table 1 about here

As Table 1 shows, strategic planning has a positive effect on technological alignment ($\beta = .34$; $p < .05$), market alignment ($\beta = .38$; $p < .005$) and NPD-marketing alignment ($\beta = .54$; $p < .005$), in support of H_{1a} , H_{1b} and H_{1c} . Similarly, a firm's innovativeness is positively associated with its technological alignment ($\beta = .22$; $p < .05$), market alignment ($\beta = .35$; $p < .05$) and NPD-marketing alignment ($\beta = .29$; $p < .05$), in support of H_{2a} , H_{2b} , and H_{2c} .

Environmental munificence is not significantly associated with technological alignment ($\beta = -.10$; $p > .10$) and market alignment ($\beta = .09$; $p > .10$). Thus, H_{3a} and H_{3b} are not supported. However, environmental munificence is negatively associated with NPD-marketing alignment ($\beta = -.24$; $p < .005$), in support of H_{3c} .

Technological change has a positive effect on technological alignment ($\beta = .23$; $p < .05$), in support of H_{4a} , but has no effect on market alignment ($\beta = .09$; $p > .10$). Thus, H_{4b} is not supported. Technological change is negatively associated with NPD-marketing alignment ($\beta = -.24$; $p < .005$), in support of H_{4c} .

Finally, technological alignment affects NPD performance ($\beta = .18$; $p < .10$) positively, which supports H_5 . Market alignment, however, has no effect on NPD performance ($\beta = -.04$; $p > .10$). Therefore, H_6 is not supported. NPD-marketing alignment has a positive effect on NPD performance ($\beta = .55$; $p < .005$), which confirms H_7 .

The number of full-time employees, which represents firm size, was included as a control variable. The log of number of employees was used in the analysis. The results indicated that the effect of firm size on NPD performance is insignificant ($\beta = -.09$; $p > .10$).

DISCUSSION

Drivers of Strategic Alignment

We found support for hypotheses H_1 and H_2 , namely that all three forms of strategic alignment are enhanced by NPD strategic planning and the presence of a supportive NPD climate. These hypotheses are based on the argument that strategic planning and an innovative climate affect how companies behave, rather than how they perform. Thus, this finding confirms that activities such as assessing technologies and markets, establishing clear product concept statements, defining target markets (Brown and Eisenhardt, 1995), examining the fit between intended new products and the firm's strategy (Salomo, Weise, and Gemünden, 2007) and recognizing and exploiting technological (Grupp, 1998; Siguaw, Simpson, and Enz, 2006) and market (Moorman, 1995; Slater, Olson, and Hult, 2006; Wei and Morgan, 2004) opportunities lead to reduced role ambiguity. This is achieved through improved communication, increased integration (Moenaert et al., 1994), reduced conflict (Song and Thieme, 2006) and improved collaboration (Zhou, Yim, and Tse, 2005) and communication between the NPD and marketing functions, which in turn affect technological, market and NPD-marketing alignment positively.

The support for hypothesis H_3 is limited. Environmental munificence appears to have minor and insignificant influence on technological (H_{3a}) and market alignment (H_{3b}). Some authors (Bantel, 1998; Covin and Slevin, 1989) suggest a negative impact of munificence on technological alignment; others (Bourgeois, 1981; Goll and Rasheed, 1997; Miller and Friesen, 1983) a positive influence. Our results suggest that some firms act conservatively in munificent environments, while others use the abundance of resources in such environments to experiment with new technology-based product development. The result regarding the munificence-market alignment relationship goes against previous reports that environmental munificence (hostility) has a negative (positive) effect on market alignment (Baum and Wally, 2003; Castrogiovanni, 1991; Dess and Beard, 1984; Slevin and Covin, 1995; Kohli and Jaworski, 1990). Further research is needed to develop an adequate explanation for this finding. The effect of environmental

munificence on NPD-market alignment (H_{3c}) is negative, as expected. The follower strategy (Covin and Slevin, 1989) prevailing in such environments, and the reduced need for the firm to process market information (Kohli and Jaworski, 1990; van Eegeren and O'Connor, 1998) seem to also reduce the need for the NPD and marketing functions to communicate and align their activities intensively.

In line with our expectations put forward through H_{4a} and H_{4c} , technological change affects technological alignment positively and NPD-marketing alignment negatively but, contrary to H_{4b} , it has no effect on market alignment. The theory underpinning these hypotheses is ambiguous. Some authors (Calantone, Garcia, and Dröge, 2003; Li and Atuahene-Gima, 2001; Siguaw, Simpson, and Enz, 2006) report a moderating effect of technological change on the relationship between technological alignment and NPD performance. Jeong, Pae, and Zhou (2006) maintain that technological change affects technological alignment directly. H_{4a} reflects and confirms the latter. As regards the relationship between technological change and market alignment, the literature is also ambiguous. Some authors (Jaworski and Kohli, 1993; Zhou, Yim, and Tse, 2005) report negative effects while others (Li and Calantone, 1998) do not find any significant effects. Our analysis supports the latter and suggests that under conditions of technological change, technological alignment is more important than market alignment. Finally, as to the effects of technological change on the NPD-marketing interface, some authors (Jaworski and Kohli, 1993) report no effect at all. Others report moderating effects of technological change on the relationships between market alignment and NPD performance (Slater and Narver, 1994) and between cross-functional integration and technological and market proficiency, respectively (Song and Montoya-Weiss, 2001). We reasoned that technological change should have a direct negative effect on NPD-marketing alignment, recognizing that listening too much to the voice of the customer in technologically dynamic environments would actually lead to reduced NPD operational performance. Our findings confirm that line of reasoning.

Strategic Alignment and NPD Performance

We found support for hypotheses H_5 and H_7 , but no significant support for H_6 . Apparently, the different forms of alignment play contrasting roles as determinants of NPD performance.

As expected, technological alignment enhances NPD performance. So, the better a firm is aligned with its technological domains, the higher is the likelihood that it creates qualitatively good products that meet customer requirements and are launched on time. This confirms findings reported previously (e.g. Voss and Voss, 2000; Gatignon and Xuereb, 1997). Similarly, NPD-marketing alignment appears to have a strong effect on operational NPD success, which supports H_7 and confirms existing theory (e.g. Li and Calantone, 1998; Menon and Lukas, 2004).

However, there is no direct link between market alignment and NPD performance. This finding goes against much of the research conducted in the United States (see Baker and Sinkula, 2005; Slater and Narver, 1994; Wei and Morgan, 2004), but is largely consistent with the evidence from Europe (Kleinschmidt, 1994; Langerak, Hultink, and Robben, 2004). This suggests that cultural differences play a decisive role (Grewal and Tansuhaj, 2001; Kirca, Jayachandran, and Bearden, 2005). For example, US managers prefer short-term pay-offs (Kleinschmidt, 1994), while employees in low power-distance and uncertainty-avoidance cultures dominant in Denmark, Norway, the Netherlands and Finland (Hofstede, 2001), the countries represented in this study, are more comfortable with long-term strategic orientations than short-term performance gains (Kirca, Jayachandran, and Bearden, 2005). Market alignment, therefore, should have a strong impact on long-term (i.e. financial performance) and a low(er) impact on short-term (e.g. speed and cost) performance in such contexts. This is supported by Langerak, Hultink, and Robben (2004) who,

using data from companies in the Netherlands, also found that market alignment has no direct impact on NPD performance.

CONCLUSION

Theoretical Contributions

This study shows how internal drivers (strategic planning and innovativeness) and external drivers (environmental munificence and technological change) affect technological, market and NPD-marketing alignment, and how these forms of strategic alignment affect NPD performance. The literature on the relationships between a company's internal and external drivers, strategic alignment and NPD performance is often ambiguous. Various publications report a moderating effect of these drivers on the strategic alignment-NPD performance relationship. Other publications show a direct - positive or negative - effect of different drivers on NPD performance, or claim that there is no such effect. This study is based on the assumption that a company's internal and external drivers affect NPD performance indirectly, i.e. through strategic alignment.

Strategic planning and innovativeness trigger companies to adopt all three types of alignment. Environmental munificence, i.e. resource abundance, has no effect on technological and market alignment, and a negative effect on NPD-marketing alignment. Furthermore, the level of technological change in a firm's environment affects technological alignment positively and NPD-marketing alignment negatively, but has no effect on market alignment.

While the beneficial effects of strategic alignment on *organizational* performance have received quite attention, this study provides empirical evidence of the effects of technological, market and NPD-marketing alignment on *NPD* performance. Technological and NPD-marketing alignment appear to affect NPD performance positively, while market alignment has no significant effect. Other research indicates that the latter might be due to cultural forces – our sample consists of northwestern European companies that tend to seek stakeholder rather than shareholder value.

Thus, strategic planning and innovativeness affect the adoption of technological and NPD-marketing alignment positively, both of which affect NPD performance positively. Environmental munificence only affects the adoption of NPD-marketing alignment and it does so negatively. This means that companies in hostile environments put more effort into aligning their NPD-marketing functions, which in turn has positive NPD performance effects. Technological change positively affects companies' levels of technological alignment and negatively affects their NPD-marketing alignment. This means that companies exposed to high levels of technological change should expect positive NPD performance effects from technological alignment, while companies in environments characterized by low levels of technological change should expect positive NPD performance effects from NPD-marketing alignment. Finally, market alignment, high in innovative companies that put a lot of effort into strategic planning, does not affect NPD performance, regardless of whether a firm's environment is munificent or not, and also irrespective of the level of technological change in that environment.

Managerial Implications

One obvious implication of our study is the need for a company to understand the nature of its competitive environment, and based on that to implement a suitable (i.e. NPD performance enhancing) set of alignment mechanisms. Today's companies need excellence in multiple criteria, both now and in preparing themselves for (the day after) tomorrow (Boer and Gertsen, 2003). This study recognizes the latter point, using a combination of different NPD success measures (i.e. cost, quality and speed) and alternative forms of strategic alignment.

The study makes it particularly clear that strategic planning and an innovative climate are key

drivers of strategic alignment and through that, NPD performance. Strategic planning involves assessing technologies and markets, establishing clear product concept statements, defining target markets and examining the fit between intended new products and a firm's strategy based on a systematic project portfolio. Key features of an innovative climate are cross-functional collaboration, proactive scanning through extensive boundary spanning, acquiring and using new technologies and, more generally, openness to new ideas and willingness to take risks and adapt to emerging (or create new) technological and market trends.

Furthermore, companies in hostile environments, that is, environments in which financial and knowledge resources are scarce, need to pay particular attention to the NPD-marketing interface. Mechanisms to increase communication, interaction and collaboration between the NPD and marketing functions vary, from organizational mechanisms such as cross-functional team work, secondment, liaison roles and role combination, to technological mechanisms such as computer-supported cooperative work and knowledge management, and managerial mechanisms such as quality function deployment (the house of quality) and concurrent engineering. Market alignment, often proposed as one of the most important drivers of organizational performance, does not have any significant NPD performance effects. This does not, however, suggest that the voice of the customer is not important. Rather, managers should realize that market alignment does not affect the efficiency but rather the effectiveness of NPD.

Limitations and Directions for Future Research

We used data provided by a single respondent in each firm, in most cases the NPD/R&D manager. According to Song, Xie, and Dyer (2000), marketing and R&D managers differ in their preferences and criteria when they evaluate cross-functional information. In other words, there may be some bias in our data.

Another limitation of our research is the northwestern European origin of the data. Similar to other studies of strategic alignment, our research needs to be extended to an international context (e.g. US, pan-European and the Far East) to check whether culture does indeed affect our findings as suggested above.

Finally, the measures of NPD performance we used in this study are based on the perception of the NPD/R&D managers. While objective and financial measures of success are preferred in the marketing and strategy literature, we have argued for the appropriateness of perceptual measures given our focus on functional (i.e. NPD) success. Future studies of the impact of strategic alignment on NPD performance might extend this research by incorporating more objective measures of NPD success such as customer satisfaction, time to market and NPD efficiency metrics. These measures would also contribute to reducing potential respondent bias.

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Table 1: Results of Hypothesis Testing

[pic]

Dependent Variables		Technological Market		NPD-Marketing		NPD		Performance	
Independent Hypotheses	Variables Conclusion	Alignment	Alignment	Alignment	Alignment	Alignment	Alignment	Alignment	Performance
Strategic Planning	.34** (2.46)		H _{1a}						Supported
	.38*** (2.79)	H _{1b}		Supported					
	.54*** (4.09)	H _{1c}		Supported					
Innovativeness	.22** (1.65)			H _{2a}					Supported
	.35** (2.53)	H _{2b}		Supported					
	.29** (2.50)		H _{2c}		Supported				
Environmental Munificence	-.10 ^{n.s.} (-.91)					H _{3a}			Not supported
	.09 ^{n.s.} (.86)		H _{3b}		Not supported				
	-.25*** (-2.67)			H _{3c}			Supported		
Technological Change	.23** (2.01)						H _{4a}		Supported
	.09 ^{n.s.} (.78)		H _{4b}		Supported				
	-.24*** (-2.56)			H _{4c}				Supported	
Technological Alignment			.18* (1.44)	H ₅					Supported
Market Alignment			-.04 ^{n.s.} (-.30)	H ₆					Not supported
NPD-Marketing Alignment			.55*** (4.25)	H ₇					Supported
Model Fit Statistics	$\chi^2 = 200.59$ (df = 151, p < .05)								
	NNFI = .90								
	CFI = .92								
	IFI = .92								
	RMSEA = .058								

[pic]

***p < .005; **p < .05; *p < .1 (One-tailed t-test); Notes: t-values are in parentheses.

Figure 1: Drivers and Performance Effects of Strategic Alignment
[pic]

Appendix: Scale Items

[pic]

Standardized Loading t-value^a

[pic]

Strategic Planning

(7-point Likert scale ranging from 'strongly agree' to 'strongly disagree')

AVE = 57.0%; HSV = 36.0%; CR = .80

- | | | | |
|----|---|-----|------|
| 1. | The role of NPD in achieving business goals is clearly articulated. | .82 | 8.92 |
| 2. | There is a formally stated NPD strategy. | .83 | 9.15 |
| 3. | We have clearly defined goals for all our individual new products. | .59 | 5.95 |

Innovativeness

(7-point Likert scale ranging from 'strongly agree' to 'strongly disagree')

AVE = 41.2%; HSV = 22.0%; CR = .70

- | | | | |
|----|---|-----|------|
| 1. | There is a strong support for further development of new ideas. | .78 | 6.96 |
| 2. | People are involved in debates about differing viewpoints. | .56 | 5.09 |
| 3. | High risk taking behavior is tolerated. | .56 | 5.01 |

Environmental Munificence

(7-point Semantic scale)

Safe, little threat to the survival and well being of the organization.	Risky, one false step can mean my organization's undoing.
Rich opportunities in investment and marketing.	Few opportunities, stressful, hostile, hard to keep afloat.
A dominant organization that can control and manipulate the environment to its own advantage.	A dominating environment in which our initiatives count for very little against environmental forces.
Technological Change	
(7-point Semantic scale)	
The rate at which products are getting obsolete in the industry is low.	The rate at which products are getting obsolete in the industry is high.
The production technology is subject to little change.	The production technology is subject to much change.

Technological Alignment

(7-point Likert scale ranging from 'strongly agree' to 'strongly disagree')

AVE = 61.7%; HSV = 24%; CR = .80

- | | |
|----|---|
| 1. | We clearly identify technological areas that focus our NPD efforts. |
|----|---|

- | | | | | | |
|----|--------|---------------|--------|---------------|----------------------|
| | .75 | | 6.54 | | |
| 2. | Future | technological | trends | are important | in our NPD planning. |
| | .82 | | 7.03 | | |

Market Alignment

(7-point Likert scale ranging from 'strongly agree' to 'strongly disagree')

AVE = 50.5%; HSV = 24%; CR = .70

- | | | |
|----|---|------------------------------------|
| 1. | The focus of our NPD efforts | clearly relates to target markets. |
| | .80 | 8.02 |
| 2. | Future markets are explicitly addressed | in our NPD planning. |
| | .79 | 7.93 |
| 3. | Our project portfolio is balanced | across markets. |
| | .50 | 4.74 |

NPD-Marketing Alignment

(7-point Likert scale ranging from 'strongly agree' to 'strongly disagree')

AVE = 66%; HSV = 32%; CR = .90

- | | | |
|----|---|-----------------------------|
| 1. | Marketing and NPD | often share information. |
| | .87 | 10.12 |
| 2. | Conflicts between marketing and NPD | are of a constructive kind. |
| | .72 | 7.82 |
| 3. | Marketing and NPD are more like teammates | than competitors. |
| | .84 | 9.68 |

NPD Performance

(7-point Likert scale ranging from 'not at all achieved' to 'very well achieved')

AVE = 54.4%; HSV = 36%; CR = .80

- 1. Our new products meet customer requirements. 8.26
- 2. Our new products are delivered on time. 6.13
- 3. The quality of our products is good. 8.42

Model Fit Statistics: ($\chi^2 = 127.03$ (df = 104, p < .05)
 NNFI = .95
 CFI = .96
 IFI = .96
 RMSEA = .048

[pic]

^aThe t-values from the unstandardized solution.

Notes: AVE = Average variance extracted; HSV = Highest shared variance with other constructs; CR = Composite reliability.

Strategic
 Planning

[pic]S^_op{[]~ÀÁû	H	I	s	t	%	?
ôæ×Æ×Æ×Æ×² %o %oy%o² bPb@b-h	?	\$h[?]gM0J\$6?)?mH	sH	#h		
?\$h[?]gM6?B*[pic]]?mH	phsH	,jh	?	\$h[?]gM6?B*[pic]U[pic]]?mH	phsH	-h
?\$h?PÂ0J\$6?)?mH	sH	,jh	?	\$h?PÂ6?B*[pic]U[pic]]?mH	phsH	#h
?\$h?PÂ6?B*[pic]]?mH	phsH	&h	?	\$h?PÂ6?B*[pic]H*[pic]]?mH	phsH	h
?\$h?PÂ5?H*[pic]\?)?mH	sH	h	?	\$h?PÂ5?\?)?mH	sH	h
	mH	s	Innovativeness			

Technological Alignment

NPD-Marketing Alignment

NPD
 Performance

Technological Change

Market
Alignment

Environmental Munificence

Strategic Alignment