

Strategic Alignment and New Product Development: Drivers and Performance Effects

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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, Vara-

darajan, 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 et al., 2005). While this stream of research notes that a firm's strategy is a significant indicator of its new product success, it lacks an

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explanation of the effects of capabilities emanating from strategic choice on NPD performance.

Located within the domain of NPD theory, this 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, the paper fills 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, the paper investigates 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, a conceptual model is presented, based on which a range of hypotheses are proposed that pertain to the drivers and performance outcomes of strategic alignment. Following the description of the research design, the results of an empirical study aimed at testing these hypotheses are reported. The paper is concluded by discussing the theoretical contributions and practical implications of the findings and by proposing directions for further research.

BIOGRAPHICAL SKETCHES

Dr. Nuran Acur is a senior lecturer in operations and innovation strategy at the University of Strathclyde, Glasgow, United Kingdom. She received her Ph.D. in strategic management from the University of Strathclyde. Previously, she worked at Aalborg University and Bilkent University. She has been serving as a board member of European Operations Management Association since 2006. She has published articles in the areas of operations strategy, product innovation, and service innovation. Her work has appeared in the *International Journal of Operations & Production Management*, *Creativity and Innovation Management*, *Supply Chain Management: An International Journal*, and the *Journal of Production, Planning and Control*.

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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; Hayes and Wheelwright, 1984; Miles and Snow, 1978; Mintzberg, 1979). 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 et al., 1989; Vorhies and Morgan, 2003) and focus (Laugen et al., 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 marketplace (Olson et al., 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 research and development (R&D), product development, design or engineering, and process planning or engineering. Similarly, the marketing function or department is usually responsible for the marketing activities of a business unit.

Appendix 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 et al., 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 to integrate new technologies into its new products (Gatignon and Xuereb, 1997; Voss and Voss, 2000; Zhou et al., 2005). *Market alignment* is a firm's ability to identify and analyze the current and future needs of its target markets and to integrate market information into its NPD activities to continuously create greater customer value (Deshpandé,

Farley, and Webster, 1993; Jaworski and Kohli, 1993; McKee et al., 1989; Narver and Slater, 1990). *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 (Day and Wensley, 1988; Lawrence and Lorsch, 1967; 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 et al., 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).

Strategic planning and innovativeness are internal drivers that are critical for NPD activities (Brown and Eisenhardt, 1995; Calantone, Garcia, and Dröge, 2003; Cooper and Kleinschmidt, 1995a; Han, Kim, and Srivastava, 1998) in that they provide a firm with cohesiveness and focus in organizing its NPD activities. External drivers such as 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 et al., 2003; Cooper and Kleinschmidt, 1995a; Langerak, Hultink, and Robben, 2004; Rauniar, Doll, Rawski, and Hong, 2008; Salomo, Weise, and Gemünden, 2007; Slater, Olson, and Hult, 2006). This study further investigates this relationship and argues 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 by allocating adequate resources to, that function (Brown and Eisenhardt, 1995; Cooper and Kleinschmidt, 1995a, 2007). As strategic planning

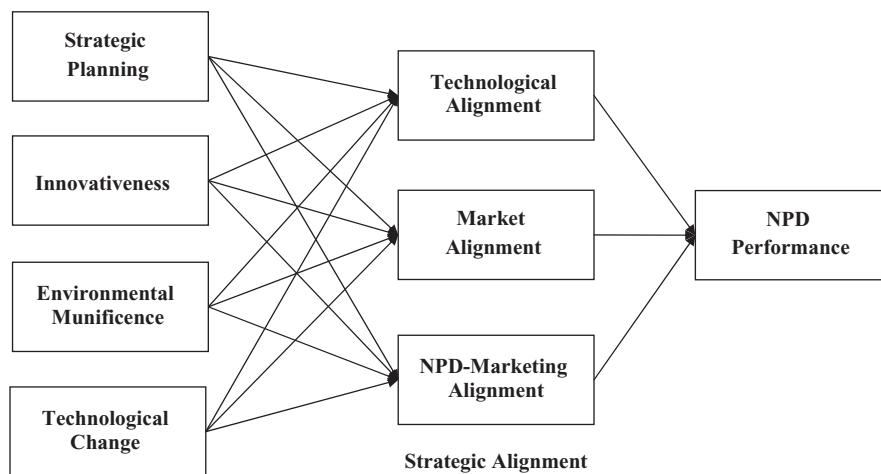


Figure 1. Drivers and Performance Effects of Strategic Alignment
NPD, new product development

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 et al., 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, Souder, De Meyer, and Deschoolmeester, 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.

H1: The better the strategic planning of a firm,

- *the stronger will be its technological alignment.*
- *the stronger will be its market alignment.*
- *the stronger will be its NPD-marketing alignment.*

Innovativeness. Innovative firms are open to new ideas, products, and processes (Zaltman, Duncan, and Holbek, 1973), and are more willing to change and 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 et al., 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. Although the relationship between innovativeness and NPD performance has been established (Han et al., 1998), existing research does not provide an explanation of *why* innovativeness should enhance NPD performance. This paper attempts to develop that explanation and argues 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 et al., 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 versus 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).

H2: The stronger the innovativeness of a firm,

- *the stronger will be its technological alignment.*
- *the stronger will be its market alignment.*
- *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 to 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, it is expected that firms operating in munificent environments decrease their technological alignment as there is no need to respond quickly to environmental changes.

H3a: 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 because of 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 to carefully integrate customer-related information in the development of new products.

H3b: The greater the munificence of a firm's environment, the weaker will be its market alignment.

Although 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, when environmental munificence is low and faster responses are needed, lower levels of alignment between NPD and marketing should be expected.

H3c: 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 marketplace (Li and Calantone, 1998). To cope with rapid changes, it is important for firms to collect and process technological information faster, 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 et al. (2006) showed technological turbulence to be positively associated with technology orientation.

H4a: 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 et al., 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 et al., 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, it is hypothesized:

H4b: The rate of technological change affects a firm's market alignment.

The literature does not provide evidence of a direct impact of technological change on NPD-marketing alignment. It can, however, be argued 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 to 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 that 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.

H4c: The greater the rate of technological change, the weaker will be a firm's NPD-marketing alignment.

Strategic Alignment and NPD Performance

Defining NPD performance as the operational effectiveness of a firm's NPD activities (i.e., quality, timeliness, and customer responsiveness), this study examines the link between strategic alignment and NPD performance (Tatikonda and Montoya-Weiss, 2001; Venkatraman and Ramanujan, 1986; Zhou et al., 2005).

Firms with a good level of technological alignment develop or acquire the latest technologies (Cooper, 1985), which results in improved NPD performance (Gatignon and Xuereb, 1997; Voss and Voss, 2000). 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 to create better solutions and/or applications to fulfill customer expectations of high-quality products in a timely manner (Gatignon and Xuereb, 1997; Zhou et al., 2005).

H5: 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 et al., 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, 1994; Kohli and Jaworski, 1990; Narver and Slater, 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.

H6: 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 et al., 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.

H7: 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 to resolve any unfamiliar or unclear wording.

For the purpose of this study, the data collected in Denmark, Finland, Norway, and the Netherlands were used. The sample consisted of food, automotive, electronics, and biotechnology industries. In all four countries, an English version of the questionnaire was used. The e-mail

list was obtained from the European Patent Office database, the Federation for the Metal and Electro-technical Industries database in the Netherlands, the Danish Nnerhverv 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), the 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, new scales and measures were developed. To develop reflective scales, the framework proposed by Churchill (1979) was used. Constructs were defined, an item pool was generated, and the measurement format was decided on. 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). Three and two items

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

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 et al., 2004; Cooper and Kleinschmidt, 1995b). NPD–marketing alignment was measured using three items adopted from Leenders and Wierenga (2002), Swink (1999), and Yam, Guan, Pun, and Tang (2004). Finally, NPD performance was measured using four items adapted from Chiesa et al. (1996).

The Measurement Model

The psychometric properties of measures were evaluated 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 environmental munificence and technological change were operationalized 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 (Multivariate Software, Inc., Encino, CA; Bentler, 1995). After some items had been dropped that had low factor loadings or high cross loadings, the confirmatory model fits the data satisfactorily. The Appendix presents key results of the CFA.

Both the convergent and discriminant validity of the constructs were assessed. Each measurement item loaded only on its latent construct. The chi-square test for the theoretical variables was statistically significant ($\chi^2_{(104)} = 127.03$, $p < .05$). The Bentler–Bonett non-normed fit index (NNFI), the comparative fit index (CFI), Bollen's incremental 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 exam-

ined 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, 1981b). 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 the Appendix). Thus, all the factors in the measurement model possess strong discriminant validity. In light of this evaluation, it can be concluded 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

The model depicted in Figure 1 was tested 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 NNFI, the CFI, IFI, and the 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).

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 H1a, H1b, and H1c. 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 H2a, H2b, and H2c.

Environmental munificence is not significantly associated with technological alignment ($\beta = -.10; p > .10$) and market alignment ($\beta = .09; p > .10$). Thus, H3a and H3b are not supported. However, environmental munificence is negatively associated with NPD-marketing alignment ($\beta = -.24; p < .005$), in support of H3c.

Technological change has a positive effect on technological alignment ($\beta = .23; p < .05$), in support of H4a but has no effect on market alignment ($\beta = .09; p > .10$). Thus, H4b is not supported. Technological change is negatively associated with NPD-marketing alignment ($\beta = -.24; p < .005$), in support of H4c.

Finally, technological alignment affects NPD performance ($\beta = .18; p < .10$) positively, which supports H5. Market alignment, however, has no effect on NPD performance ($\beta = -.04; p > .10$). Therefore, H6 is not sup-

Table 1. Results of Hypothesis Testing

Independent Variables	Dependent Variables				Hypotheses	Conclusion
	Technological Alignment	Market Alignment	NPD-Marketing Alignment	NPD Performance		
Strategic planning	.34** (2.46)	.38*** (2.79)	.54*** (4.09)		H1a H1b H1c	Supported Supported Supported
Innovativeness	.22** (1.65)	.35** (2.53)	.29** (2.50)		H2a H2b H2c	Supported Supported Supported
Environmental munificence	-.10 ^{n.s.} (-.91)	.09 ^{n.s.} (.86)	-.25*** (-2.67)		H3a H3b H3c	Not supported Not supported Supported
Technological change	.23** (2.01)	.09 ^{n.s.} (.78)	-.24*** (-2.56)		H4a H4b H4c	Supported Supported Supported
Technological alignment				.18* (1.44)	H5	Supported
Market alignment				-.04 ^{n.s.} (-.30)	H6	Not supported
NPD-marketing alignment				.55*** (4.25)	H7	Supported
Model fit statistics	$\chi^2 = 200.59$ (df = 151, $p < .05$) NNFI = .90 CFI = .92 IFI = .92 RMSEA = .058					

*** $p < .005$; ** $p < .05$; * $p < .1$ (one-tailed *t*-test).

Notes: *t*-values are in parentheses. CFI, comparative fit index; df, degrees of freedom; IFI, incremental fit index; NNFI, nonnormed fit index; NPD, new product development; n.s., not significant; RMSEA, root mean square error of approximation.

ported. NPD-marketing alignment has a positive effect on NPD performance ($\beta = .55$; $p < .005$), which confirms H7.

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

The analysis supported H1 and H2, 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 et al., 2007), and recognizing and exploiting technological (Grupp, 1998; Siguaw et al., 2006) and market (Moorman, 1995; Slater et al., 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 et al., 2005) and communication between the NPD and marketing functions, which in turn affect technological, market, and NPD-marketing alignment positively.

The support for H3 is limited. Environmental munificence appears to have minor and insignificant influence on technological (H3a) and market alignment (H3b). Some authors (Bantel, 1998; Covin and Slevin, 1989) suggest a negative impact of munificence on technological alignment; other studies (Bourgeois, 1981; Goll and Rasheed, 1997; Miller and Friesen, 1983) report a positive influence. Apparently, 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; Kohli and Jaworski, 1990; Slevin and Covin, 1995). Further research is

needed to develop an adequate explanation for this finding. The effect of environmental munificence on NPD-market alignment (H3c) 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 the expectations put forward through H4a and H4c, technological change affects technological alignment positively and NPD-marketing alignment negatively, but, contrary to H4b, it has no effect on market alignment. The theory underpinning these hypotheses is ambiguous. Some authors (Calantone et al., 2003; Li and Atuahene-Gima, 2001; Siguaw et al., 2006) report a moderating effect of technological change on the relationship between technological alignment and NPD performance. Jeong et al. (2006) maintain that technological change affects technological alignment directly. H4a 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 et al., 2005) report negative effects while others (Li and Calantone, 1998) do not find any significant effects. The 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). The line of reasoning adopted in this paper was 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. The findings confirm that argument.

Strategic Alignment and NPD Performance

The data support H5 and H7. H6, however, is not supported. 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., Gatignon and Xuereb, 1997; Voss and Voss, 2000). Similarly, NPD-marketing alignment appears to have a strong effect on operational NPD success, which supports H7 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 it is largely consistent with the evidence from Europe (Kleinschmidt, 1994; Langerak et al., 2004). This suggests that cultural differences play a decisive role (Grewal and Tansuhaj, 2001; Kirca, Jayachandran, and Bearden, 2005). For example, U.S. managers prefer short-term payoffs (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 et al., 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 et al. (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. The present 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 has 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 some 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—the sample consists of north-western 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 the present 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

The data used were provided by a single respondent in each firm, in most cases the NPD/R&D manager. According to Song et al. (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 the data underpinning this study.

Another limitation of the research is the northwestern European origin of the data. Similar to other studies of strategic alignment, the research needs to be extended to

an international context (e.g., United States, pan-European, and the Far East) to check whether culture does indeed affect the findings presented here.

Finally, the measures of NPD performance used in this study are based on the perception of the NPD/R&D managers. Objective and financial measures of success are preferred in the marketing and strategy literature. However, given the focus on functional (i.e., NPD) success, it was argued that perceptual measures would be appropriate. 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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Appendix: Scale Items

	Standardized Loading	<i>t</i> -value ^a
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 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)		
1. Safe, little threat to the survival and well-being of the organization	Risky, one false step can mean my organization’s undoing	
2. Rich opportunities in investment and marketing	Few opportunities, stressful, hostile, and hard to keep afloat	
3. 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)		
1. 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.	
2. 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.	.78	8.26
2. Our new products are delivered on time.	.62	6.13
3. The quality of our products is good.	.80	8.42
Model fit statistics	$\chi^2 = 127.03$ (df = 104, $p < .05$)	
	NNFI = .95	
	CFI = .96	
	IFI = .96	
	RMSEA = .048	

^a The *t*-values from the unstandardized solution.

Notes: AVE, average variance extracted; CFI, comparative fit index; CR, composite reliability; df, degrees of freedom; HSV, highest shared variance with other constructs; IFI, incremental fit index; NNFI, nonnormed fit index; NPD, new product development; RMSEA, root mean square error of approximation.