

FROM MARKET DRIVEN TO MARKET DRIVING: AN ALTERNATE PARADIGM FOR MARKETING IN HIGH TECHNOLOGY INDUSTRIES

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Although useful, the currently dominant marketing philosophies reveal themselves to be inadequate for addressing issues and problems specific to high-tech industries and products. This study proposes "market driving" as a new paradigm for marketing high-technology products and innovations. Based on an extensive review of the extant literature (and input from leading marketing scholars), a broad-based definition of the market driving approach is developed, and compared to existing paradigms of market driven activity, customer leading and market pioneering. The suitability of the market driving paradigm in addressing the unique characteristics of high technology industries is discussed.

INTRODUCTION

Marketing in technologically-oriented industries presents organizations with a unique set of issues and challenges. High technology industries are characterized by high levels of technological and market uncertainty, and competitive volatility (Moriarty and Kosnik 1989; Mohr 2001). These industries operate in an environment of rapid product innovation and obsolescence. Firms that are able to establish their products/technologies as a real or de facto industry standard stand to reap disproportionate market returns (Arthur 1996; Hill 1997; Shapiro and Varian 1999). Many high-tech products function as a part of a larger system of products rather than as stand-alone products (e.g., PC, printer, scanner, software, server, and network). Consequently, issues such as the availability of complementary products and compatibility with other

products in a system become critical to the success or failure of new technologies (Hill 1997).

With the success of the market-orientation philosophy, it has been implicitly assumed that such an approach is likely to succeed in the high-tech industries as well. Indeed in recent years, the marketing discipline has come to regard market driven activity (i.e., Kohli and Jaworski 1990; Narver and Slater 1990; Deshpande, Farley and Webster 1993; Jaworski and Kohli 1993), customer-leading (i.e., Day 1990; Narver, Slater and MacLachlan 2001), and pioneering (i.e., Kerin, Varadarajan and Peterson 1992; Golder and Tellis 1993) as appropriate paradigms for achieving long- and short-term success.

The marketing literature broadly describes market orientation as the process by which firms acquire, process,

and disseminate customer and competitor information throughout the organization, and act upon this information in the market (Kohli and Jaworski 1990; Narver and Slater 1990; Deshpande, Farley and Webster 1993). Customer leading on the other hand is described as a process of uncovering the latent needs of customers, and directing their preferences and behaviors in new directions (Day 1990; Narver, Slater and MacLachlan 2001). Pioneering is described as being the first to introduce a new product to market (Kerin, Varadarajan and Peterson 1992; Golder and Tellis 1993).

This study will show that despite being extremely valuable, the established marketing approaches mentioned above may not be sufficiently well-suited to address the unique characteristics of high technology industries and markets. We submit that marketing in these industries requires a broader and more proactive strategic approach, *market driving*, which we propose as an alternate paradigm for marketing in high-tech industries. We will show that a review of the literature (i.e., Day 1999; Kohli, Jaworski, and Sahay 2000; Kumar, Scheer and Kotler 2000) suggests that market driving could be regarded as a firm's ability to lead fundamental changes in the evolution of industry conditions by influencing the value creation process at the product, market, or industry levels.

In the following discussion we will show that while building on the earlier philosophies of market driven activity, customer-leading, and pioneering; market driving is distinct from them. Market driving is a broader paradigm which could conceivably subsume these three marketing philosophies. In so doing, we first describe the market driving paradigm, and examine how it differs from the other, more established marketing philosophies mentioned earlier. We then describe the unique characteristics of high technology industries/markets, and discuss how market driving offers a more appropriate approach for addressing these characteristics. Finally, we conclude with some managerial implications of implementing a market driving philosophy in the high technology industries.

MARKET ORIENTATION & THE MARKET DRIVING PARADIGM

Developing a market orientation is widely considered the most effective means of achieving and maintaining market advantage (Kohli and Jaworski 1990; Narver and Slater 1990; Deshpande, Farley and Webster 1993; Jaworski and Kohli 1993). Market orientation is the process by which competitor and customer information is gathered, disseminated throughout the organization, and used to fill the needs of the current market (Day 1990; Kohli and Jaworski 1990; Narver and Slater 1990). The conventional wisdom is that, since market oriented firms are better able to understand customer needs, they more readily adapt offerings to meet changing preferences (Day 1990).

The past decade has resulted in a reasonably large body of literature on the market orientation concept. In reviewing these works, we note that market orientation is either defined largely in terms of customer-related activity (Day 1990; Kohli and Jaworski 1990; Deshpande, Farley and Webster 1993; Jaworski and Kohli 1993), or in the balance between customer and competitor focused behavior (Day 1994; Narver and Slater 1990; Slater and Narver 1994a; 1994b; 1995). Many of these conceptualizations rely on a somewhat responsive, or market driven approach to market orientation (Day 1990; Narver, Slater and MacLachlan 2001; Sandberg 2002). Market driven firms respond to environmental changes as they arise, but do not attempt to force change back into the environment (Narver, Slater and MacLachlan 2001; Sandberg 2002). Though competitors are considered, as previously mentioned (e.g., Day 1990; Narver and Slater 1990), they are examined primarily for benchmarking purposes, and are not the targets of any specific firm activity. Even in those instances where latent needs are uncovered by the firm, there is still no active attempt to create or change behaviors among other industry stakeholders (Narver, Slater and MacLachlan 2001).

It is perhaps the narrowing of market orientation to this somewhat reactive emphasis that has led to the supposition that market orientation is really comprised of distinct, yet complementary sets of behaviors: those which are primarily market driven and those that are primarily market driving (Day 1990; Jaworski, Kohli and Sahay 2000; Kumar, Scheer and Kotler 2000). Market driving activity, the lesser known of the two components, has been defined in several ways:

A discontinuous leap in the customer value system and the implementation of a unique business system to support that leap.

(Kumar, Scheer and Kotler 2000, p. 131)

Changing the structure or composition of a market and/or the behavior of players in the market.

(Kohli, Jaworski and Sahay 2000, p. 46)

Establishing distinctive strategic positions that are critical to shifting market share or creating new markets.

(Markides 1999, p. 59)

Due to the variety of definitions available in the literature, and the broad spectrum of activities covered under them, it was necessary to understand what we meant by market driving. In order to synthesize these various viewpoints and develop a clear, integrated definition of market driving that conveyed the spirit and scope of the philosophy, we followed a grounded theory approach similar to the procedure outlined by Quinn (1988).

We contacted 138 marketing faculty and asked them to provide top-of-mind descriptors, definitions and/or examples of market driving activity. These faculty were

selected because they had previously published on pertinent topics (i.e., market orientation, market driving, customer leading, and market pioneering) in marketing literature, or they served as editors or review board members of major marketing journals (e.g., *Journal of Marketing*, *Journal of Marketing Research*, *Journal of Consumer Research*, *Academy of Marketing Science Journal*).

Responses were received from 86 faculty yielding a response rate of 62.3%. Similar responses were then categorized. Next, based on existing literature we tried to identify emerging themes/patterns in the categories. As shown by the sample responses in Table 1, this exercise revealed three interrelated dimensions that seemed to underlie the market driving construct: *value creation*, *change* and *leadership*.

TABLE 1
SAMPLE RESPONSES

Value Creation Statements	Change Statements	Leadership Statements
"[Developing a] new business model that overwhelms the current dominant business model."	"Modifying the composition of players in the market"	"Leaders in innovation"
"Create new markets through innovation by recognizing unmet needs."	"Redefines the structure of a market and the nature of competition"	"Lead markets into unfamiliar territory."
"Develops a way of doing business that is so seductively effective that others in the category can't resist doing the same"	"Changing the rules of competition in the category"	"Take the market in new directions."
"Creating the future."		"Leading the way"

From these sample responses, the first dimension underlying market driving seems consistent with *value creation*. Market driving organizations create value by engaging in innovative activities both within the organization, and outside it (Deshpande 2000). This notion aligns with the "discontinuous leap" suggested by Kumar, Scheer and Kotler (2000), as well as the creation of new markets suggested in other works (Hamel and Prahalad 1991; Kim and Mauborgne 1999; Markides 1999). Value creation can occur through means such as: process innovation (Reichheld and Sasser 1990; Greising 1994), strategy implementation (Hamel 1996; Markides 1999), and development of competitive barriers to entry (MacMillan and McGrath 1997; Jaworski, Kohli and Sahay 2000) among others.

The second dimension underlying market driving appears to be *change*. Market driving organizations act as change agents or catalysts. Even in situations where little radical innovation has taken place, market driving firms are able to alter their market conditions to their benefit. Such change could be directed beyond just customers and competitors, to other relevant stakeholders (Morgan and Hunt 1994) of a market driving firm such as channel members, allies/partners, vendors, and regulatory agencies. For example, market driving firms don't just engage in educating customers about product attributes and benefits (Carpenter and Nakamoto 1989; Kumar, Scheer and Kotler 2000), but their activities extend to creating fundamental shifts in the attitudes, behaviors and structures of competitors, allies, potential partners, investors and other industry-level actors (Hill 1997; Shapiro and Varian 1999; Jaworski, Kohli and Sahay 2000).

Closely related to the dimension of change, *leadership* emerges as the third dimension underlying market driving. While it may be possible that any firm might create value or effect change, market driving firms extend themselves farther, compelling other industry participants to follow them in a new direction. The notion of leading product-markets/industries into uncharted territory was not only strongly supported by our qualitative research, but also seems implicit in the existing literature, which discusses the need for firms to be proactive (i.e., Day 1990; 1999; Jaworski, Kohli and Sahay 2000; Narver, Slater and MacLachlan 2001). Evidence suggests that in addition to being multi-dimensional, market driving might be a multi-level concept as well. These different levels of market driving are discussed next.

LEVELS OF MARKET DRIVING ACTIVITY

Extant literature (i.e., Hamel 1996; Markides 1999; Jaworski, Kohli and Sahay 2000; Kumar, Scheer and Kotler 2000) seems to suggest that besides having three underlying dimensions of value creation, change and leadership, market driving activities can occur at multiple levels. Hamel (1996) offers one of the most complete descriptions, suggesting nine "routes to industry revolution," and noting that advantage would more likely fall to the firm that made best use of those routes. Shown in Figure 1, these nine mechanisms for driving change were classified into three general areas: (1) reconceiving a product or service, (2) redefining market space, and (3) redrawing industry boundaries.

These areas are more recently echoed in the definitions of market driving previously discussed. In keeping with these works, we offer three levels at which market driving activity might take place:

- Industry level – activity focused on driving change to the nature of competition by altering the structures and/or functions of industry participants.

- Market level – activity focused on driving change in one or more market space(s) within an industry by altering customer preferences and behaviors.
- Product level – activity focused on driving change to specific products/services within a market by altering the standards for that offering.

Examples of these different levels are described below.

FIGURE 1
NINE ROUTES TO INDUSTRY REVOLUTION
(HAMEL 1996)



Industry Level Activity

Jaworski, Kohli and Sahay (2000) suggest that changing the roles or behaviors of key industry participants is the most direct means of driving markets. Activities such as changing industry scale, disintermediating, reintermediating, and promoting industry convergence drive the development of new business structures or models which permanently alter the nature of competitive, cooperative, and regulatory interactions within an industry (Jaworski, Kohli, and Sahay 2000).

For example, changing the industry scale can alter the number of participants in an industry, either through the addition of new players or the elimination of existing participants (Jaworski, Kohli and Sahay 2000). Similarly, developments like disintermediation and reintermediation can change the vertical channel structure by eliminating or

adding players in the value chain (Hamel 1996). Such activities alter the vertical and horizontal relationships within an industry, shifting the overall balance of power, and redefining the roles played by each remaining participant and those overseeing these roles (Hamel 1996; Jaworski, Kohli and Sahay 2000).

On the other hand, activities like convergence allow an organization to 'blur' the traditional boundaries between industries, and bring ideas/innovations from diverse sources together to give rise to new core competencies (Prahalad and Hamel 1990; Hamel 1996). The creation of new competencies by an organization encourages/forces other firms in a dynamic industry to pursue similar behaviors in order to remain competitive (DiMaggio and Powell 1983; Galaskiewicz and Wasserman 1989).

Therefore in highly competitive and uncertain industries like the high-tech industry, the successful creation of any sustainable competitive advantage through industry-level activities mentioned above is likely to change the behavior of firms in the industry. The structure, processes, and behaviors of the market driving firm are likely to be mimicked by other organizations in the industry in order to maintain parity and/or ensure survival (DiMaggio and Powell 1983; Galaskiewicz and Wasserman 1989). This could also translate to supporting other firm(s) in their market driving activities as allies and partners instead of directly mimicking their behaviors.

Market Level Activity

Market-level activities also provide an indirect means of driving markets through changes in customer behavior, need, and preferences (Kohli, Jaworski and Sahay 2000). Market level activities include pushing the bounds of universality, striving for individuality and increasing accessibility (Hamel 1996). Expanding the bounds of universality, according to Hamel (1996), means to imagine beyond the current customer base to include all potential market segments. Taking this perspective decreases myopia, and drives the boundaries of the current market space through expansion and market creation. Increasing access to the existing market space, and/or creating individual markets through mass customization can also be used to drive markets at this level (Hamel 1996; Kim and Mauborgne 1999). Increasing accessibility removes time and location barriers, while mass customizing products and services can provide customers with feelings of uniqueness and individuality (Hamel 1996). Such behaviors encourage customers (and sometimes regulatory agencies) to consider and adopt new market definitions and boundaries. Market driving results when the subsequent changes in customer behaviors, needs, and preferences compel other industry players to alter their behavior in response.

Product Level Activity

Hamel and Prahalad (1994) note that a disproportionate amount of management talent and time is spent on product-level activities. As such, much of what we currently perceive and conceive as market driving takes place at the product level. Hamel (1996) further observes that firms can significantly influence the evolution of markets and industries through product level activities such as the development of new product features, improvements in product performance, separation of product form from product function, and/or improvement in customer enjoyment/ease of use. Product-level activities not only introduce customers to new attributes, but they can also fundamentally change how customers value existing attributes and future offerings (Carpenter and Nakamoto 1989). Such activities go beyond simple product innovation to drive markets when the changes in customer needs, preferences, and behaviors compel other industry participants to adopt the new product introductions, improvements, features, or standards (Kohli, Jaworski and Sahay 2000).

The effect of product-level activities in driving markets is particularly salient in the high-tech industries because many of these markets tend to be supply-side driven early in the product life cycle (Moriarty and Kosnik 1989). It is not uncommon for successful high-tech firms to take the lead in creating demand for its product by uncovering latent/unarticulated customer needs, rather than waiting for customers to provide explicit feedback about felt needs (Martin 1995; Moriarty and Kosnik 1989; Mohr 2001; Narver, Slater and MacLachlan 2001).

The previous discussion, a review of the literature, and our qualitative data indicates that the different levels of activities along with the three underlying dimensions of value creation, change and leadership, are salient to understanding the market driving paradigm. As a result, we offer an integrated conceptualization of market driving by defining it as *a firm's ability to lead fundamental changes in the evolution of industry conditions by influencing the value creation process at the product, market or industry levels.*

MARKET DRIVING vs. EXISTING MARKET ORIENTATION PARADIGMS

As we have previously suggested, market driving activity is one of a group of distinct components of the market orientation concept. Taken individually, the three dimensions of market driving, value-creation, change, and leadership, may also be found in the existing paradigms of market driven behavior (Kohli and Jaworski 1990; Narver and Slater 1990; Deshpande, Farley and Webster 1993; Jaworski and Kohli 1993), customer leading behavior (Day 1990; 1999), and pioneering behavior (Kerin, Varadarajan, and Peterson 1992; Golder and Tellis 1993). However, what distinguishes the market driving from these existing paradigms is the *simultaneous* presence of the three

underlying dimensions. We submit that the range and scope of our conceptualization of market driving is broader than that offered by the market driven, customer-leading or market pioneering perspectives individually.

The primary differences between a market driving philosophy and the existing paradigms of market driven behavior, customer leading and product pioneering are summarized in Table 2.

As previously suggested, market driven behavior relies heavily on exploitative learning, which occurs within *existing* market boundaries (Kyriakopoulos and Moorman 1998), and hence primarily regarded to be a reactive rather than a proactive stance. The customer leading philosophy, also known as proactive market orientation, is essentially an extension of market driven activity. Customer leading makes use of the untapped market space uncovered by exploratory learning (Day 1990; Kyriakopoulos and Moorman 1998) in order to uncover the unarticulated or latent needs (Narver, Slater and MacLachlan 2001). Firms utilizing this approach are more likely to introduce innovations that radically change customer behaviors and preferences (Day 1990; Narver, Slater and MacLachlan 2001).

The primary differences between market driving, market driven and customer leading activities lie in stakeholder emphasis and active industry change. In both market driven and customer leading activities, the customer is the primary stakeholder of interest. Although a passive secondary emphasis is placed on competitors by some researchers (e.g., Day 1990; Narver and Slater 1990), the competitors are not the active targets of any specific intervention by the firm. As a result, firms engaged in these activities do not seek to introduce change among industry participants beyond the customers and perhaps the competitors.

In contrast market drivers consider the entire range of industry participants as potential stakeholders of interest, including competitors, channel members, alliance partners, and industry regulators among others (Jaworski, Kohli and Sahay 2000); suggesting a more broad-based strategic approach (Burnett 2001). Market drivers seek to effect industry change, either directly at the industry level, or indirectly through changes at the product- and/or market-levels.

We can also note a clear distinction between market driving and pioneering activities. While both approaches are related to value creation, pioneering is limited to the beginning of a technology or product life cycle (Golder and Tellis 1993) and occurs exclusively during the development of new and novel technologies/products. In contrast, market driving is not restricted to the beginning of a product or technology life cycle, but can take place over its entire duration. While pioneering may involve the development of novel concepts or technologies, novelty is not a necessary condition for

TABLE 2.
COMPARISON AMONG MARKET DRIVING AND EXISTING PARADIGMS

	<i>Market Orientation</i>	<i>Customer Leading</i>	<i>Pioneering</i>	Market Driving
Customer Needs	Expressed Narver, Slater & MacLachlan 2001	Latent Narver, Slater & MacLachlan 2001 Day 1999	Expressed or Latent	Expressed or Latent Kumar, Scheer & Kotler 2000
Product or Service Provided	Incremental Narver, Slater & MacLachlan 2001 Day 1999	Radical Narver, Slater & MacLachlan 2001 Day 1999	Radical or Incremental	Radical or Incremental Kumar, Scheer & Kotler 2000
Market	Existing Narver, Slater & MacLachlan 2001 Kohli & Jaworski 1990 Narver & Slater 1990	Existing Narver, Slater & MacLachlan 2001 Day 1999	New Golder & Tellis 1993 Tellis & Golder 1996	Existing or New Kohli, Jaworski & Sahay 2000 Kumar, Scheer & Kotler 2000
Business System Employed	Existing	Existing	Existing or New/Novel	Existing or New/Novel Kohli, Jaworski & Sahay 2000 Kumar, Scheer & Kotler 2000
Changing Customer Behavior/Preference	No Narver, Slater & MacLachlan 2001	Yes Narver, Slater & MacLachlan 2001 Day 1999	No	Yes Kohli, Jaworski & Sahay 2000 Kumar, Scheer & Kotler 2000
Changing Competitor Behavior/Preference	No	No	No	Yes Kohli, Jaworski & Sahay 2000 Kumar, Scheer & Kotler 2000
Changing Industry Structure	No	No	No	Yes Kohli, Jaworski & Sahay 2000

market driving. Thus while most pioneering activities are designed to drive markets, not all market driving activities are a result of pioneering. The primary objective of market driving firms is to influence the evolution of their industry in a direction consistent with their own strengths and abilities, and to derive long-term advantage from such an evolution. As such, this component of market orientation seems particularly well suited to address the unique characteristics of high technology industries.

MARKET DRIVING IN HIGH TECHNOLOGY INDUSTRIES

The Nature of High Technology

The distinctive nature of high technology markets creates conditions under which the market driving approach is particularly applicable. Table 3 summarizes these advantages. However, in order to appreciate the suitability

of marketing driving for the high-tech industries, it is imperative to understand the characteristics that make the high-tech industries unique.

Uncertainty & Volatility

High technology industries are characterized by technological uncertainty, market uncertainty, and competitive volatility (Moriarty and Kosnik 1989; Mohr 2001). Technological uncertainty arises due to doubts about the ability of the new technology to function as expected, deliver the promised benefits, and be compatible with existing technologies (Davidow 1986; Moriarty and Kosnik 1989). Market ambiguity arises not only due to customer fear and anxiety, but also due to concern about the market/customer reaction to the new technology, the ability of the technology to meet customer needs, and the ability of the market to accept the technology as a standard (Levy 1998; Moriarty and Kosnik 1989; Mohr 2001).

TABLE 3
COMPARISON OF APPROACHES FOR HIGH TECHNOLOGY INDUSTRIES

	<i>Market Orientation</i>	<i>Customer Leading</i>	<i>Product Pioneering</i>	Market Driving	<i>Influenced By:</i>
<i>Market Uncertainty</i>	Yes	Yes	Maybe	Yes	<ul style="list-style-type: none"> • Jaworski & Kohli 1990 • Narver & Slater 1990 • Day 1990; 1999 • Kohli, Jaworski & Sahay 2000 • Kumar, Scheer & Kotler 2000
<i>Technological Uncertainty</i>	No	No	Maybe	Yes	<ul style="list-style-type: none"> • Martin 1995 • Day 1999 • Kumar, Sheer & Kotler 2000
<i>Competitive Volatility</i>	Maybe	Maybe	No	Yes	<ul style="list-style-type: none"> • Jaworski & Kohli 1990 • Narver & Slater 1990 • Day 1990; 1999 • Kohli, Jaworski & Sahay 2000 • Kumar, Scheer & Kotler 2000
<i>Network Externalities</i>	No	No	No	Yes	<ul style="list-style-type: none"> • Davidow 1986 • Cohen 1997 • Chan & Mauborgne 1999
<i>Supply Side Conditions</i>	No	Maybe	No	Yes	<ul style="list-style-type: none"> • Davidow 1986 • D'Aveni 1994 • Day 1999
<i>Product Standard Need</i>	Maybe	Maybe	No	Yes	<ul style="list-style-type: none"> • Carpenter & Nakamoto 1989 • Liebowicz & Margolis 1999
<i>Increasing Returns Loop</i>	Maybe	Maybe	No	Yes	<ul style="list-style-type: none"> • Aley 1996 • Arthur 1996 • Hill 1997
<i>Shortened PLC</i>	No	Maybe	Maybe	Yes	<ul style="list-style-type: none"> • Martin 1995 • Kohli, Jaworski & Sahay 2000 • Kumar, Sheer & Kotler 2000
<i>Shortened NPD Cycle Time</i>	No	Maybe	Maybe	Yes	<ul style="list-style-type: none"> • Martin 1995 • Mohr 2001 • Grewal & Tansuhaj 2001

A third characteristic of high-tech markets is competitive volatility, which is defined as the rate of change in market participants, both in terms of the number of competitors and the basis on which participants compete (Mohr 2001). Many high technology industries tend towards hypercompetition, existing in a state of almost constant competitive turbulence due to market disruptions (D'Aveni 1994). Uncertainty and frequent changes in the competitive landscape often force participants in high-tech industries to make decisions with insufficient information, thereby creating a perception of risk in participants at both the

supply and demand side of the industry (D'Aveni 1994).

Product Standards & Increasing Returns

The presence of uncertainty and volatility create in many high technology markets the need for an industry-wide product standard (Arthur 1996; Hill 1997; Shapiro and Varian 1999). Firms that are able to establish their technology/product/process as a standard for the industry dictate what attributes should be valued

(Carpenter and Nakamoto 1989), and what complementary offerings should be available (Hill 1997; Shapiro and Varian 1999). This signals to relevant stakeholders the viability and reliability of the technology, and reduces market uncertainty (Gomes-Casseres 1994; Liebowicz and Margolis 1999). In addition, creating a product standard lends credibility to the developing organization, and strengthens the position of any firm that has adopted and supported that standard (Gomes-Casseres 1994; Liebowicz and Margolis 1999). This reduces the overall competitive volatility as the industry converges on a single, well-defined set of technologies.

Central to the development of a product standard is the creation of an increasing returns feedback loop. This phenomenon suggests that as the number of users using a given technology increases, additional complementary technologies will become available, thus increasing the value of the overall system to existing and potential users (Arthur 1996; Hill 1997). As this positive feedback cycle perpetuates, the size of the user base of the technology reinforces a product standard (Shapiro and Varian 1999). Firms that can take advantage of the increasing returns phenomenon are able to reap disproportionate market rewards, while those that fail to establish or support an increasing returns cycle are often relegated to less desirable niche positions or are eliminated from the market entirely (Aley 1996; Arthur 1996; Hill 1997).

Product Systems & Network Externalities

Many high technology products do not operate in isolation, but instead function within a larger ecosystem of products and services (Gulati 1995; Cohan 1997; Kim and Mauborgne 1999). This subjects a firm to technology changes and innovations from others within a product system (Aley 1996; Hill 1997; Mohr 2001). The resulting externalities increase the rate of product obsolescence and decrease the time available for new product development (Davidow 1986; Moore 1993; Mohr 2001). These additional constraints increase both the market and technical uncertainties associated with new technologies in the high-tech industries (Davidow 1986; Cohan 1997; Kim and Mauborgne 1999).

Appropriateness of Marketing Paradigms to High Technology

Existing literature suggests that the approaches of market driven activity, customer leading and pioneering may only be partially effective in minimizing the effects of these characteristics. Market oriented firms are focused on understanding and responding to established market needs more effectively than the competition (Kohli and Jaworski 1990; Narver and Slater 1990; Deshpande, Farley and Webster 1993). Because offerings are created in response to articulated needs, market uncertainty is effectively minimized. It may also help to create an initial user base for the technology. The competitor data that is gathered for

benchmarking purposes (Day 1990; Narver and Slater 1990) may also provide insight into the level of volatility in the market. What seem to be missing from discussions of the market driven activity philosophy are the mechanisms by which technology development issues are managed. The customer is the primary stakeholder of interest, placing little emphasis on the industry participants needed to establish a product standard or create a viable product system. The focus on articulated needs may result in missed opportunities for radical innovation (Hayes and Abernathy 1980; Martin 1995), rendering the firm unable to effectively manage rapid rates of product obsolescence.

Customer leading, the process of uncovering and responding to latent customer needs (Day 1990; Narver, Slater and MacLachlan 2001) offers similar concerns. As with market driven activity, competitor data is gathered in this approach, and may be used to determine the level of competitive volatility. In focusing on latent needs, customer leading firms direct market preferences in new directions (Day 1990; Narver, Slater and MacLachlan 2001). This can include directing consumer responses to new technology, and encouraging technology acceptance, both of which reduce market uncertainty. By using exploratory learning to discover unarticulated needs, customer leading firms may be better able to adapt to shorter product life cycles through innovation (Martin 1995; Kyriakopoulos and Moorman 1998; Day 1999). Still, this approach seems to lack a mechanism for developing an increasing returns feedback loop (and thus a product standard) from the initial user base, as well as means of insuring functioning product ecosystems.

Pioneers, who are concerned with introducing a new technology to market (Kerin, Varadarajan and Peterson 1992; Golder and Tellis 1993), may place greater emphasis on technology function and rapid new product development (Golder and Tellis 1993). This seems to suggest adequacy at addressing issues of technological uncertainty and shortened product life cycles. However, this concentration on creating new products and/or markets may not adequately address customer needs. Pioneers have often lost advantage to later, more market-oriented entrants (Tellis and Golder 1996).

In contrast to these approaches, a market driving philosophy uses product, market and industry-level changes to create value and set new market directions (Markides 1999; Kohli, Jaworski and Sahay 2000; Kumar, Scheer and Kotler 2000). Similar to customer leading firms, market drivers can direct customer response to a new technology. In addition, other industry stakeholders (e.g., competitors, channel members, and alliance partners) are also encouraged to value the new technology, increasing the likelihood that

complementary products will be developed, minimizing levels of technological uncertainty. Such industry-level change can also lead to convergence upon an industry standard. Product standards provide a definable set of practices for industry participants, reducing the overall level of competitive volatility (Hill 1997; Shapiro and Varian 1999).

Market driving firms can proactively engage in developing inter-firm networks to support a specific technological format in an interdependent manner (Moore 1993; Gomes-Casseres 1994; Coyne and Dye 1998; Shapiro and Varian 1999). These networks/ecosystems provide participant firms with risk sharing, greater access to resources, and the ability to create and exploit scale economies (Moore 1993; Gomes-Casseres 1994). Market driving activities not only increase the availability of complementary products; they also increase the probability that the products developed by the network to support a technological format are likely to be mutually compatible. As such market driving increases the chances of market acceptance of a technology, and reduces the market and technological uncertainties associated with new technologies. Multiple competing technological formats lead to increased volatility in the competitive environment. However, as alternative business ecosystems/networks of alliances compete (Grewal and Tansuhaj 2001; Mohr 2001), one or two will emerge as dominant in the industry, relegating the others to industry niches (Hill 1997). Thus, market driving will ultimately reduce the competitive volatility in high-tech markets.

Implications For Marketing Practice

To summarize, this research has offered a conceptual discussion of the appropriateness of the market driving philosophy for firms operating in high technology markets. After developing an integrated conceptualization for the construct based on the existing literature and qualitative research, we differentiated the market driving approach from existing paradigms of market driven activity, customer leading and pioneering, particularly under high technology market conditions. Market driving firms seek to direct the evolution of an industry in a manner that cannot be achieved through these other approaches. This driving activity seems to be especially appropriate to the high-tech industries

because market driving firms are better prepared to proactively form critical inter-organizational linkages necessary for the development of product systems and industry standards.

It has long been suggested that reliance on a single set of strategic behaviors can lower firm performance (Tushman, Newman and Romanelli 1996). It is, therefore, critical that firms develop both market driven and market driving skills, and understand when each is appropriate (Day 1990). In accordance with existing theory, this research hopes to suggest that successful performance in both the long and short term will be dependent on an understanding of the differences between market driven and market driving activities. Short term advantages are garnered as other industry participants adapt to meet new competitive conditions. As conditions stabilize around new standards of behavior, customer uncertainty and environmental turbulence should be minimized, generating long term advantages as well. We hope this research suggests a theoretical foundation for the development of new mechanisms for determining the scope of marketing strategy implementation. In addition to potential contributions to the practice of marketing, we hope to encourage a stream of empirical research in the area of market driving, as well as broaden our understanding of the role of market orientation in high technology industries.

Limitations and Directions for Future Research

This research has suggested market driving as an alternate paradigm for marketing in high technology industries. However, there is still a great deal of work to be done. Measures of the market driving construct need to be developed and validated. Empirical testing of the relationship between market driving activity and performance must also be conducted. Finally, understanding the capabilities and/or values needed to best implement each level of market driving activity can further substantiate this philosophy's value for obtaining and maintaining competitive advantage in the high technology marketing environment.

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