

Doctoral Program First Paper

Customer Involvement in Industrial Product Development:
Creating Superior Products

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Introduction

It has long been recognized that the success of a business depends on its ability to innovate and create new products. Such innovation and new product creation must build and sustain a competitive advantage (Porter, 1985). Moreover, innovation and new product creation must meet the needs and satisfy the wants of customers and users (Cooper, 1998; Drucker, 1954; Wheelwright & Clark, 1995a). Unfortunately, the rich role that the customer performs in this process remains mostly unexplored.

Related to customer involvement in the innovation process is the topic of market orientation, which has received considerable attention in the literature. This topic, along with others such as market-driven and customer-focused development, has become synonymous with business strategies that place the customer at the center of business planning (Deshpande, 1999), but they are not the same as customer involvement.

Another stream of literature, Relationship Marketing, has also focused on the establishment of relationships with the customer including its antecedents and consequences. While this literature has not exclusively concentrated on industrial marketing, much of contemporary development has been dominated by business-to-business (B2B) marketing (Sheth & Parvatiyr, 1995). This emphasis on B2B marketing is due to the relatively higher importance B2B marketing places on the relationship between the buyer (customer) and seller than traditional consumer marketing (Comer & Zirger, 1997; Dwyer, Schurr, & Oh, 1987; Parkinson, 1985; Wilson, 1995). Market orientation, relationship marketing, and product development literature have all recognized the importance of the customer. But, lacking is any discussion of the role of the customer in this effort, with one notable exception being von Hippel's (1976; 1978;

1984; 1988) work on lead user analysis. For example, market orientation is company-focused as illustrated by Kohli and Jaworski's (1990) definition: market orientation is the "organization wide generation of marketing intelligence pertaining to current and future customers needs, dissemination of the intelligence across departments, and the organizational wide responsiveness to it." However, little attention has been given to the role of the customer in this process.

Of the studies that have examined the B2B market, most agree with the general premise that customer involvement benefits the development process. For example, von Hippel (1988) found that customers involved in the development process could help identify key industry trends. Some research, however, suggests that customers may be risk-adverse and may not be eager for new product innovations, thereby inhibiting the development process (Souder, 1987). Still others (Christensen & Bower, 1996; Daily, 1996) believe that listening to the customer may lead a company to failure. Thus, customer involvement may not necessarily be a panacea for product development.

It is intuitively obvious that customers will never become involved in the development of every product they use or consume, e.g. toothpaste. Therefore, might customer involvement in product development vary across different development scenarios in terms of both amount and type of involvement? If so, what explains this variation? Anecdotal evidence, along with some research, (Moore, 1995; von Hippel, 1988; Wilson, 1995) suggests that the impact the product has on its customer base has a positive relationship to the extent to which customers become involved in the development.

Integrating this literature, a framework for investigating customer involvement in the technology commercialization and product development process is proposed. The customer involvement in NPD framework suggests that a market orientation and relationship with the customer have a mediated effect through customer involvement on new product success, measured as product advantage. Marketing orientation is also believed to have a direct effect as well. In addition, the effect of customer involvement on product success is moderated by the product's impact on the customer.

Scope

While it is anticipated that the customer involvement in NPD framework will hold true across all sectors of marketing, the domain under consideration is limited to industrial new product development. Furthermore, a narrow definition of industrial products is intended here. In this definition only manufactured materials, parts and capital items, where the purchases for further processing, or for use in conducting business, eclipses all other uses. This excludes services, and making the distinction between consumer products and industrial products based on their intended use (Kotler & Armstrong, 1997).

Commercialization of technology and new product development are both considered because of the central importance of both the involvement of the customer, and the development of a first product based on that technology, to the broader commercialization of that technology (Jolly, 1997; Moore, 1991). While the commercialization of technology is much broader than the development of a single product, the first product is a critical step whose importance cannot be overstated. By including the commercialization of technology, the discussion is forced to the extremes

of product development (new to the world products) which expands the opportunities for the examination of customer involvement. Throughout this paper, references to product development or new product development (NPD) are therefore intended to include the commercialization of technology. Note that for emphasis and clarification, distinctions between NPD and commercialization of technology will occasionally be made.

Organization

The construct of customer involvement in the new product development success is first examined. The antecedents to customer involvement are then discussed, followed by the outcome variable, NPD success, and the moderating influence of a product's impact on the customer. The paper concludes with a discussion of the implications for future research and the managerial implications.

Customer Involvement in New Product Development

Customer involvement in new product development is a construct that has not received much attention in academic literature, with the noted exception of the work on lead user analysis by von Hippel. This work however stops well short of investigating the full range of customer involvement, limiting itself to the narrow, but important, topic of the customer as a *source of innovation*. Therefore, the development of conceptual framework for customer involvement in NPD borrows from literature on B2B involvement in contexts other than product development and involvement with parties other than customers.

In the context of customer involvement in new product development, the customer is actively engaged in the process of product development with the developing company. Sometimes customer involvement is at arms length and at other times customer involvement maybe an entangled process. However, in any case customer involvement in new product development involves some form of exchange between the customer and the people of developing organization. By contrast, in consumer behavior literature, involvement is cognitive or affective involvement with things other than the development team such as activities, interests, issues, products, advertisements or purchase decisions (Day, Stafford, & Camacho, 1995). The focus of this paper is the customer-manufacturer dyad in the development of new products and not individual customer's cognitive or affective approach to an existing product or product class.

Much of the literature on market orientation, relationship marketing and product development all mention the customer, even frequently, yet this literature rarely goes beyond references such as “information generation” and “understanding the needs of the

customer.” Furthermore, the reported investigations are usually from the perspective of what is needed from the customer or the benefits of a relationship with the customer, rather than understanding how the needed information may be obtained by cultivating involvement with the customer.

The investigation of customer involvement will include not only an investigation of the antecedents and consequences of customer involvement, but will also attempt to analyze the process of customer involvement. Customer involvement is not a simple act, practiced uniformly by the business community, but a complex interaction that is dynamic, malleable and contextual. To illustrate, von Hippel (1988, p. 4) found that 90% of the innovations in the Pultrusion industry were generated by customers and only 10% were from the manufactures, while within the engineered plastics industry, these numbers were reversed. In both industries, customers were involved in the NPD process, but in obviously different rolls and with different goals.

Note that the topic here is customer involvement, and therefore, it should not be confused with advocating a customer-orientation, which is often associated with being customer-led or favoring current customers to the detriment of the potential markets (Day, 1999). By advocating customer involvement, the notion that customers are “at best just a rearview mirror” (Flint, 1997) is soundly rejected in favor of a more balance view of the world. A balanced view which accepts that:

- a firm can and should both lead and follow its customers,
- a firm can and should stay close to both its current customers and potential customers, and

- technology-push and market-pull can and should be balanced.

The rejection of these balanced assertions in favor of a dichotomous view appears to be the basis for advocating the discounting of customer primacy in decisions making by Hamel, Prahalad (1994) and Christensen (1997). They reject not only customer orientation but also market orientation. These dichotomous views are misleading because they confuse inept implementation and poor interpretation with best practices. In fact, these critics present alternatives that are consistent with the leading views of market orientation (Deshpande, Farley, & Webster, 1993; Jaworski & Kohli, 1993; Kohli & Jaworski, 1990; Slater & Narver, 1998).

With the rapid advance of the internet and e-commerce, comes increasing pressure for mass customization. Researchers (Peppers, Rogers, & Dorf, 1999; Prahalad & Ramaswamy, 2000; Slywotzky, 2000) contend that the customer interaction afforded by internet technology is the enabler of mass customization. However, customer interaction is just a rudimentary form of customer involvement, and unfortunately, much of discussion surrounding customer involvement has been limited to customer interaction. Recently this has been referred to as transactional customer-centric marketing (Sheth, Sisodia, & Sharma, 2000). A richer view of customer involvement, one that begins before customer interaction and extends through collaboration to co-development warrants investigation.

Interdepartmental interaction within product development is governed by communication, using standard forms, e-mail, telephone calls and faxes (Kahn, 1996). Within the context of the e-commerce mass customization, many of these same

mechanisms of interaction are used today, particularly standardized forms or choiceboards (Slywotzky, 2000) popularized by Dell's on-line configurator.

Customer involvement is not something new, nor a by-product of the internet age. In today's market, there is a seemingly unquenchable desire to involve more customers at lower levels in the product development process. This practice seems to be driven by little more than the realization that it can be done or that the competition is doing it, without any understanding of what, if anything, should be done. There is a need to recognize and understand a broader view of customer involvement.

Research to date on customer involvement in the product development context has failed to answer, or even ask, the following fundamental questions. What are the antecedents to customer involvement? What are the implications of customer involvement for our products? Are there factors which will moderate or mediate the impact of customer involvement? What motivates a customer to become involved? In what activities should the customer be involved? What benefits do manufacturers receive from customer involvement? Should every customers be involve, or only customers that possess particular skills or knowledge? To better understand customer involvement, and to facilitate future research to answer these questions and others, a conceptual framework of customer involvement in new product development is proposed based on the literature review that follows.

Customer Involvement Conceptual Framework

The framework, shown in Figure 1, consists of five complex constructs: customer involvement, market orientation, customer relationship, NPD success, and product impact

on the customer. Within this framework, market orientation and customer relationships are both antecedents to customer involvement in NPD. Customer involvement then contributes to NPD success, as measured by product advantage. However, the contribution of customer involvement is moderated by the impact that the product has on the customer. Finally, there is a direct effect of marketing orientation on NPD success. Each of these constructs and their interrelationship will in turn be discussed.

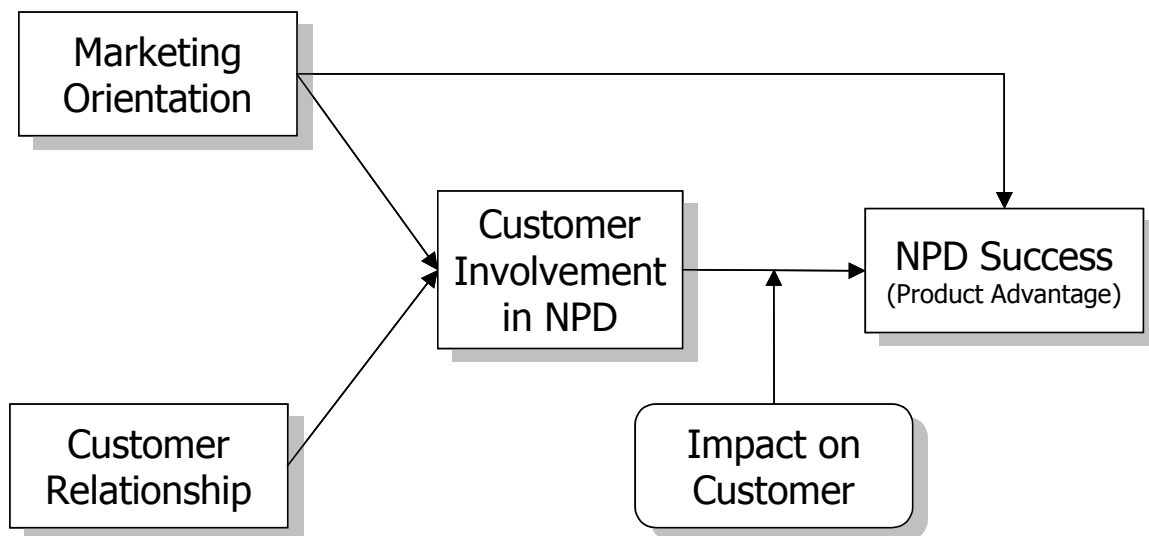


Figure 1: Conceptual Framework for customer involvement in NPD

Customer Involvement

Customer involvement in NPD covers a very broad range of activities by both the customer and the manufacturer. The least intimate form of involvement consists of the customers providing unsolicited feedback or suggestions to the manufacturer. At its most complex, the customer takes on an active role, contributing intellectually, financially, or physically to the product development.

By examining interdepartmental involvement in NPD, there is clear evidence of various types of involvement between departments rather than a homogeneous protocol. Table 1, illuminates the difference between interdepartmental interaction and collaboration in a product development context. This study (Kahn, 1996) found that the more complex form of involvement, collaboration, had a significant positive impact on product development performance, while interaction alone had a negative, though not statistically significant ($\alpha=0.1$), impact on product development performance. By extrapolation, it seems reasonable to predict that when customers are included in the product development process, similar variation in customer involvement would vary in effectiveness.

Table 1: Interdepartmental Relationships: Interaction Vs. Collaboration, Source Kahn (1996)

	Interaction	Collaboration
Relationships	Transactions	Continuous
Structure	Formal	Informal
Dependency	Independent	Interdependent
Environment	Competitive	Cooperative
Mechanisms	Communication	Shared vision, collective goals
Metric	Cost per transaction	Opportunity gain

Within the product development context, Customer involvement is defined as: *the interaction and/or collaboration between channel members (including customers and users) and company personnel during the course of product development to actualize a commercial product.* To begin to understand and research the role of the customer in NPD, a common typology classifying different types of customer involvement and illustrating how customer involvement may vary must be established.

Classifying Customer Involvement

NPD and technology commercialization have long be characterized by the two dimensions of technology development and market development (Leonard-Barton, Wilson, & Doyle, 1993; Moriarty & Kosnik, 1989). The technology dimension captures the concrete aspects of inventing capabilities within general economic constraints. The market dimension captures and refines those constraints within a business context. From a development perspective, application requirements are a subset of market requirements which when implemented, transforms the invented capabilities into a bundle of attributes (features, function, benefits, and uses) (Crawford, 1997, p.486) desired by a particular market segment (Moore, 1991, p. 73-89).

To clarify, in every development there is some degree of technology development and some degree application development. Technology development is the invention of capabilities. Application development is the process of defining requirements, refining technology, and packaging technology in a form suitable for use in a particular context (Clark & Wheelwright, 1993). Therefore, in every NPD or technology commercialization, there are two key sets of objectives for the degree of technology development desired and the degree of application development needed (Jolly, 1997).

Combining these two objectives presents a two dimensional grid that suggests four possible cells of technology commercialization. It is proposed that each of these cells typifies a unique form of customer involvement.

Figure 2 shows the proposed matrix, which serves as a typology of customer involvement in business-to-business NPD originally proposed by Kahn and Pinegar (1999). As shown, the vertical axis of the matrix portrays the technology development objective, with one pole indicating no objective of technology development and the opposite pole indicating technology development as the primary objective. The horizontal axis represents the objective of application of technology, where one pole indicates no application development interest and the other pole indicates a primary application development objective. In each of the four matrix regions are four types of customer involvement labeled, *Coaching*, *Partnering*, *Advising*, and *Reporting*. Each of these types of customer involvement are discussed.

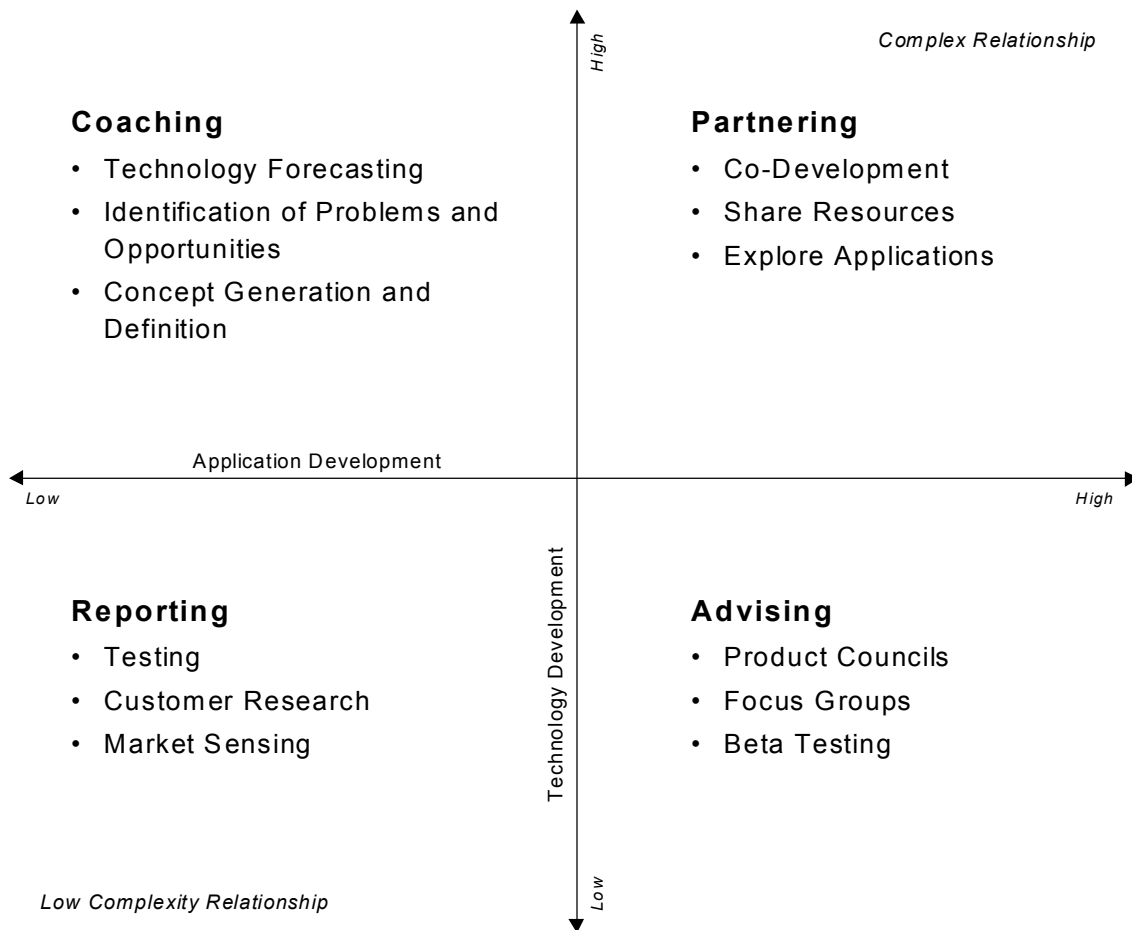


Figure 2: Classifying Customer Involvement

Coaching

Coaching takes place when there is a minimal focus on application (use of the technology) and a high concentrated focus on developing/solidifying a particular technology. In *coaching*, the technology originator/OEM work to develop a promising new emerging technology that represents a discontinuous innovation (Moore, 1991). The OEM’s purpose in involving the customer is to search for unfulfilled needs that the respective technology might satisfy. By involving the customer early in the development process, an undifferentiated form of the technology would be shown to the customer for

their opinion of potential applications. Characteristic of *coaching* is the ideation of technology options to fuse emerging technology concepts with potential demand opportunities (Myers & Marquis, 1969).

The success of a *coaching* relationship depends greatly on the ability to select a coach that has a unique mix of skills, knowledge and vision required for the particular situation and objective. Key experts, opinion leaders and technology enthusiasts would represent the caliber of coaches required. *Coaching* is most effective when it takes place in the OEM's laboratory or during customer visits. Customer involvement in the laboratory could consist of hands-on "play" followed by critical assessment, while customer visits would be oriented toward presentations and discussions of market trends, technology roadmaps, foreseen technology gaps, etc. In the latter forum, a more thorough understanding of the environment heightens the possibility of an innovative solution and encourages development team integration (McQuarrie, 1993).

OEMs seek out *coaching* relationships early in the development process in an attempt to identify and clarify problems and the needs of potential customers. To facilitate this, the OEM must create a learning environment where there can be a free exchange of ideas and customers are comfortable sharing their technology forecasts. Many times customers are motivated to participate in this type of relationship because of curiosity or a past affiliation with specific individuals, or the OEM in general. However, for the relationship to move beyond a superficial conversation, the customer must recognize a potential application of the technology for their business. Other challenges associated with *coaching* concern both parties' loss of privacy since any meaningful dialog will include details of strategic intent and planned activities. With the introduction

of additional voices in the planning process, the OEM also runs the risk of “scope creep.”

The distinction of *coaching* is that it represents a limited relationship because customers are not intimately involved with the company. Customer/users in the role of *coaching* only provide comments and input into what a new technology can or should be; there is no further relationship sought. For example, experts and key customers may be brought in to help conceptualize a radically new technology or to assist in forming a list of possible avenues for leapfrogging current technologies. Table 2, summarizes the above description of the *coaching* type of customer involvement.

Table 2: A Characterization of the Proposed Four Types of Customer Involvement in Business-to-Business Technology Commercialization

	Coaching	Partnering	Advising	Reporting
<i>Type of Innovation</i>	<i>Discontinuous Innovation</i>		<i>Incremental Innovation</i>	
<i>OEM Commercialization Focus</i>	<ul style="list-style-type: none"> Conceive Plan 	<ul style="list-style-type: none"> Development Prototyping Launch 	<ul style="list-style-type: none"> Market Acceptance Market growth 	<ul style="list-style-type: none"> Maintenance Market Expansion
<i>OEM Offering to the Customer</i>	<ul style="list-style-type: none"> Learning Forum 	<ul style="list-style-type: none"> Technology Form Expertise 	<ul style="list-style-type: none"> Key Access to OEM 	<ul style="list-style-type: none"> Responsiveness to Customer Feedback
<i>OEM's Motivation to Involve Customers</i>	<ul style="list-style-type: none"> Opportunity Identification Idea Generation Clarity of Problem Definition 	<ul style="list-style-type: none"> Product Integrity Technology Application Fusion Establish a Beachhead 	<ul style="list-style-type: none"> Complete Product Platform Market Expansion Strengthen Channel Presence 	<ul style="list-style-type: none"> Market Sensing Product Fine Tuning
<i>Customer Participants</i>	<ul style="list-style-type: none"> Key Experts Opinion Leaders Technology Enthusiasts 	<ul style="list-style-type: none"> Lead Users Visionaries 	<ul style="list-style-type: none"> Early Majority Customers Channel Partners 	<ul style="list-style-type: none"> Customers Non-customers
<i>Customer Offering to the OEM</i>	<ul style="list-style-type: none"> Technology Forecasting, Seeding of Ideas 	<ul style="list-style-type: none"> Technology Application Expertise 	<ul style="list-style-type: none"> Direction 	<ul style="list-style-type: none"> Feedback
<i>Customer's Motivation to Work with OEM</i>	<ul style="list-style-type: none"> Learning Opportunity Affiliation with OEM Curiosity 	<ul style="list-style-type: none"> Competitive Advantage Dramatic Performance Increase Technology Application Exclusivity 	<ul style="list-style-type: none"> Influence Direction of OEM Increase Customer Value Augment/Complete Solution Expand Solution Opportunities 	<ul style="list-style-type: none"> Ability to Voice Opinion Product Enhancements
<i>Collective Activities Between OEM and Customer</i>	<ul style="list-style-type: none"> Technology Forecasting Identification of Problems and Opportunities Concept Generation and Definition 	<ul style="list-style-type: none"> Evaluate Implementation Choices Explore Possible Applications Co-Development Joint Problem Solving Shared resources Prototype Testing 	<ul style="list-style-type: none"> Product Councils Problem/Opportunity Identification Beta Testing 	<ul style="list-style-type: none"> Market Testing Customer Research
<i>Challenges Facing the OEM-Customer Relationship</i>	<ul style="list-style-type: none"> Scope Creep Privacy 	<ul style="list-style-type: none"> Complexity of Relationship Relationship Commitments Intellectual Property Rights "Not Invented Here" Attitude Finding the Right Partner 	<ul style="list-style-type: none"> Multiple Firm Dynamics Group Think Impact vs. Value 	<ul style="list-style-type: none"> Overconfidence Apathy Biased Opinions

Partnering

When the OEM's objectives are to develop the applications and technology simultaneously, the greatest level of customer involvement is needed. Here the customer serves in a *partnering* role with the OEM, engaging in the co-development of the technology and its specific applications. In this vein, customers become intimately and actively involved with the OEM from the very start of the project and have a shared stake in ensuring the successful commercialization of the technology. This collaboration with customers in a process of mutual and interactive learning about the applications for a new technology is at the very heart of co-development (Sinkula, 1994).

The typical customer contribution is their sophisticated knowledge and understanding of a target application and market. The technology originator/OEM provides a similar depth of understanding and knowledge of comprehension of the core technology. Intimate consumption or use of the technology may also change the customer's expectations and application of the product (Baker, 1976) as customer/users receive a more heightened exposure to the technology. Thus, customer involvement in co-development may alter the customer's expectations of the product and therefore lead to the development of a product that more closely matches the true needs and wants of the customer/user.

In the *coaching* situation, OEMs rarely have only one coach. However, the nature of *partnering* almost always mandates a monogamous relationship. Consequently, selecting the right partner is critical to the success of a *partnering* relationship and the commercialization effort. Von Hippel (1988) contends that the ideal partner should be a lead user. According to von Hippel, lead users are customers that (1) experience needs

months or years before the majority of marketplace encounter them and (2) stand to benefit substantially from the innovations (von Hippel, 1988). Both of these criteria are crucial to the success of the partnership because without the substantial benefit from success, the customer will not engage in the hard work of innovation. Typically, this benefit must be in the form of a fundamental and essential increase in performance over the current state-of-the-art, achieved through discontinuous innovation. A cost reduction, even if substantial, is seldom an adequate motivation to encourage customer/users to partner because there are usually other alternatives that are less risky and uncertain. Another motivation is, having identified the need months or years ahead of their competition, the customer will have a head start searching for a solution. From the OEM's perspective, involving lead users still affords the OEM time to develop the technology, evaluate prototypes, and have a first generation product available by the time the majority of the market begins to realize the need and to seek a solution.

Lead users have some additional characteristics that make them complementary partners. Lead users can frequently articulate the emerging need. They may have already worked on a solution and at the very least have identified implementations that do not work. And, they have an application that can be used to prove and demonstrate the benefits of the new technology (von Hippel, 1988).

Interestingly, a *partnering* relationship may be the result of either technology-push or technology-pull market forces. A technology-push scenario might involve an OEM interested in expanding into an unfamiliar market with an emerging technology. During the co-development process, the OEM would gain application and market knowledge from their customer partner, while the customer would gain from the OEM

early access to a revolutionary new technology and have the opportunity to optimize that technology for use in their products and processes. A technology-pull scenario might exist if a large customer provides technical expertise and capital to ensure the successful application of a new technology, which is then used to establish their competitive advantage. In this scenario, the OEM may offer the customer exclusive rights to the technology in their industry, as well as provide the technical expertise to make the technology feasible.

A partnering relationship represents the deepest and most complex relationship between the OEM and customer. In order to succeed, the rewards must be commensurate with the effort for both parties. For the OEM, the motivation is the fusion of technology capabilities and an application to form a product that is technologically consistent and performs to customer expectations (Clark & Fujimoto, 1990). To achieve this goal the OEM and customer must combine their respective technology expertise. The OEM contributes technology form expertise, while the customer contributes application expertise. For the customer, the motivation is typically nothing short of competitive advantage. That is, the technology must offer the customer the potential for an immediate and dramatic performance increase, and the opportunity for permanent or temporary application exclusivity. Overall, if the partnership is successful, the OEM will have established a beachhead in this market (Moore, 1991), and the customer will have established a formidable competitive advantage.

Implicitly, *partnering* is associated with technologies that produce substantial benefit for customer/users. Moreover, such technologies are characteristically high impact (discontinuous innovations), adding significant value to the customer's product

offerings. Decisions concerning the technology may therefore become meticulous to ensure proper treatment of issues. This leads to a variety of challenges with the *partnering* effort. First, decisions during the partnering process may be slowed down by the extra scrutiny. Second, there is a greater tendency to develop the solution internally and reject ideas that are “not invented here.” Third, intellectual property rights to the solution may have a profound impact on the competitive position and potential market valuation of the company, thus legal wrangling can abound. All these factors tend to increase the complexity of the *partnering* relationship. In fact, partnering is characterized as the most complex level of customer involvement. See Table 2 for a summary of the above discussion concerning the *partnering* type of customer involvement.

Advising

In the situation where application/use is the major objective, the customer serves in an *advising* role on a customer council or an advisory board. The customer is not exclusively tied to the new technology, but participates to ensure that the technology will be able to serve their needs. This may require the technology to be provided in a variety of additional forms in the future.

In the situation of *advising*, the OEM is not exclusively aligned with a single customer, but rather is looking for broader application and industry knowledge than what a single customer can provide. Furthermore, the OEM is searching for advice that may affect the development of incremental innovations such as line extensions and new applications as the OEM seeks to gain a greater understanding of the market while watching for disruptive technologies. In addition to targeting early majority customers, the OEM may broaden their definition of a customer to include channel members for

purposes of identifying channel idiosyncrasies. Thus, a more complete product technology offering becomes the focus, and not necessarily the proving of technology. The *advising* type of customer involvement is most appropriate when the OEM has a substantial understanding of where their technology can be applied. Application is the focal point for customer communication because the intent is to incrementally expand the market for the respective technology.

In an *advising* relationship, the OEM provides customers and channel partners selective access to OEM decision makers in exchange for guidance and direction in their commercialization efforts. The OEM is working to complete the product platform with the expectations of strengthening their present channel position and possibly expanding their market. Customers engage in an *advising* relationship because they believe that their advice will be accepted by the OEM and lead to a more complete technology solution with broader application and higher value.

The major challenge of involving customers in an *advising* role is managing the multi-firm dynamics to ensure a positive benefit. Product councils are often composed of competitors who may be unwilling to discuss issues or the council will have difficulty-reaching consensus on an issue. There also is the likelihood that councils will have groupthink. Hence, the OEM may receive a biased, and possibly incorrect, opinion for future technology applications. Refer to Table 2, which summarizes the above discussion on the *advising* type of customer involvement.

Reporting

There are situations where a technology becomes a mainstay in the marketplace and applications are well established. Here OEMs review with customers traditional

market research such as surveys and focus groups. The customer's role corresponds to one of reporting because the customer reports on what they want to see improved. No dramatic technology or application developments are planned, but rather, incremental improvements are the foci. This type of situation would occur when both the OEM and customer users have a similar understanding of how the technology may be applied. Such common intimate knowledge enables the OEM to query the customer/user on how to improve the existing technology incrementally for the purpose of securing and/or sustaining market position.

The proposition that forms the foundation of the *reporting* relationship is that the customer will provide feedback when queried, and in return, the OEM will respond. Thus, the customer is motivated to participate by their desire for product enhancements from the OEM. The ability to get market intelligence through market sensing and, in turn, fine-tuning the technology, motivates the OEM.

The challenges to an effective *reporting* relationship are OEM overconfidence, apathy, and non-response bias. One of the greater challenges is OEM overconfidence with their technology. That is, the OEM may assume that it fully understands the customer and the application needs, leading the OEM to disregard customer feedback. A second challenge is apathy caused by the time lag between product updates and customer reporting. Third, the OEM may overreact to select customer responses and spend unnecessary resources on a problem or feature that adds little value. Table 2 summarizes the above description of the *reporting* type of customer involvement.

Customer Involvement within the Framework

While customer involvement is classified as *coaching, partnering, advising* or *reporting*, it is important to first understand the general context and framework for customer involvement. After a general framework is established, it will serve as foundation for future research developing a model and searching for differences between the four types of customer involvement. Therefore, the proposed framework of customer involvement in NPD will does distinguish *coaching, partnering, advising* or *reporting*. The antecedents and consequences are considered to apply generally, though not necessarily equally, to each of the four type of customer involvement.

If customer involvement contributes to new product development success as proposed, it is important to understand the antecedents to customer involvement. In the proposed framework, these antecedents are market orientation and a relationship with the customer. Each will be discussed in turn.

Market Orientation

In support of the customer involvement framework, a comprehensive review of market orientation literature has been conducted. The debate as to whether market orientation should be viewed as a culture or a set of activities and behaviors will be discussed. Significant moderator and control variables, which need to be considered in a future empirical evaluation of a customer involvement model will be discriminated. Finally, a case will be made for the role of market orientation as an antecedent to customer involvement and for the direct effect of market orientation on NPD success.

Market Orientation before 1990

The term market-oriented, market-driven, and customer-focused are synonymous with proactive business strategies worldwide that places the customer at the center of the business planning process (Deshpande, 1999). While this may seem to be a very contemporary idea, in fact, the idea of focusing on the customer is not new at all. Peter Drucker is often cited by management theorist for his early advocacy of the idea that it is the customer that determines what the business is and therefore the customer must be at the center of business planning.

“There is only one valid definition of business purpose: to create a customer ... It is the customer who determines what the business is ... because it is its purpose to create a customer, any business enterprise has two - and only two - basic functions: marketing and innovation.” (Drucker, 1954, p. 37)

This idea, that the customer is at the center, is captured in the marketing concept. Through its history, the marketing concept has been described by authors as:

“A corporate state of mind that insists on the integrations and coordination of all the marketing functions which, in turn, are melded with other corporate functions, for the basic objective of producing maximum long-range corporation profits” (Felton, 1959, p. 55).

“The external consumer orientation ... as contrasted to internal preoccupation and orientation around the production function; profit goals as an alternative to sales volume goals; and ... complete integration of organizational and operational effort ...” (Kanopa & Calabro, 1971, p. 9)

“The marketing concept means that an organization aims all its efforts at satisfying its customers—at a profit” (McCarthy & Perreault, 1984, p. 35)

“The marketing concept holds that achieving organizational goals depends on determining the needs and wants of target markets and delivering ...” (Kotler & Armstrong, 1997, p. 19)

“The marketing concept ... calls for most of the effort to be spent on discovering the wants of a target audience and then creating the goods and services to satisfy them” (Kotler & Zaltman, 1971, p. 5)

“... The marketing concept states that an entity achieves its own exchange goals most efficiently through a thorough understanding of potential exchange partners and their needs and wants, through a thorough understanding of the cost associated with satisfying those needs and wants, and then designing, producing, and offering products in light of this understanding.” (Houston, 1986, p. 85)

It is important to note that the marketing concept is essentially a business philosophy or policy statement defining in what manner business is to be conducted (Barksdale & Darden, 1971; McNamara, 1972). The marketing concept revolves around two fundamental principles:

1. identifying the needs and wants of potential target customers
2. then, producing products or services that satisfy those need and wants.

It should also be noted that the marketing concept is not the only viable business philosophy. For example, two other business philosophies are the production concept and sales concept. For contrast, with a sales concept, a company seeks to find customers for products it has already designed and produced (Houston, 1986). Two principles of the sales concept, which are nearly the reverse of the marketing concept, are

1. produce products that perform a function
2. then, identify customers that need or want that function performed.

If the marketing concept is a business philosophy, then what is meant by market orientation? By tradition McGrath (1995), Deshpande and Farley (1999; 1989), Kohli and Jaworski (1990), and Narver and Slater (1990), use the term *market orientation* to mean the implementation of the marketing concept; thus contrasting the business philosophy from its implementation.

Market Orientation, Culture or Activities and Behaviors?

Originally, market orientation was defined in terms of an organizational culture (Deshpande & Webster, 1989; Shapiro, 1988), where Deshpande defined organizational culture as *the pattern of shared values and beliefs that help individuals understand organizational functioning and thus provide them norms for behavior in the organization.*

In this context, the marketing concept was viewed as a distinct organizational culture, a fundamental shared set of beliefs and values that put the customer in the center of the firm's thinking about strategy and operations (Deshpande & Webster, 1989, p. 3).

Deshpande goes on to articulate five organizational culture paradigms: (1) comparative marketing management, (2) contingency marketing management, (3) marketing symbolism, (4) structural / psychodynamic perspective in marketing, and (5) marketing cognition. In the marketing cognition paradigm, culture is seen as a metaphor for organizational knowledge systems with shared cognition. As such, the marketing cognition paradigm focuses on the diffusion of marketing knowledge and the marketing concept into the various layers of the company. This marketing cognition paradigm is further developed by Kohli and Jaworski (1990) and forms the foundation for the three-component view of market orientation (generation of, dissemination of, and responsiveness to market intelligence.)

This work by Kohli and Jaworski marks a transition point in the literature on market orientation. From Drucker's initial articulation up until this point, market-orientation has been viewed primarily as a cultural phenomenon. However, Kohli and Jaworski (1990) operationalized and defined market-orientation as a collection of behaviors and activities relating to market intelligence generation, market intelligence dissemination within the firm, and action-oriented responsiveness to the customer. Going forward from 1990, there is an increasing focus on market orientation as a collection of behaviors and activities (Deshpande, 1999; Gatignon & Xuereb, 1997; Jaworski & Kohli, 1993; Kohli & Jaworski, 1990; Narver & Slater, 1990; Slater & Narver, 1994a, 1995) and a corresponding decrease in attention given to the firm cultural view. Continuing, a disproportionate amount of time will be focus on the behaviors and activities of a market orientation rather than the culture because this is both easier to operationalize than culture and more reliable. It is more reliable, because it asks respondents to report what they

actually do rather than their beliefs and values. The difficulty of measuring culture stems from the fact that it is easy for respondents to report what they aspire to, rather than what they have accomplished. To illustrate, here are two typical items from the market orientation scales developed by Deshpande, Farley, and Webster (culture) and Kohli, Jaworski, and Kumar (behaviors and activities).

- We have a good sense of how our customers value our products and services (Deshpande et al., 1993).
- In this business unit, we meet with customers at least once a year to find out what products and services they will need in the future (Kohli, Jaworski, & Kumar, 1993).

In the first case, the respondent is asked to speculate about their customer's views. In the second case, the respondent is asked if *they* engaged in a *specific activity* within a *specific period of time*. The second item clearly illustrates that the Kohli et al. operationalization makes it easier for the respondent to answer accurately and reliably; therefore, the Kohli et al. scale will be adopted.

Market Orientation 1990 - 2000

During the past decade much of the literature on market orientation has focused on five themes: (1) measurement of a firm's level of market orientation, (2) understanding the relationship between the strategic context of a firm and their optimal level of market orientation, (3) the relationship between market orientation and innovation, (4) understanding the causes and impact of a high market orientation, and (5) the

relationship of market orientation to corporate culture and strategic orientation (Deshpande, 1999).

Discussed in more detail on page 52, item 1, the measurement of market orientation has been well developed starting with three scales (Deshpande et al., 1993; Jaworski & Kohli, 1993; Narver & Slater, 1990). These original three scales have undergone further investigation and refinement in order to provide a parsimonious measure of this important construct (Deshpande & Farley, 1998; Kohli et al., 1993).

Items 2, 3 and 5 from the list above still need work, (Deshpande, 1999). For example, the author is unaware of any studies that investigate optimal levels of market orientation for business performance. However, most studies assume the relationship is linear, but perhaps the relationship between market orientation and business performance is not linear but an inverted U-shape. With respect to item 3 above, there have been some studies that examine the relationship between market orientation and innovation, (Atuahene-Gima, 1995; Li & Calantone, 1998; Ottum & Moore, 1997). These studies will be discussed in greater detail starting on page 41.

Finally, item 4 above, understanding the causes and impact of high market orientation, has a substantial start (Jaworski & Kohli, 1993; Kohli & Jaworski, 1990; Narver & Slater, 1990; Slater & Narver, 1994a). We will continue with a review of the market orientation construct with in the customer involvement context next, followed by market orientation antecedents on page 38, consequences on page 40, and moderator of market orientation on page 41.

The Market Orientation Construct

Market orientation has been defined and operationalized as a set of activities or behaviors relating to the market intelligence generation, market intelligence dissemination, and responsiveness to the customer based on this market intelligence. The seminal work in this area was done by Kohli and Jaworski (1990) and based on 62 field interview in four US cities, leading them to propose a conceptual framework (Figure 3) that includes antecedent, consequences and moderators, and offering the following definition.

“Market orientation is the organization wide generation of marketing intelligence pertaining to current and future customers needs, dissemination of the intelligence across departments, and organization wide responsiveness to it.”

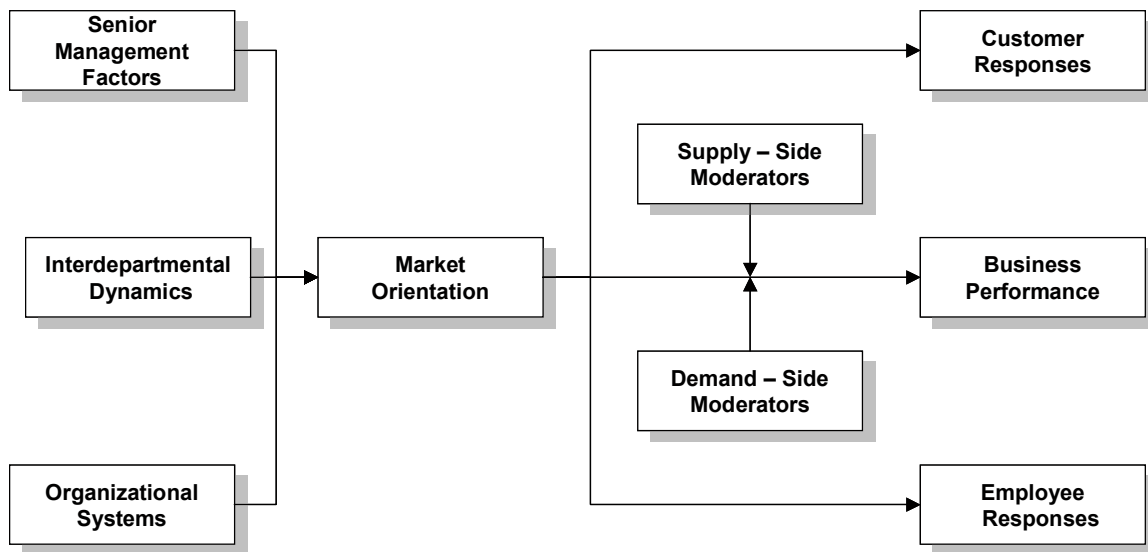


Figure 3: Antecedents and Consequences of Market Orientation. Source: (Kohli & Jaworski, 1990)

Market Intelligence Generation

The starting point of market orientation is market intelligence generation, and understanding the needs of the customer is the starting point of market intelligence generation. Market intelligence generation, however, goes far beyond gathering data concerning the needs of your current customers where both anecdotal evidence and research suggest most organizations stop (Banting, 1978; Cooper, 1998; Jolly, 1997; Leonard-Barton et al., 1993; Ottum & Moore, 1997; 1974). At a minimum, market intelligence should cover the following items (Porter, 1980, 1985):

- current customers needs a wants
- who are the potential customers and what are their needs and wants
- who are the current and potential competitors and what are there strengths and weakness
- what are the relative price and performance of substitute products
- what are the switching costs associated with changing to a competitor's or a substitute product
- what is the price sensitivity of this product in the market and at key customers
- what is the industry growth rate
- what is the current capacity of the industry and what are the costs of adding or eliminating capacity as well as the entry and exist barriers
- what is the regulatory environment like today and what is it likely to be like in the future

Although assessment of the customer and their industry is the cornerstone of market orientation and product development (Cooper, 1998; Deshpande, 1999), defining customers is not a simple task. In most cases, businesses have customers (end-users of products and services) as well as channel partners and intermediaries) that may dictate or influence the choice of the end-users. For example, packaged goods suppliers indicate that it is critical to understand the needs and wants of both the end-users and the retailer through whom their products are sold. In industrial environments, the list of parties is further extended to include buying-centers in addition to the end-user and the channel partners. A buying center may include the initiator, decider, influencers, purchaser, gatekeeper and the end-users (Rangan, Shapiro, & Moriarty, 1995, p. 50). Still further complicating the situation, neither the relationships nor their relative importance is constant. An illustrative example, though not an industrial example, is the health care industry. In the past, suppliers to this market saw the patient as the customer, whereas today, the customer is increasingly viewed as those paying for the patients' care, in most cases, the managed care providers.

Gathering market intelligence is not performed exclusively by the marketing function, nor can it be. The entire organization should be involved in this process. In studying the subject of customer visits, McQuarrie (1992) demonstrates that every customer contact is an opportunity to generate marketing intelligence, whether that contact is a traditional sales call, service call or inquiry concerning delivery.

Market intelligence generation goes beyond the relatively simple task of gathering the data described above. This data must be transformed into information, eliminating

redundancies connecting related items and interpreting the data. Only after the data is converted to information or intelligence should it be disseminated.

Market Intelligence Dissemination

Marketing intelligence dissemination is the process of by which the information generated is distributed and is made to permeate the entire organization. The observations of Kohli and Jaworski (1990) are also supported by many others (Kotler & Armstrong, 1997; Rangan et al., 1995) that a primary function of the marketing managers is to educate other managers and the people in other functional areas. The role of selling the organization may be a marketer's most important but not its only role (Anderson, 1982). As market intelligence generation is not the sole providence of the marketing manager, responsibility for market intelligence dissemination must also rest collectively on those that possess market intelligence.

Effective communication of market intelligence is important because it provides a shared marketing intelligence infrastructure for the creation of strategic plans and becomes the foundation for shared norms. While the dissemination process certainly includes formal mechanisms, equally important are the informal dissemination processes, including everything from coffee breaks to bowling leagues (Shapiro, 1988).

Responsiveness

Responsiveness to marketing intelligence is the third pillar of a market orientation. All the market intelligence generation and dissemination will be wasted if this information is not turned into action. One could even argue that if there is no response to the market information, the generation and dissemination process is actually a

burden to the organization in terms of wasted resources and disenfranchised stakeholders. Empirical findings by Kohli and Jaworski (1990) indicate that responsiveness can take the form of:

- selecting target markets,
- designing and offering products that cater to their current and anticipated needs and,
- producing, distributing, and promoting the products in a way that elicits favorable end-customer responses.

Antecedents to Market Orientation

Based on a review of the literature, Kohli and Jaworski (1990) first proposed three sets of antecedents to a market orientation, (1) senior management factors, (2) interdepartmental dynamics and (3) organizational systems. In a subsequent study, Jaworski and Kohli (1993) refined a subset of these propositions into a set of hypothesis for testing. In addition, their conceptual framework was further refined (Figure 4).

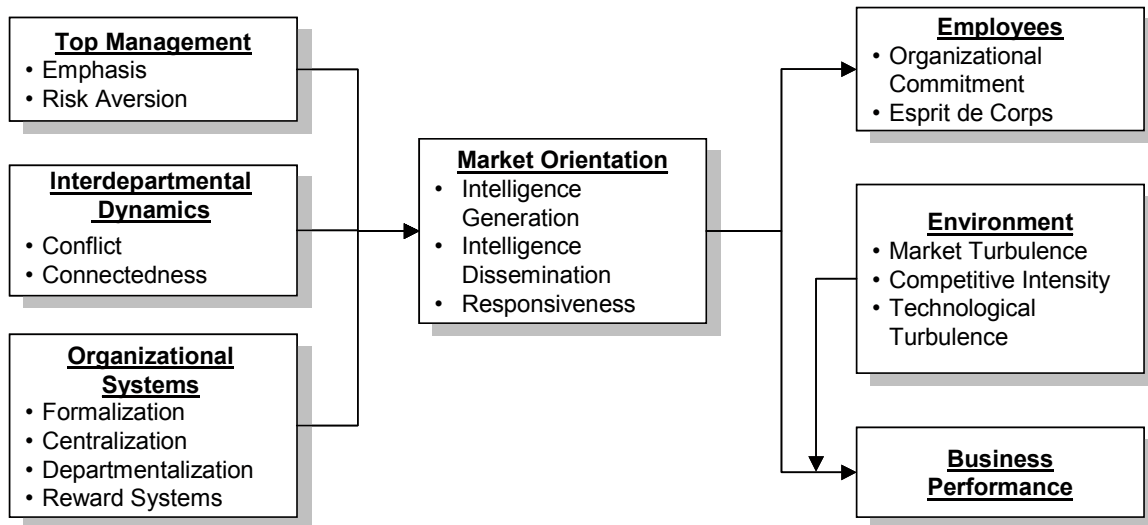


Figure 4: Antecedents and Consequences of a Market Orientation. Source: (Jaworski & Kohli, 1993)

Top Management

Jaworski and Kohli (1993) hypothesized that the greater top management emphasis on a market orientation, the greater the market intelligence generation, dissemination, and responsiveness. They also hypothesized that the greater top management's risk aversion, the lower their market orientation. While top management emphasis was supported, there was support for the risk aversion hypothesis only in relation to responsiveness.

Interdepartmental Dynamics

Jaworski and Kohli (1993) hypothesized that greater interdepartmental connectedness and lower interdepartmental conflict would lead to greater intelligence dissemination and responsiveness. Both hypotheses found support in this study.

Organizational Systems

Jaworski and Kohli (1993) hypothesized that greater formalization, centralization (lack of delegation of authority) and departmentalization (number of department) would lead to lower market intelligence generation but greater responsiveness. The study found no support for the formalization or the departmentalization hypothesis. However, there was support for the centralization hypothesis. These results precipitated speculation that the content of rules should be more important than the presence of rules (formalization was operationalized as the presence of rules) and that how departments work together (interdepartmental dynamics) should be more important than the number of departments.

Consequences of a Market Orientation

Kohli and Jaworski (1990) first proposed three sets of consequences to a market orientation: customer responses, business performance, and employee responses. In their subsequent study, Jaworski and Kohli (1993) modified their conceptual framework leaving only business performance and employees as consequences of a market orientation.

Business Performance

The relationship between market orientation and business performance is perhaps the most studied relationship involving market orientation (Appiah-Adu & Ranchhod, 1998; Balakrishnan, 1996; Becherer & Maurer, 1997; Han, Kim, & Srivastava, 1998; Jaworski & Kohli, 1993; Kahn, 1998; Kumar, Subramanian, & Yauger, 1998; Narver & Slater, 1990; Pelham, 1997, 1999; Pelham & Wilson, 1996; Ruekert, 1992; Slater & Narver, 1994a, 1994b, 1995). This relationship has been studied cross-sectionally,

longitudinally, in narrow industry segments and across market segments, and the results are the same—the greater the market orientation, the better the business performed. No published studies on the relationship between a market orientation and business performance were found that failed to find a positive and statistically significant relationship.

Employee Responses

While not well grounded in the literature, during interviews (Kohli & Jaworski, 1990) managers reported several employee responses to a firm's market orientation. Based on this, Kohli and Jaworski (1990) proposed, “the greater the market orientation, the greater the (1) esprit de corps, (2) job satisfaction, and (3) organizational commitment of employees.” During this empirical study, only the esprit de corps and organizational commitment were tested. Both were supported by the findings.

Customer Responses

While not tested in any empirical studies at the time, Kohli and Jaworski (1990) discovered during interviews, that managers observed that some customers indicated a higher level of satisfaction and indicated that they intended to keep coming back. This led to the proposition that the greater the market orientation, the greater the customer satisfaction and repeat business from the customer. This proposition is consistent with the assertion of Kotler (1997).

Market Orientation and Customer Involvement

As operationalized by Kohli, Jaworski, and Kumar (Kohli et al., 1993) market orientation includes market intelligence generation, market intelligence dissemination,

and responsiveness. In the context of new product development, firms with a market orientation should involve their customers in the activities of market intelligence generation, market intelligence dissemination and responsiveness as they relate to new product development. An examination of this relationship, structured around the various types of involvement, which are identified as *coaching*, *partnering*, *advising* and *reporting*, will explore the effect of customer involvement to the three dimensions of market orientation: market intelligence generation, market intelligence dissemination and responsiveness.

Coaching is appropriate during the early, fluid stages of development when the technology, rather than the application of technology, is under extensive development. This type of involvement is motivated by the OEM's desire to involve the customer in a search for opportunities, idea generation and to clarify customer needs and problems. These motivations are the result of the OEM's desire to generate market intelligence.

As stated previously, *coaching* is most effective when key experts, opinion leaders and technology enthusiasts converge on the firm's laboratories. Customer involvement in the laboratory consists of hands-on "play" with the technical experts, followed by critical assessment. These direct exchanges at various levels within the organization increase the rate and the depth of market intelligence dissemination.

Perhaps the weakest connection between market orientation and *coaching* customer involvement is in the area of responsiveness. At this stage of development, the OEM is formulating possibilities, probing and learning (Lynn, Morone, & Paulson, 1996). Most of the energy has been focused on gaining understanding, not on producing a finished product in response to the customer. However, since responsiveness is action

taken in response to intelligence that generated and disseminated (Kohli et al., 1993) perhaps customer involvement during *coaching* facilitates responsiveness at a later stage.

Partnering is appropriate when the firm is attempting to apply a new technology to satisfy a new need or solve a new problem while simultaneously developing the technology. Typically, this means that the firm should be applying their technology in a new application setting, typical a technology push setting. In this setting, the OEM will be looking for application expertise to ensure product integrity (Clark & Fujimoto, 1990) during the technology-application fusion (Kodama, 1995). As a result, the successful firm should establish a beachhead (Moore, 1991) from which to expand and diffuse their technology.

Partnering by its very nature flows from a market orientation. The act of involving a customer in order to gain application knowledge is market intelligence generation. Partners also serve as integrating agents (United States, 1994), as a number of representatives from the partnering firm are forced to work across organizational and physical boundaries, facilitating interaction, collaboration and market intelligence dissemination. The cross firm activities of co-development, joint problem solving, prototype testing and evaluation of implementation choices, all increase market learning throughout the organization (Hurley & Hult, 1998; Slater & Narver, 1995).

A primary outcome of any successful *partnership* is a product designed to satisfy the needs of the partners and satisfying the customer is a principle of responsiveness. It is clear that market oriented companies would view *partnering* as an opportunity to generate market intelligence, create an environment to enhance dissemination of market

knowledge, and establish a firm relationship with a customer by responding to their needs and developing a product that uniquely satisfies those needs.

Advising takes place when the firm is attempting to apply a technology that is reasonably well established to new application area for the firm. For example, if the manufacturer of controls for packaging machinery wanted to penetrate the printing industry, they might consider seeking advise from potential customers in that market, searching for unsatisfied articulated needs and latent need. Another valuable source of information may come from channel partners. Whether from a channel partner or potential customer, the objective of the *advising* form of involvement is to gather market information from participants of the market. Furthermore, Maltz and Kohli (1996) found that information gathered directly from customers was more effectively disseminated, perceived as higher quality, and therefore more likely to be used (responsiveness).

Reporting is the most distant or arms length form of customer involvement. A reporting form of involvement is employed when both the technology and the applications are well established. Therefore, the range of opportunities for responsiveness is narrower in scope, with the breadth of information to be gathered, less significant, while the content is more detailed. As a result, the need for rapid dissemination is greatly reduced. However, direct reporting from the customers remains one of the most effective ways of gathering market intelligence, to foster its dissemination and promote its application. Finally, this leads to the following proposition:

P1: A market orientation will encourage firms to involve customers in their product development efforts.

P1a: A market orientation will encourage firms to involve customers in their product development efforts, regardless of the degree of technology development.

P1b: A market orientation will encourage firms to involve customers in their product development efforts, regardless of the degree of application development.

The Direct Effect of Market Orientation on Product Development and Business Success

A majority of the work reviewed on market orientation investigates the relationship between market orientation and a general level of business performance (Appiah-Adu & Ranchhod, 1998; Jaworski & Kohli, 1993; Kumar et al., 1998; Narver & Slater, 1990; Pelham, 1997, 1999; Pelham & Wilson, 1996; Ruekert, 1992; Slater & Narver, 1994a, 1994b, 1995). In every case, the empirical evidence confirmed a positive relationship between market orientation and business performance. While early studies tended to include a general measure of business success, a close examination of recent studies reveals that some operationalization of business success includes new product success as one of the measures of business success (Appiah-Adu & Ranchhod, 1998; Pelham, 1997; Pelham & Wilson, 1996; Slater & Narver, 1994a, 1995). A lesser but significant number of studies have directly examined the relationship between market orientation and new product performance (Atuahene-Gima, 1995, 1996; Balakrishnan, 1996; Cooper & Kleinschmidt, 1993; Han et al., 1998). We continue by first examining evidence of the connection between market orientation and product development success,

and then follow with the connection to business success and finally a review of some dissenting views.

Market Orientation and Product Success

Atuahene-Gima (1995) investigated 275 Australian firms to explore the relationship between market orientation and new product development. His results show a strong positive relationship between market orientation and a new product's market performance. Market orientation was also shown to have a strong positive effect on proficiency of predevelopment activity, proficiency of launch activity, product advantage, marketing synergy, and teamwork. However, market orientation's influence varies, depending on the type of new product, with the greatest effect when the new products represent incremental changes to the firms existing products. Market orientation was also found to have a greater effect on new product performance in hostile market environments and during the development, introduction and growth phases of the product's life cycle. The moderating effect of environmental hostility was confirmed in a study of Fortune 500 manufactures of industrial products (Calantone, Schmidt, & di Benedetto, 1997).

In an empirical study (Atuahene-Gima, 1996) of 158 manufacturing and 117 services firms in Australia, the influence of market orientation on innovation characteristics and performance was examined. The results indicated that market orientation had a significant relationship with innovation characteristics such as innovation-marketing fit, product advantage, and interfunctional teamwork but not with product newness and innovation-technology fit.

Product Success and Business Success

The best practices studies conducted by the PDMA (Page, 1993) revealed the strong relationship that exists between successful new product introductions and overall firm performance.

A study (Pelham, 1997) sought to investigate potential mediating influences on the market orientation – profitability relationship in a model that operationalizes performance as a multi-dimensional construct. The research suggested that market orientation directly and significantly influenced the firm's effectiveness dimension of performance, which was composed of new product success, customer retention, and relative product quality. Firm effectiveness was found to be a mediating variable between market orientation and the performance dimensions of sales growth / market share and profitability. These conclusions were based on a structural equation model analysis of the responses of 160 small industrial firms responding to a mailed survey.

Dissenting View

Notwithstanding the evidence above, the proposition of a positive connection between market orientation and new product development and business success is not without its critics. Many critics base their arguments on the Lawton and Parasuraman (1980) study of the impact of a market orientation on new product planning. In that study, Lawton and Parasuraman concluded there was no evidence to support the contention that the adoption of the marketing concept influences new product planning. However, their hypothesis was that adoption of the marketing concept is contributing to the decline of product innovation and introductions of break-through products, which they failed to find support for this position. Lawton and Parasuraman (1980) also

cautioned that additional research was needed, using new measures, before firm conclusions could be reached. Others (Bennett & Cooper, 1979; Christensen & Bower, 1996; Cooper, 1998) have gone further; suggesting that following a marketing concept inhibits organizational innovation and therefore their ability to develop breakthrough products.

Since 1980, improved scales for market orientation have been developed, and five studies have been conducted which show a positive relationship between elements of market orientation and new product performance (Atuahene-Gima, 1995, 1996; Balakrishnan, 1996; Han et al., 1998; Li & Calantone, 1998; Moorman, 1995; Ottum & Moore, 1997). Until recently there was no published explanation for the dichotomous views of the impact of market orientation on new product success. Slater and Narver's (1998) discussion of the difference between being customer-led and market-oriented provides such an explanation, see Table 3. They suggested that it was not market orientation that has led to the uninspired product developments nor the lack of breakthrough products at some firms, but their myopic obsession to focus on the current customers at the expenses of investments for future customers and markets.

Table 3: Customer-Led Versus Market Oriented

	Customer - Led	Market - Oriented
Strategic Orientation	Expressed Wants	Latent Needs
Adjustment Style	Responsive	Proactive
Time Horizon Focus	Short-Term	Long-Range
Objective	Customer Satisfaction	Customer Value
Learning Processes	Customer Survey Key Account Relationship Focus Groups Concept Testing	Customer Observation Lead user Relationships Continuous Experimentation Selective Partnering

Source: Slater, S. F., & Narver, J. C. (1998). Customer-led and market-oriented: Let's not confuse the two. *Strategic Management Journal*, 19(10), 1001-1006

Hamel and Prahalad (1994) have another variation of customer-led which they called “tyranny of the served market” which causes managers to see the world only through their current customers’ eyes. Leonard-Barton, Wilson and Doyle (1993) refer to this as the tyranny of current markets and identify an additional factor they call core rigidities. Product developments that take advantage of the company's core competencies have been identified as having a greater success rate (Banting, 1978; Cooper, 1985, 1998; Cooper & Kleinschmidt, 1993; Souder & Song, 1997), however, the very same core competencies that have made a company great, can also constitute core rigidities and hinder new product developments. These core rigidities function as a sort of corporate *immune system*, rejecting ideas that challenge, weaken or take resources from the further development of the core competencies or products based on these competencies. Therefore, breakthrough products, which by their very nature rely on new technology and

challenge, or at the very least, siphon resources from existing core technologies, are frequently rejected despite market intelligence which suggests they should be developed.

An additional complication for ongoing enterprises may be that their organizations reflect the products they design. Iansiti (1998) has found that the structure of an organization and products they develop converge over time. For example, the R&D staff of a company that manufactured high-performance motors and drives migrated into fiefdoms of motor engineers and drive engineers followed by subdivisions into mechanical, magnetic, power electronic and control electronic groups. It has been postulated, and supported with theories such as social identity theory, that the further this migration continues, the greater the resistance to change, i.e. technology change threatens an organizations established groups. To continue with this example, the very idea of building a motor with the power and control electronics inside challenges the existing structure. In this actual example, the established businesses, which possessed all of the technology and market research, did not develop the integrated solution. A start-up company, without a bifurcated engineering staff developed the integrated motor and drive.

Market Orientation and New Product Success

A majority of market orientation empirical research confirms a positive relationship between market orientation and a general level of business performance (Appiah-Adu & Ranchhod, 1998; Jaworski & Kohli, 1993; Kumar et al., 1998; Narver & Slater, 1990; Pelham, 1997, 1999; Pelham & Wilson, 1996; Ruekert, 1992; Slater & Narver, 1994a, 1994b, 1995). A close examination of recent studies reveals that many operationalizations of business success included new product success as one of the

measures of business success (Appiah-Adu & Ranchhod, 1998; Pelham, 1997; Pelham & Wilson, 1996; Slater & Narver, 1994a, 1995). In addition, a few, but significant number of studies, have directly examined the relationship between market orientation and new product performance (Atuahene-Gima, 1995, 1996; Balakrishnan, 1996; Cooper & Kleinschmidt, 1993; Han et al., 1998). Further, the proposition that market orientation leads to greater customer satisfaction and repeat business (Kohli & Jaworski, 1990; Kotler, 2000) implicitly acknowledges that market oriented firms produce products with greater advantages over the competition than their nonmarket oriented counterparts (Montoya-Weiss & Calantone, 1994). Therefore,

P2: A market orientation has a direct effect on the success of a firm's new products.

P2a: A market orientation will promote the development of products that have a strong competitive advantage.

Measurement of Market Orientation

The proper operationalization of a construct is critical to the success of empirical research. While it is not necessary, or even possible, for a conceptual paper to discuss all the measurement issues introduced by the work, where that discussion can contribute, it should be included. The evolution of market orientation measurement (Deshpande & Farley, 1998; Kohli et al., 1993; Wrenn, 1997) contributes such insight. The measurement of market orientation has evolved during the past decade. Three separate scales were developed in the early 1990's, one each by the major researchers in the field (Deshpande et al., 1993; Kohli et al., 1993; Narver & Slater, 1990). The table below summarizes these scales.

Table 4: Comparison of Market Orientation Scales

Attributes \ Authors	Narver and Slater (N-S)	Kohli, Jaworski and Kumar (K-J-K)	Deshpande, Farley and Webster (D-F-W)
Reference	(Narver & Slater, 1990)	(Kohli et al., 1993)	(Deshpande et al., 1993)
Number of items	15	20	9
Sample Frame	Top management teams from 140 SBU's of a single corporation	AMA membership (230) MSI membership (27 dyads) Dun and Bradstreet top 1000 US Firms (229 dyads)	Nikkei Stock Exchange (buyer-customer dyads)
Respondents	Multiple informant (371 respondents)	Single Informant Multiple Informant (256 dyads marketing and non-marketing)	50 firms (nth observation sample) 2 respondents per firm and 2 respondent customers

Deshpande and Farley (Deshpande & Farley, 1998) conducted an analysis of these three scales and developed a summary 10-item scale of market orientation. Combining all 44-items from the original three scales, Deshpande and Farley (1998) factor analyzed the responses of 82 marketing executives. The summary scale is composed of the first 10 items that loaded on the first factor, and also exhibited a high response rate. All 10-items are positively worded and operationalized on a 5-point Likert scale ranging from 1 = *Strongly disagree* to 5 = *Strongly Agree*. Cronbach's coefficient alpha estimate of internal consistency for this 10-item scale was 0.89. The reported alpha of the summary scale (0.89) is an improvement over the original scales (0.6 - .81). This improvement is substantial considering a major way to improve scale reliability is to make scales longer (Nunnally & Bernstein, 1994, p. 264) not shorter as is the case of this summary scale. Furthermore, the value of 0.89 exceeds the 0.8 standard (Nunnally & Bernstein, 1994) for group research. Before forming the summary scale, a number of comparisons across the three separate scales were conducted. This analysis included tests for scale reliability, discriminate validity, and predictive validity.

A closer look at the items of the Deshpande and Farley (1998) summary scale, reveals some potential deficiencies. Table 5 lists the items contained in the summary scale and identifies their original source and the dimension of market orientation which that item attempts to tap. A review of this scale reveals there are no measures of responsiveness, limited coverage of market intelligence dissemination, and a disproportionately high content of market intelligence generation items. Furthermore, the overall measures of market orientation represent subjective measures of feelings rather than the more reliable measures of behaviors contain in the MARKOR scale.

Table 5: Analysis of Market Orientation Summary Scale

Summary Scale Items (Deshpande & Farley, 1998)	Source	Focus
1. Our business objectives are driven primarily by customer satisfaction.	N	O
2. We constantly monitor our levels of commitment and orientation to serving customer needs.	N	G
3. We freely communicate information about our successful and unsuccessful customer experiences across all business functions.	N	D
4. Our strategy for competitive advantage is based on our understanding of customers' needs.	N	G
5. We measure customer satisfaction systematically and frequently.	N	G
6. We have routine or regular measures of customer service.	D	G
7. We are more customer focused than our competitors.	D	O
8. I believe this business exists primarily to serve customers.	D	O
9. We poll end-users at least once a year to assess the quality of our products and services.	K	G
10. Data on customer satisfaction are disseminated at all levels in this business unit on a regular basis.	K	D

Source: D = Deshpande, Farley and Webster; K = Kohli, Jaworski and Kumar;
N = Narver & Slater, 1990

Focus: G = Intelligence Generation; D = Intelligence Dissemination;
R = Responsiveness; O = Overall measure of Market Orientation

Relationship Marketing

Relationship marketing refers to all marketing activities directed toward establishing, developing and maintaining successful relational exchange (Morgan & Hunt, 1994) hereafter referred as a customer relationship. This material draws heavily on the channel literature including relationships between manufactures and distributors (Frazier & Antia, 1995; Nevin, 1995; Parker & Funkhouser, 1997; Weitz & Jap, 1995) and between buyers and sellers (Athaide, Meyers, & Wilemon, 1996; Comer & Zirger, 1997; Ganesan, 1994; Loftus, 1997; Smith, 1998; Wilson, 1995).

Much of the study of relationship marketing revolves around Morgan and Hunt's (1994) original commitment-trust theory of relationship marketing and subsequent research (Barclay & Smith, 1997; Ganesan, 1994; Garbarino & Johnson, 1999; Geyskens, Steenkamp, & Kumar, 1998; Geyskens, Steenkamp, Scheer, & Kumar, 1996). We will begin with a review of the antecedent and consequences contained in commitment-trust theory, followed by a review of some additional variables that have been added in the context of product development.

Commitment-Trust Theory of Relationship Marketing

The intention here is not to review the theoretical development of commitment-trust theory, but to review the conclusions and the variables which will be helpful to understanding this construct in the context of customer involvement in product development. Morgan and Hunt (1994) proposed two alternative models, the key mediating variable model (KMV), shown in Figure 5, and a direct effects model, not

shown. The KMV model resulted in a great improvement in parsimony (from 29 paths to 13 paths) by surrendering only 7.8% in Comparative Fit Index.

Commitment and trust are considered key mediating variables because they encourage the marketer to (1) work toward preserving relationship investment, (2) resist attractive short term opportunities, and (3) enable prudent high-risk actions because partners will not act opportunistically. “Commitment and trust lead directly to cooperative behaviors that are conducive to relationship marketing success” (Morgan & Hunt, 1994)

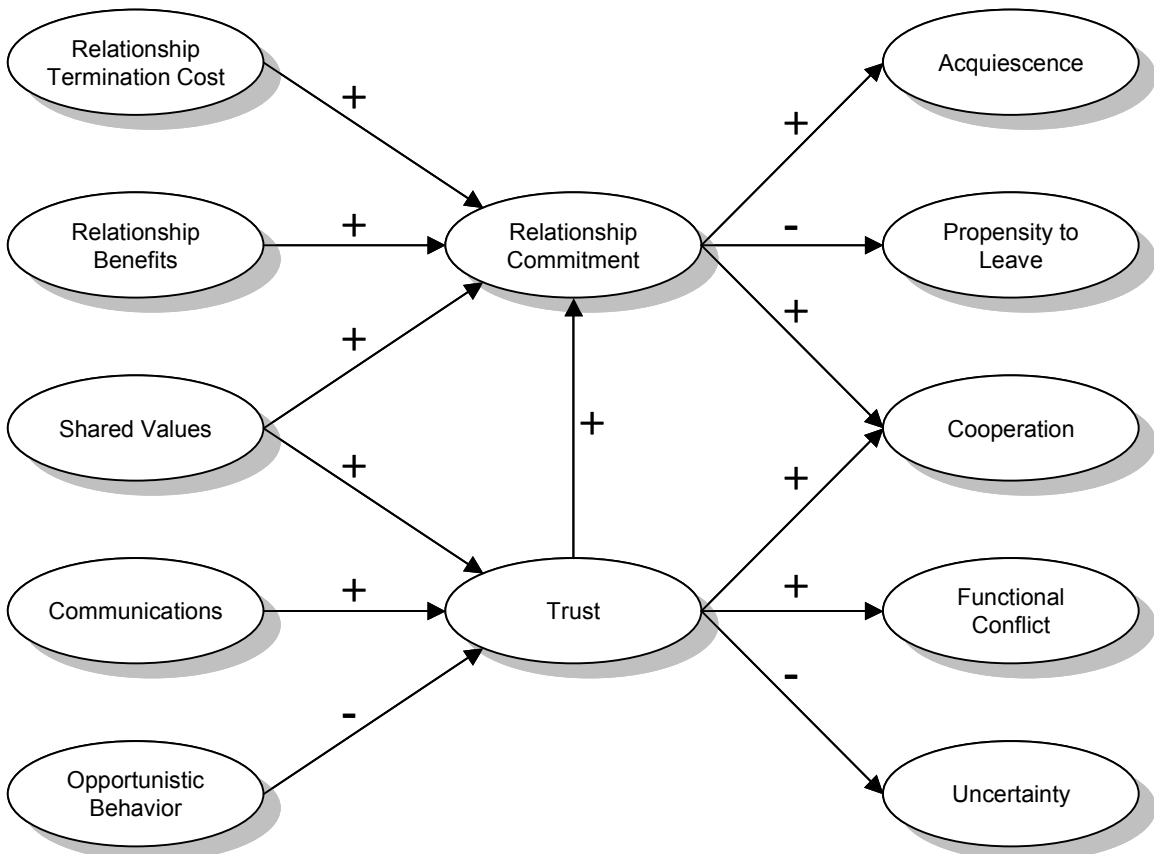


Figure 5: Key Mediating Variable Model of Relationship Marketing. Source: (Morgan & Hunt, 1994)

Relationship Commitment

Relationship commitment is one of the central themes of relationship marketing (Morgan & Hunt, 1994) and one of the key mediating variables of commitment trust theory. Commitment implies importance and desire to continue the relationship (Wilson, 1995). Several definitions of relationship commitment have been offered.

“an exchange partner believing that an ongoing relationship with another is so important as to warrant maximum effort at maintaining it ... committed party believes the relationship is worth working on to ensure that it endures infinitely” (Morgan & Hunt, 1994)

“Commitment refers to an implicit or explicit pledge of relational continuity between exchange partners” (Dwyer et al., 1987)

“an enduring desire to maintain a valued relationship” (Moorman, Zaltman, & Deshpande, 1992)

Relationship commitment is a common theme from a review of various literature (organizational commitment, consumer behavior, buyer behavior) on relationships: “Parties identify commitment among exchange partners as key to achieving valuable outcomes for themselves, and they endeavor to develop and maintain this precious attribute in their relationships” (Morgan & Hunt, 1994)

Trust

Trust is the second of the two key mediating variables of commitment trust theory. Over the years, several definitions of trust have been proposed in the literature.

“Trust exists when one party has confidence in an exchange partner's reliability and integrity” (Morgan & Hunt, 1994)

“A willingness to rely on an exchange partner in whom one has confidence” (Moorman et al., 1992)

“One party believes that its needs will be fulfilled in the future by actions taken by the other party.” (Anderson & Narus, 1990)

“A party's expectation that another party desires coordination, will fulfill obligation, and will pull its weight in the relationship” (Dwyer et al., 1987)

“the firm's belief that another company will perform actions that will result in positive outcomes for the firm as well as not take unexpected actions that result in negative outcomes” (Anderson & Narus, 1990)

All of these definitions reveal a common conclusion for firms that believe they have a commitment from another firm. Firms that trust that they have a commitment, are willing to take actions based on their trust that the other firm will do what it has said it would do, and fulfill its commitment. Said simple, action is proof of the existence of trust.

Trust influences relationship commitment

In commitment-trust theory, trust is antecedent to commitment. Trust is a major determinant of relationship commitment because commitment entails vulnerability and risk. Thus, parties will seek only trustworthy partners (Morgan & Hunt, 1994). Trusting relationships are desired so parties in the relationship commit to them (Anderson & Narus, 1990). Also, mistrust bred mistrust, which decreased commitment and shifted a transaction to one of short-term exchange (Morgan & Hunt, 1994).

Antecedents to Commitment and Trust

Relationship Termination Costs

Relationship termination costs are the costs associated with ending one relationship and either beginning another or making alternative internal arrangements. Often these cost have been labeled as switching costs (Heide & John, 1988). Among switching costs, idiosyncratic investments, specific investments made by a firm that are of considerably less value outside the focal relationship (Heide & John, 1990), were often substantial in terms of lost investments in the old relationship and new investments required by a new relationship. Dwyer, Schurr, and Oh, (1987) found that the anticipation of high switching cost results in a firm's commitment to working through troubles in the relationship rather than switch to an alternative. Even in cases where there was not a new supplier, there was still be termination costs (Morgan & Hunt, 1994) such as dissolution expense, which bias the relationship toward continued commitment.

Morgan and Hunt (1994) further pointed out that it was not the actual termination cost but the expected termination cost which generated commitment to the relationship. The actual cost may be high but unknown, leading to lack of commitment, or the actual cost may be low but assumed high, leading to commitment.

Relationship Benefits

Competition requires firms to continually seek ways of adding value to their offerings (Porter, 1985) which, in turn, requires firms to continually seek out products, processes, and technologies that add value to their own offerings (Morgan & Hunt, 1994). Partners that can deliver superior benefits will be highly valued and firms will commit to locating, building and maintaining these relationships.

Shared Values

Shared values is “the extent to which partners have beliefs in common about what behaviors, goals, and policies are important or unimportant, appropriate or inappropriate, and right and wrong (Morgan & Hunt, 1994).” Heide and John (1992) referred to this appropriate action as “norms.” Attitudes and behaviors resulted from (1) rewards and punishments (2) the desire for identification with another person or group and (3) having the same values as another person or group (Kelman, 1961). This finding led authors of commitment literature to distinguish two types of commitment: (1) sharing identity and internalizing values and (2) a type of positive net-present-value, adding up the positives and negatives of the relationship, and weighting them over time to determine the worth of the relationship.

In the same logic as shared values, Wilson (1995) said that it was not shared values but mutual goals that lead to trust and commitment. A mutual goal is a shared goal that can only be accomplished through joint action by both firms in the relationship. Wilson judged mutual goals easier to operationalize than shared values.

Communications

Communication “can be defined broadly as the formal as well as informal sharing of meaningful and timely information between firms” (Anderson & Narus, 1990). Timely communications foster trust (Moorman, Deshpande, & Zaltman, 1993) by assisting in dispute resolution and aligning expectations. Anderson and Narus (1990) found that past communication was an antecedent to trust, and that the accumulation of trust led to better communication.

Opportunistic Behavior

The concept of opportunistic behavior is taken from transaction cost analysis literature and is defined as “self-interest seeking with guile” (Williamson, 1975, p. 6). Opportunistic behavior led to a decrease in trust (Morgan & Hunt, 1994).

Consequences of Commitment and Trust

Acquiescence

Acquiescence is defined as “the degree to which a partner accepts or adheres to another's specific requests or policies” (Morgan & Hunt, 1994). Conceptually, acquiescence was similar to the performance outcome of compliance. A firm that was committed in a relationship was more likely to acquiesce than one that is not committed.

Propensity to leave

Propensity to leave is defined as “the perceived likelihood that a partner will terminate the relationship in the near future” (Morgan & Hunt, 1994) and was negatively correlated with relationship commitment. Those committed to a relationship were less likely to leave that relationship and more willing to work through difficulties.

Cooperation

The word cooperation comes from the Latin *co* meaning “together” and *operari* meaning “to work.” Anderson and Narus (Anderson & Narus, 1990) defined it as “parties working together to achieve a mutual goal.” Frazier (1983a) noted that cooperation was not simply the absence of conflict. Cooperation was proactive whereas acquiescence was reactive. Passively accepting new product specifications from a manufacturer was acquiescence. Proactively suggesting modifications, contributing

technology was cooperation (Morgan & Hunt, 1994). Firms which were committed to, and trusting of, each other were willing to cooperate.

Functional Conflict

When disputes can be resolved amicably, to the mutual satisfaction of both parties, the disagreement is referred to as functional conflict. Such conflicts prevent stagnation and provide a medium through which problems were resolved (Morgan & Hunt, 1994). There will always be conflict in a relationship; it is trust that permits that conflict to be functional rather than destructive.

Uncertainty Reduction

Uncertainty in decision making refers to the extent to which partners (1) lack information to make key decisions, (2) cannot predict consequences of those decisions, and (3) lack confidence in those decisions (Achrol & Stern, 1988). Trust reduces decision-making uncertainty because trustworthy partners can be relied on to pull their weight in the relationship (Dwyer et al., 1987).

Commitment - Trust Theory and Time

It should be noted that relationships are not static, yet many of the studies are cross-sectional studies. As a result, many of the findings are based on point observations of relationships captured at various stages of development and decline. In a longitudinal investigation, Wilson (1995) found that first came trust, performance satisfaction and comparative levels of alternative and mutual goals, followed by cooperation, adaptation and commitment. He classified this progression through five phases, (1) partner selection, (2) defining purpose, (3) setting relationship boundaries, (4) creating

relationship values, and (5) relationship maintenance. Dwyer, Schurr and Oh (1987) described this progression as five phases (1) awareness, (2) exploration, (3) expansion, (4) commitment, and (5) dissolution.

Other Relationship Variables

The relationship variables included in commitment-trust theory are enriched with three additional variables from recent studies that have both theoretical and empirical support: shared technology, comparison level of alternatives and adaptation.

Shared Technology

Shared technology was the degree to which one partner values the technology contributed by the other partner in the relationship (Wilson, 1995). Firms may find that they (1) already share technology with prospective partners, (2) need to develop a shared technology in order to function together, or (3) may come together for the specific purpose of creating a shared technology. Wilson (1995) has found that the process of creating shared technology strains the relationship at first, but inevitably contributes to a stronger relationship once the technology is up and working. Furthermore, Han and Wilson (1993) reported that technology contributes to increasing the commitment to the relationship. This leads to the conclusion that shared technology is an antecedent to relationship commitment.

Comparison Level of Alternatives

Closely related to relationship termination cost is comparison level of alternatives, an additional antecedent to relationship commitment. Anderson and Narus (1990) defined comparison level of alternatives as “the quality of the outcome available from the

best alternative relationship partner.” If a partnership is terminated, both partners will likely seek alternative trading partners. The quality of this outcome when judged against the alternatives is a measure of the dependency of one partner on the other. Partners with a low level of alternatives will be less likely to leave than partners with a high level of alternatives will be more likely to leave.

Adaptation

Adaptation occurs when one or more parties in a relationship alter their processes or products to accommodate another party (Han et al., 1993; Wilson, 1995). Such adaptations (1) raise the barrier to entry for competitors, (2) lower the comparison level of alternatives, (3) and raise the switching costs. As a result, adaptations tend to bond the partners into tighter relationships.

Customer Relationship and Customer Involvement

Although it may appear obvious that for a customer to be involved in a firm's new product development there must be relationship between the firms, this assertion will be scrutinized by examining the challenges faced by organizations engaged in four types of customer involvement: *coaching*, *partnering*, *advising* and *reporting*.

A *coaching* relationship faces challenges from scope creep and privacy. To overcome the obstacle of privacy concerns, firms must be able to trust one another. When scope creep begins to become an issue, cooperation and conflict resolution skills, grounded in trust and commitment, will expedite solutions.

Customers involved in *partnerships* face the most challenging dilemmas of any relationship type. These relationships are characterized by their complexity, issue of

intellectual property rights, and the ubiquitous not-invented-here philosophy. Once again, it is the relationship pillars of commitment and trust which lead to cooperation, acquiescence, a lower propensity to leave, and a foundation for conflict resolution that enables customer involvement to continue.

When customer involvement takes the form of *advising* or *reporting* it is once again the underpinnings of commitment, trust and cooperation, that maintain the relationship and permit the involvement of the customer in the product development process to continue. Otherwise, the customer would lose confidence that their opinions and concerns were being considered and withdraw. This leads to the following propositions:

P3: A customer relationship enables a firm to involve that customer in their product development efforts.

P3a: A relationship with a customer enables coaching activities.

P3b: A relationship with a customer enables partnering activities.

P3c: A relationship with a customer enables advising activities.

P3d: A relationship with a customer enables reporting activities.

Customer Relationship and NPD Success

In the proposed framework, Figure 1, there is no direct affect of customer relationships on NPD success, only a mediated effect through customer involvement. This should not be interpreted as implying that a relationship with the customer or

relationship marketing in general does not have an affect on business performance.

However, it is saying there is no evidence to suggest that a relationship with the customer will influence new product development and product advantage, except through the involvement of the customer.

New Product Development Success

In support of the customer involvement framework, factors that effect NPD success and failure and issue involving measurement of NPD success will be discussed, followed by a discussion of customer involvements impact of NPD success.

Factors that effect NPD Success and Failure

It should be obvious that a customer involvement alone will not lead to product success. Several authors have written extensively about the factors that lead to product success and failure: von Hippel (1978), Calantone (1990a; 1990b; Montoya-Weiss & Calantone, 1994), Crawford (1997), Cooper (1985; 1998; 1995), Griffin and Hauser (1992), Clark and Fujimoto (1991), Rothwell (1992), Souder (1997; Yap & Souder, 1994), Urban and Hauser (1993), Ulrich and Eppinger (1995), Wheelwright and Clark (1995b). In fact, prior to 1993, at least 61 research studies and 77 articles were published on the subject of product success and failure (Griffin & Page, 1996).

Crawford (1997, p.54), found three primary causes of product failures: (1) there was no need or want for the product, (2) the product did not meet the existing need, or (3) the product was not well marketed. While Crawford reduced his list to three, project SAPPHO (1974) included three additional factors: (4) inefficient development, (5) a not-invented-here (NIH) attitude that interferes with the appropriate use of outside experts, and (6) a lack of senior management involvement.

In addition, the work on project SAPPHO failure factors (Rothwell, 1974) revealed eleven factors that contributed to the success of new product development, see Table 6. The cells in this table have been augmented with insights from Crawford (1997,

p.52) and Cooper (1998). Item 9 in the table below is somewhat redundant with item six above, however it was retained for completeness and further clarification.

Table 6: Product Development Success Factors

Factors	Details
<p>1. Strategic Alignment</p>	<p>How does the project contribute to the business unit's strategic objectives? Are the core competencies of the company leveraged? Does the company make similar products? Is the company willing to take a loss on the product for the first year? Does the company “need” the product more than it “wants” it? Projects that have a direct impact on the strategic objectives of the company have higher rates of success</p>
<p>2. User And Customer Needs</p>	<p>Is there a specific market segment targeted for the product? Can the team articulate the problems that the product must solve for it to be successful? When questioned, many members of failed development projects could not articulate the customer’s need the product was intended to fulfill.</p>

Factors	Details
3. Compliance Issues	<p>Has the team identified all the relevant compliance issues that the product must adhere to, including manufacturing and recycling issues? Failure to identify or recognize the significance of regulatory compliance has contributed to the failure of many projects. The cost of designing and manufacturing a compliant product may make the product prohibitively expensive, while the lack of compliance can lead to a ban on sales.</p>
4. Competitive Analysis	<p>Has the team identified the product's top three competitors (by market share) and thoroughly identified what their business and product strengths and weaknesses will be at the time of market release? The reaction of key competitors must also be considered.</p>
5. Product Positioning	<p>Is the product defined to solve your customers' problems better than the competitors can and at a greater value to the customers?</p>

Factors	Details
6. Project Priorities	<p>What is the hierarchy of priorities for the project? Prioritize cost, date of market release, and features to identify what you would trade off for what. Without clearly defined priorities, various development team members will have different rankings for the priorities. While one team member trades off cost for performance, another team member may be trading off performance for cost. In addition, if these priorities are not captured and recorded as part of the project documentation they will tend to drift over time.</p>
7. Risk Management	<p>Is the team striking an acceptable balance between risk or uncertainty and project gains in R&D, marketing, and manufacturing? Is R&D at least one third of the product budget? If the team continues to do things using past techniques they are likely to get results similar to past projects. On the other hand, projects that require a team to make great advances in the fields of marketing, manufacturing and R&D simultaneously frequently fail.</p>

Factors	Details
<p>8. Marketing Channels</p>	<p>Does the company now sell to a related customer market?</p> <p>Will the market channel required to be successful in this business be established by the time of market release? Will the product need service or repair? Products that are suitable for a firm's existing channel show the highest likelihood of success. In contrast, products that are placed in an inappropriate or poorly prepared channel have the highest probability of failure.</p>
<p>9. Management Leadership</p>	<p>Does upper management know about this project, support the efforts, and provide the team guidance in making decisions? Will the company president see the project leader without an appointment? In the area of new product development, one of the greatest criticisms is reserved for top management. Successful projects tend to have top management's attention and support from the start. In contrast, failed projects tend to only attract the attention of top management when the projects are in trouble, which is often too late.</p> <p>Project leadership is also critically important. Did the project leader succeed on their last two projects? Would the leader quit and take the project along if the company refuses to back it?</p>

Factors	Details
10. Resource Availability	<p>Do you have the staffing and funding needed to meet the goals of the project within the allotted amount of time? The needs of the project should be considered from start to finish and include R&D, manufacturing, marketing, and sales. Successful projects have the right people with the right tools available at the right time. Without adequate staffing and resources, doing everything else right is not going to make a difference.</p>
11. Dependency Management	<p>Are all internal and external strategic dependencies established and functioning well enough to assure yourselves that there will be no integration or schedule problems?</p>

While these factors have consistently been found in successful new product development and their absences appears to forewarn of pending failure, researchers continue to search for the systemic origins to these symptoms of a successful product development. Reexamining Crawford's (1997, p.54) three failure factors, (1) there was no need or want for the product, (2) the product didn't meet the existing need, or (3) the product was not well marketed, note that all three are entangle with the customer. The next three factors from project SAPPHO (1974), (4) inefficient development and the inappropriate exclusion of (5) outside experts and (6) senior management, all focus on internal efficiency of product development. One could argue that the first three factors surround the question of, what to do? and lead to customer acceptance or market success while the last three factors focus on the theme of, how to do it, and contribute to company

acceptance and financial success. An analysis of success factors (Rothwell, 1974) reveals a similar split between factors that indicate what to do (user and customer needs; regulatory compliance, *or the customers minimum needs*; competitive analysis, *or what the customer is currently buying*; product positioning; and distribution channels, *or where the customer buys*) and factors that indicate if and how to do it (strategic business alignment, project priorities, risk management, management leadership, resource management and dependency management).

Both success factors and failure indicators can be segmented into *what to do* and *how to do it* groups. While internal factors such as core competencies play a role in the determination of *what to do*, this issue is dominated by external considerations of the customer, positioning and competitors. Therefore, when looking to measure the contribution of customer involvement to product development success, the focus narrows to those measures which seek to gage “did we do the right thing?”

Measuring New Product Development Success

There are always two considerations in a discussion of new product development success; (1) what are the factors that effect NPD success and failure, discussed above and (2) how do you measure new product success. In any discussion of measurement of success, one must first clarify how success is defined. Success is not just elusive; it is also multifaceted and difficult to measure (Griffin & Page, 1996). While there are numerous studies investigating the antecedents of product development success and failure there are relatively few studies investigating the measurement of product development success and failure (Griffin & Page, 1993, 1996; Hultink & Robben, 1995).

Griffin (1996), suggests that product success can be measured along three independent dimensions: (1) customer-based, (2) financial, and (3) technical or process-based. Firms may elect to focus their attention on one or two of these dimensions or they may attempt to strike a balance between all three. Regardless of intentions, firms frequently must sacrifice some performance along one dimension to realize gains in another dimension. These inevitable trade-offs illustrate the need for established and agreed upon project priorities and success measurement criteria.

Further complicating the measure of success along these three dimensions is the element of time. Hultink (1995) discovered that performance measurement emphasis shifts with time. For the short term, the respondents emphasize technical performance success measures such as meeting performance specifications, competitive advantage, speed-to-market and whether the product was launched on time. In the long term, the focus was on customer-based and financial performance, including attaining goals for profitability, margins, ROI, and unit volume. Four other factors were perceived as being equally important for both short-term and long-term success: customer satisfaction, customer acceptance, meeting quality guidelines and product performance level. There were at least two explanations for this change with time. First, in the short term, there was only limited and volatile information available to serve as a bases for evaluation. Second, in the short term, focus was often on the performance of the development team rather than the product and measures such as speed-to-market and competitive advantage were proxy measures for the performance of the development team and product development process. As time passes, the development team is typically reassigned, reliable financial information becomes available and the focus is shifted away from team

performance and toward product performance, typically measured in financial terms or by market share.

Another complication in the selection of a measure for product success or failure is the nature of the product development, ranging from the extremes of new-to-the-world projects to simple cost reduction projects. The success of cost reduction projects has most frequently been measured by the short-term achievement of specific cost targets. On the other hand, new-to-the-world projects have frequently been measured on a long-term basis using customer acceptance, market-share, ROI, break-even time or innovativeness (Griffin & Page, 1996).

While important to the long-term success of the firm, measures of product development process efficiency and sales success are not the focus here. The primary focus here is on understanding the role of the customer in the process of developing the *right* product, believing that it is most important to make the *right things* are done first, and only then making sure that these things are *done right*. A perfect and efficient product development process, with unlimited resources and the unconditional commitment of top management, will likely fail to be a financial success if applied to development of the wrong product.

NPD Success Measurement in the Customer Involvement Context

The selection of a measurement of product success or failure could consider customer, financial, process and technical dimensions, as well as the time horizons and the nature of the product development. Within the context of customer involvement, the interests is in the factors and measures of product fit with the market, since this is the area where customer involvement should have its primary impact. Product fit with the market

is primarily a measure of *product advantage*, which refers to the target market's perception of product superiority with respect to quality, cost-benefit ratio, or function relative to the competition (Montoya-Weiss & Calantone, 1994) at the time of launch. As Cooper (1998, p. 60) wrote “It's almost too obvious, but a dominate success factor is having an unbeatable product: a superior product; a differentiated product; and a product that delivers unique benefits and better value to the customer.” As secondary measures of NPD success, technology synergy, and speed to market could be included.

Customer Involvement's effect on NPD Success

Virtually every study of NPD success indicates that understanding customer needs and wants is at the heart of successful new product development. Merle Crawford, Robert Cooper, and William Souder are perhaps the three most prolific and influential writers in the area of new product development. Each has suggested that understanding the customer is perhaps the most significant discriminator of new product success and failure. One of six critical success factors in a new product development process model is the inclusion of the voice of the customer *throughout* development (Cooper, 1998, p. 35). In an international study of firms researching advanced technologies which enhance the customer's success, Souder et al. (1997) reported much higher rates of new product success from firms where technical personnel “spent long periods of time at the customer site, both domestic and foreign.”

The overwhelming evidence from empirical research supports customer knowledge as an antecedent to new product success, and the focus of the marketing concept on external customers, implicitly acknowledge that customer involvement in the

new product development process will improve success and yield superior products.

Therefore,

P4: Customer involvement in product development will improve NPD success.

P4a: Customer involvement in product development will lead to the development of higher quality products relative to competitive products.

P4b: Customer involvement in product development will lead to the development of products with superior functional attributes relative to competitive products.

P4c: Customer involvement in product development will lead to the development of products with a superior cost-benefit ratio relative to competitive products.

Moderators and Control Variables

In nearly every investigation of business performance or new product performance, control variables or moderating variables have been present. In some studies the variables were treated as control variables (Montoya-Weiss & Calantone, 1994; Narver & Slater, 1990) to avoid overstating the size of the effect of market orientation, while most others treated these variables as moderators (Atuahene-Gima, 1995; Becherer & Maurer, 1997; Jaworski & Kohli, 1993; Kohli & Jaworski, 1990; Pelham, 1997, 1999; Slater & Narver, 1994a, 1994b). These variables are divided into three groups: market level moderators, business level moderators and product level

moderators. Consideration of these variables will be important during the empirical evaluation of models derived from the customer involvement framework. Unless these variables are controlled, or otherwise accounted for, the contribution of customer involvement cannot be isolated from the environment. The market level variables will be discussed first.

Market Level Variables

Market Growth

When the market is growing, it is easier for all the participants to acquire and retain new customers than when the market is stagnant or contracting (Porter, 1980, 1985). However, when the market is expanding there are reasons why a company may not be profitable in the short-term. First, if the market growth was unanticipated, the seller may not be prepared to respond. Second, in the short term, a company's manufacturing and marketing capabilities must be considered to have a fixed capacity because of the lead-time required to develop additional resources. Third, if there were low barriers to entry, even short-term market growth can lead to increased competition from new entrants, especially if the exit barriers are also low. Finally, a seller may choose to capture market share during a market expansion rather than increase profitability. However, the traditional view is that there is a positive relationship between market growth and profitability. This variable has typically been included as a control variable.

Market Concentration

Market concentration is the extent that a market is dominated by a few suppliers (Porter, 1980, 1985). Traditionally, this is measured as the percent of market share

controlled by the four or eight suppliers with the largest volume market share. In highly concentrated markets, sellers may jointly exhibit monopolistic behavior, leading to higher profits for them as well as smaller players which operate under a “profit umbrella” created by the large operators. Additionally, market concentration may be a proxy for the firms that have captured sales, taken advantage of the learning curve and acquired manufacturing economies of scales.

Entry Barriers

An entry barrier is defined as an obstacle a firm must conquer to become profitable in a new market. The extent of the entry barriers are generally measured as the total unique incremental costs associated with a firm entering and becoming competitive in a new market (Porter, 1980, 1985). Markets with low entry barriers are generally viewed as less profitable markets than ones with high entry barriers.

Buyer Power

Buyer power is measured by the extent to which a buyer can negotiate lower prices and/or higher value from the seller (Porter, 1980, 1985; Scherer & Ross, 1990). The traditional view is that buyer and seller are opponents negotiating an exchange where each attempts to extract the maximum profit from their opponent. Situations where the customer has high buyer power are characteristically less profitable for the manufacture.

Seller Power

Seller power is measured by the extent that a seller can negotiate higher prices from the buyer (Porter, 1980, 1985; Scherer & Ross, 1990). In this paradigm, the buyer and seller are engaged as opponents in an exchange relationship where the seller is trying

to maximize the contributions of the buyer to the seller's profitability. Situations with high seller power are characteristically more profitable.

Strength of General Economy

When the general economy is growing, it is easier for all the participants to acquire and retain new customers than when the general economy is stagnant or contracting (Porter, 1980, 1985).

Environmental Hostility

Environmental hostility refers to the market settings characterized by intense market competition, lack of market opportunities, and unfavorable and harsh business climate (Covin & Slevin, 1989). Market orientation is thought to have a stronger influence on success in markets with intense market competition than those under weak competition (Atuahene-Gima, 1995). The rationale is that in weak competitive markets, buyers have a limited choice of suppliers. In contrast, strong competition leads to multiple choices for the customer. As a result, the seller must monitor and respond to customers' changing needs and wants to ensure the continued patronage of the buyer (Kohli & Jaworski, 1990).

The second dimension, hostility of the environment, involves a general lack of opportunities. Covin and Slevin (1989) reported that in a hostile environment, when firms adopted innovative solutions, they were more successful. It is argued that in increasingly hostile environments, sellers should be driven to develop more innovative products and search for new markets; activities that are risky and have uncertain results.

Firms that adopt a market orientation can reduce this risk and uncertainty (Atuahene-Gima, 1995).

Business Level Moderators

Relative Size of the Firm

This variable captures the cost and revenue advantages associated with a large market share (Scherer & Ross, 1990). Cost advantages are associated with economies of scale and learning curve. Revenue advantages come from the higher prices a market leader can typically command. Market leaders also gain incremental sales because, all things being equal, many people prefer to buy from the market leader. A large manufacturing share typically yields lower manufacturing costs as the result of more opportunities to learn better manufacturing techniques, commonly referred to as the learning curve effect. These advantages are thought to diminish the significance of a market orientation.

Relative Cost Structure

In contrast to the relative size variable, this variable captures only the cost advantages associated with a large market share (Scherer & Ross, 1990). Traditionally, larger firms are assumed to have lower cost as a result of savings associated with economies of scale. Though the number of cases is assumed to be small, there are instances, particularly with service industries, where diseconomies of scale are present. Adhering to the traditional view, when there is a positive relationship between cost advantage and profitability, as a result of the economies of scale, a lower operating cost is

expected. Therefore, sellers with a relative cost advantages should gain less from a market orientation than those that have a higher cost structure.

Product Level Moderators

While a market orientation will be shown to improve product success, the strength of this relationship is not consistent across market and product conditions (Atuahene-Gima, 1995; Gatignon & Xuereb, 1997; Narver & Slater, 1990; Ottum & Moore, 1997; Slater & Narver, 1995). There are several product factors that have been investigated as control variables or moderator variables including: product newness to the market, product newness to the seller (Meyer & Roberts, 1986), stage of product life-cycle, and technology newness/turbulence.

Product Newness to the Market

Product newness is a measure of how revolutionary a product concept or category is to the market. It is not intended to capture the newness of a particular implementation. For example, product newness would measure how new Digital Video Disks (DVDs) are to the market, not how new the Sony model XYZ is to the market. Product newness is also a proxy for market turbulence, as most new markets are inherently turbulent. Market turbulence may also be thought of as the rate of change of the market composition, i.e. customer preferences. Sellers operating in this environment are more likely to have the need to modify their products and other marketing mix components to satisfy the changing desires of their market than sellers operating in more stable markets. As a result, markets that are new and turbulent are traditionally less profitable than markets that have stabilized and entered a growth phase. A market orientation, however, should

improve an organization's ability to anticipate the changing desires of the buyer (Atuahene-Gima, 1995).

Product Newness to the Seller

Product newness to the Seller is a measure of how revolutionary a product concept or category is to the firm compared to those already marketed by the firm. New products can range from incremental product improvements and line extensions, to imitation products of their nontraditional competitors, to radical new-to-the-world products. Here, it is argued that a market orientation will have a greater influence on the performance of radically new products than on incremental product improvements, and that the degree of product newness will indicate the extent of learning and developing required by the selling firm and the buyer. Consequently, in contrast to incremental developments, sellers need a higher level of market orientation to cope with the higher levels of uncertainty associated with developing a radically new product as well as establishing and educating the market (Atuahene-Gima, 1995).

Technology Newness/Turbulence

The effect of technology newness is very analogous to the effect of product newness, and is a measure of how revolutionary a product implementation is to the market. For example, technology newness would attempt to measure how new irradiation is as a method of controlling food spoilage. Technology turbulence is a proxy for market turbulence because the introduction of revolutionary technology frequently disrupts the market equilibrium established by the current technology. Sellers operating in this environment are invariably required to modify their products to satisfy the

changing desires of their market, searching for a new equilibrium position. As a result, markets that are new and turbulent are traditionally less profitable than markets that have stabilized and entered a growth phase. A market orientation, however, should improve an organization's ability to anticipate the changing desires of the buyer (Atuahene-Gima, 1995).

Stage of Product Life-Cycle

There are two opposing views in the literature concerning the influence of the product life cycle on market orientation (Atuahene-Gima, 1995). One point of view is that market orientation is less important in the early stages of development (Teece, 1988). During the early stages of a product or technology introduction, there is typically no dominate technology and the market is usually turbulent. During this time, competition is based on product features and technology attributes. At this early stage, customers buy based on their understanding of the technology, leading some to believe that engineering, rather than marketing skills, are more critical to the new product success. Continuing with this logic, in the later stages of the product life cycle, the product features and functions have stabilized and marketing skills become critical as market segmentation, distribution, pricing, strategies become the determinates of success. This viewpoint is actually closer to the selling concept than it is consistent with a marketing concept (Kotler, 2000).

The alternative viewpoint is that the organization needs a high degree of market orientation during the early stages of the product life-cycle in order to monitor customers in an effort to determine their expressed and latent needs. During this turbulent time, it is also critical that the organization responds rapidly to changing customer requirements. In

summary, it is imperative during this early product life cycle period that the organization gathers market intelligence, disseminates this information and responds rapidly – the three cornerstones of a market orientation. Olleros (1986) found that a lack of market understanding led to the demise of many companies in the early stages of the product life cycle as more market oriented companies adapted their products more rapidly to customer expectations. Atuahene-Gima (1995) tested and confirmed this second viewpoint in a cross-sectional study of 600 firms.

Product Impact and Customer Involvement

Many studies have been conducted which support models that define relationship variables and their interrelationships (Anderson & Narus, 1990; Dwyer et al., 1987; Frazier, 1983b; Heide & John, 1990), culminating with Commitment-Trust theory of relationship marketing (Morgan & Hunt, 1994). However, there has been less empirical work on the process of relationship development (Wilson, 1995). Just how and why do relationships form and parties become involved?

Clearly, direct customer involvement is not the solution for every new product development; it is highly unlikely that an individual would desire to be involved in the development of their next brand of toothpaste, nor would the manufacture generally welcome such customer participation. Even in a business-to-business setting, relationship and customer participation is not always appropriate. For example, in most cases, users do not need to have a relationship with the manufacturer of the fasteners they use to assemble their products. However, the development of a technology having a major impact on a customer's business will motivate that customer to participate in the development process. Wilson (1995) concluded that customer relationships are only likely to develop in high-impact areas. He defines high impact areas as those areas where (1) the value added to the buyer's product by the seller is high and (2) the amount of operating risk associated with doing business with the seller is low, the upper right quadrant of Figure 6. Operating risk refers to the risk that a buyer incurs because of supplier failure to deliver quality goods on time, or any other thing that causes difficulty for the buying organization. A supplier who adds value to a buyer's product increases the value added at the market level. For example, Intel provides high name recognition

microprocessors to the manufactures of personal computers, having a significant technical and marketing impact on the manufacturer's products.

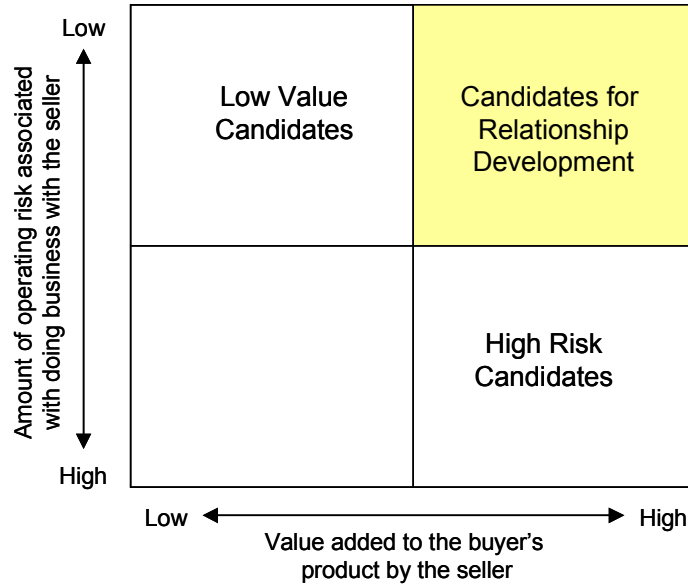


Figure 6: Candidates for relationship development, Adapted from Wilson (1995)

For the customer, the motivation is typically nothing short of competitive advantage. That is, the technology must offer the customer the potential for an immediate and dramatic performance increase, and the opportunity for permanent or temporary application exclusivity. Overall, if the partnership is successful, the OEM will have established a beachhead in this market (Moore, 1991), and the customer will have established a formidable competitive advantage.

Perceived Product Impact will Moderate effect of customer Involvement

As stated above, customer involvement is expected to occur primarily in high impact areas. In addition, the product's impact on the customer is expected to moderate

the effect of customer involvement on new product development success. As has been discussed, a factor influencing customer involvement is the customer's perceived impact of the technology on their respective business. A technology having a major impact on a customer's business will motivate that customer to participate in the technology commercialization process. Specifically, a customer's perceived importance of a technology will delay the move to the less intimate relationship of *reporting*, and encourage more intimacy through *partnering*. This intimacy will increase the opportunity to achieve greater product advantage. Therefore,

P5: Customer involvement in product development will generally occur in areas of high-impact.

P5a: Customer involvement in product development will generally occur in areas where the value added to the buyer's product by the seller is high.

P5b: Customer involvement in product development will generally occur in areas where the amount of operating risk associated with doing business with the seller is low.

P6: Perceived product impact on the customer will moderate the relationship between customer involvement and new product development success, with customer involvement being more important at higher levels of perceived impact.

Implications for Future Research

Contained within this paper are two elements in the continuing investigation of customer involvement in technology commercialization and product development. First, there is the proposed matrix for classifying customer involvement according to the degree of technology development and application development, originally proposed by Kahn and Pinegar (1999). Second, there is the proposed framework for investigating the effect of customer involvement on new product success. Both are important tools for the understanding of customer involvement. We will first comment on the classification matrix.

Classification Matrix

Overall, the proposed matrix of customer involvement (Figure 2 and Table 2) suggests that customer users are involved throughout the technology commercialization and new product development process. This involvement varies, however, with the highest level of customer involvement in situations where the objectives of technology development and application development necessitate a *partnering* relationship.

A general intent of the proposed matrix is to prescribe how to best involve customer users in new product developments based on the objectives for technology application and application development. As discussed, an OEM manager needs to consider the objectives of their own technology development and the needs for application development to determine what would be the most appropriate type of customer involvement. Overall, the implicit guideline for OEMs is to realize that the role of the customer is NOT a constant one.

The matrix also gives insight into the challenges facing OEMs and customer users with each type of customer involvement. Furthermore, the matrix delineates the roles to be expected by the two respective parties. Hence, the matrix attempts to illustrate what OEMs and customers might expect in terms of activities and challenges when different objectives of technology development and application development are pursued.

Customer Involvement Conceptual Framework

The proposed framework, shown in Figure 1, begins to add detail and texture to the mechanism through which customer needs and wants are gathered from the customer and turned into successful products. Missing from the current literature is any guidance as to how the customer participates in this transfer of knowledge. The framework lays out the antecedent to customer involvement found in market orientation and relationship marketing literature as well as the moderating role of the product impact.

The intent of the proposed framework is to provide a grounded theory foundation for a continued investigation into the role of the customer in product development and technology commercialization. To go forward, a refinement of the proposition into testable hypothesis is required. To accomplish this, the proposed framework must be refined into a model, detailing the portions of relationship marketing that are truly antecedents to customer involvement.

The customer involvement in NPD framework provides insight into the dynamic nature of customer involvement and product development. In this framework that as perceived product impact lessens, the relative importance of the direct effect of market orientation on NPD success becomes greater. Alternatively, as the perceived impact on

the customer increases, the relative importance of customer involvement increases, shifting the relative contributions of market orientation and customer relationship to new product development success.

While the packaged goods markets are not within the scope of this study, the inclusion of the construct “impact on the customer” results in a framework that, on its face, does appear to be consistent with the role of customer involvement in that domain. In a packaged goods setting, one would expect that the perceived impact of the product on the customer would be extremely low, lowering the relative influence of customer involvement to insignificance when compared to the direct effect of market orientation. In this situation, customer relationship no longer influences product development just as expected.

Naturally, further development of the proposed framework and matrix of customer involvement is required. Much of this development will be centered around empirical investigations to verify and validate the framework and matrix.

Empirical Testing

Before empirical testing can begin, the proposed framework must be refined into a testable model. Before that can begin, several of the constructs need to be operationalized including: product advantage, customer involvement and perceived product impact on the customer. In order to avoid confounding the results of this exploratory research, an initial study should be conducted within a single industry, controlling for type of product development i.e. incremental, line extension, new-to-the world, etc. This would eliminate the need to control for other factors which have been shown to moderate the effects of a market orientation discussed above.

Summary of Framework Propositions

The follow summarizes the propositions developed in this paper:

P1: A market orientation will encourage firms to involve customers in their product development efforts.

P1a: A market orientation will encourage firms to involve customers in their product development efforts, regardless of the degree of technology development.

P1b: A market orientation will encourage firms to involve customers in their product development efforts, regardless of the degree of application development.

P2: A market orientation has a direct effect on the success of a firm's new products.

P2a: A market orientation will promote the development of products that have a strong competitive advantage.

P3: A customer relationship enables a firm to involve that customer in their product development efforts.

P3a: A relationship with a customer enables coaching activities.

P3b: A relationship with a customer enables partnering activities.

P3c: A relationship with a customer enables advising activities.

P3d: A relationship with a customer enables reporting activities.

- P4: Customer involvement in product development will improve NPD success.*
- P4a: Customer involvement in product development will lead to the development of higher quality products relative to competitive products.*
- P4b: Customer involvement in product development will lead to the development of products with superior functional attributes relative to competitive products.*
- P4c: Customer involvement in product development will lead to the development of products with a superior cost-benefit ratio relative to competitive products.*
- P5: Customer involvement in product development will generally occur in areas of high-impact.*
- P5a: Customer involvement in product development will generally occur in areas where the value added to the buyer's product by the seller is high.*
- P5b: Customer involvement in product development will generally occur in areas where the amount of operating risk associated with doing business with the seller is low.*
- P6: Perceived product impact on the customer will moderate the relationship between customer involvement and new product development success, with customer involvement being more important at higher levels of perceived impact.*

Managerial Implications

In summary, it can be argued that the most important factor in successful technology commercialization is customer involvement. However, determining what exactly is meant by customer involvement is a consideration deserving close attention. One cannot simply assume that customer involvement is a constant phenomenon. In addition, it cannot be assumed that customer involvement occurs without implications for both the OEM and the customer user. The proposed framework and matrix of this paper has attempted to answer the question of what is meant by customer involvement, and highlight implications and boundaries to assist OEMs in determining how to most appropriately involve customers in new product development. From a pedagogical perspective, the proposed framework and matrix serve to outline an understanding of how and why customers should be involved. The driver behind achieving such an understanding is to optimize the OEM-customer relationship and best manage the new product development process.

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