Strategic Learning Orientations and Competitive Complexity: When What You Know Will (and Won't) Help You

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Abstract

This study extends market orientation research by examining the effect on firm performance of five strategic learning orientations. The authors use complexity theory and relational exchange theory to predict moderating effects for competitive density and relational contracts. The results confirm that strategic learning orientations interact with competitive density to determine performance in transactional market segments but not in relational market segments. These results are consistent with the idea that causal ambiguity obscures the relationships between strategic learning orientations and performance and that relational contracts with customers effectively absorb competitive complexity.

Market orientation has been a focal construct of interest for marketing researchers over the last 15 years. The appearance of two meta-analyses examining the relationship between market orientation and performance suggests that the field of study has reached a level of maturity (Cano, Carrillat, and Jaramillo 2004; Kirca, Jayachandran, and Bearden 2005). Both studies agree that market orientation has a consistently positive effect on performance. Cano, Carrillat, and Jaramillo (2004, p. 179) conclude that "… the relationship between market orientation and performance is positive and consistent worldwide." Kirca, Jayachandran, and Bearden (2005, p. 30) conclude that, "Market orientation can improve an organization's performance by enhancing the satisfaction and loyalty of it customers, the quality of its products and services, and its innovativeness…" revenues, and profits.

Despite widespread support for the positive effects of market orientation, recent research has emphasized the importance of deconstructing the market orientation construct into its component parts and incorporating other orientations that might compete for firm resources and deliver competitive advantage. Empirical results have demonstrated that customer and competitor orientations, for example, can have independent and sometimes opposite effects on firm performance (e.g., Gatignon and Xuereb 1997; Han, Kim, and Srivastava 1998; Noble, Sinha, and Kumar 2002; Voss and Voss 2000) and that these effects may vary depending on the firm's business strategy (Olson, Slater, and Hult 2005). Noble, Sinha, and Kumar (2002, p. 36; see also Zhou, Kin, and Tse 2005) offer compelling evidence that "there are competitive cultures beyond the traditional view of market orientation that may lead to strong firm performance." Ignoring the effects of alternative cultures or orientations increases the risk of omitted variable bias leading to spurious associations.

To expand the traditional market orientation conceptualization, we incorporate five distinct strategic learning orientations. We focus on strategic learning at the level of the independent business unit, which we refer to as a firm. Strategic learning is a dynamic capability that uses coordinated search routines to identify and exploit external and internal information to create competitive advantage (Eisenhardt and Martin 2000; Teece, Pisano, and Shuen 1997). By extension, strategic learning orientations are specific routines that identify and exploit external and internal sources of knowledge. Collectively, these strategic learning orientations capture knowledge that comes from customers, competitors, suppliers, innovation, and internal adaptive learning processes.

Although early market orientation theory recognized the need to integrate contingency factors (e.g., market turbulence, technological turbulence, and competitive intensity) that might moderate the relationship between market orientation and performance (Jaworski and

Kohli 1993; Kohli and Jaworski 1990; Narver and Slater 1990; Slater and Narver 1994), results of empirical tests examining the role of these moderators have been equivocal (Kirca, Jayachandran, and Bearden 2005). The common use of self-reported measures for independent, moderating, and dependent variables may be responsible for these inconsistent findings. Self-report measures may not capture nuanced variation, so that information lost due to range restrictions and coarseness can attenuate researchers' ability to detect significant moderation effects that truly exist in the population (Russell and Bobko 1992). We use complexity theory to reexamine the role of environmental moderators, and we collect objective measures of moderating and dependent variables to empirically examine the proposed relationships.

Marketing theory recognizes the importance of performance within different market segments, but there have been few attempts to incorporate market segmentation and targeting into the market orientation theory or testing. For example, evidence indicates that, although an intense customer focus facilitates incremental innovation that satisfies current customers, it may also lead to myopia and missed product or market opportunities (e.g., Chandy and Tellis 2000; Christensen and Bower 1996; Voss, Montoya-Weiss, and Voss 2006). This suggests that different market segments may respond better or worse to different strategic learning orientations. To address this gap, we explicitly examine the effect of strategic learning orientations on performance in two distinct market segments, relational and transactional.

To summarize the strengths and contributions, this study adopts a dynamic capabilities perspective to conceptualize the value of customer, competitor, supplier, innovation, and adaptive learning to the firm. We integrate complexity theory and relational exchange theory to hypothesize that competitive interdependencies in the marketplace differentially moderate the relationship between each strategic learning orientation and firm performance in relational and transactional market segments. To test our hypotheses, we implement a two-stage design using three data sources for a single industry that: (1) establishes temporal ordering between strategic learning orientations measured during the fiscal year and objective firm performance measured at the end of the fiscal year; (2) captures firm performance in two distinct market segments, relational and transactional; (3) includes objective measures of market-level competitive density; (4) incorporates lagged measures of the dependent variables to control for initial conditions; and (5) controls for the effect of current-year, firm-level expenditures on targeted promotional activity. The results offer compelling empirical support for hypotheses drawn from complexity theory simulations, which leads us to concur with Lusch and Brown (1996, p. 33) that "…the literature stands much to gain by cross-pollinating empirical research with analytic modeling research."

Theoretical Development

Following Hunt and Morgan (1995), we begin with the assumption that firms seek superior performance by using heterogeneous, imperfectly mobile resources to create and modify strategies under conditions of imperfect information with respect to buyers and competitors, in a dynamic environment that features heterogeneous and dynamic demand, buyers who have limited and imperfect information, and sellers and buyers who are motivated by constrained self-interest. We adapt complexity theory (Anderson 1999; Holbrook 2003; Kauffman 1993; McKelvey 1999; Levinthal and Warglien 1999) to conceptualize competitive markets as dynamic, open, complex, adaptive systems composed of a nested hierarchy of complex adaptive systems that represent competing firms, which are in turn composed of a nested hierarchy of complex adaptive systems that may be thought of as product portfolios or distinctive competencies. Consistent with the idea of bounded rationality, firms are unable to foresee system-level outcomes and therefore seek out local optima (Simon 1991). This means that firm behaviors and performance are sensitive to initial conditions (Holbrook 2003).

Building on complexity theory and simulation results, we propose that firm performance is maximized when internal complexity matches the complexity of the external environment (Anderson 1999; Galbraith 1982; McKelvey 1999). Product portfolio activities represent a key form of internal complexity, which increases as the firm engages in more product exploration and innovation. Competitive complexity is a key form of external complexity, which increases as a function of the density of competition (Kauffman 1993; McKelvey 1999); we use the terms competitive complexity and competitive density interchangeably. Appendix A provides greater detail for the conceptualization of product and competitive complexity.

We offer conceptual and empirical evidence that a product innovation strategy provides the best fit in markets featuring many competitors and a product proliferation strategy provides the best fit in markets featuring few competitors. Building on this evidence, we hypothesize that competitive density moderates the relationships between strategic learning orientations and firm performance. We also hypothesize that firms and customers use relational strategies to mitigate the moderating effect of competitive density. We present our conceptual model in Figure 1.

------------ Insert Figure 1 about here ----------

Complexity Theory

Complexity theory addresses the behavior of dynamic systems that are poised between order and chaos, where specific behavior may be unpredictable even though the general structure of behavior is predictable. Although empirical research applying complexity theory to firm behavior is negligible, theorists have used complexity theory to model firm behavior and performance. Complexity theory simulations indicate that performance is most positive and stable in markets with relatively few firms and low levels of internal complexity (McKelvey 1999). For a given level of product complexity, performance levels remain constant with increases in the number of products; holding the number of products constant, fitness levels decrease with increases in product complexity; and when the number and complexity of products increase linearly, complexity catastrophe occurs (McKelvey 1999). This implies that firms competing in low competition markets achieve peak performance if they engage in incremental product modification and proliferation (increasing the number of products), with little attempt to increase product complexity through innovation. This product proliferation strategy reduces direct competition and competitive complexity by creating entry barriers, resulting in a rugged landscape with a few local optima. There is substantial support for complexity theory's prediction that a product proliferation strategy provides the best fit for a firm competing in mature, low product complexity markets (e.g., Connor 1981; Kekre and Srinivasan 1990; Putsis 1997; Schmalensee 1978).

As competitive density increases, firms increase performance by increasing internal complexity (McKelvey 1999). This suggests that firms introducing innovative new products should perform better in complex environments that feature a large number of competitors. Empirical research in the semiconductor industry (Barnett and Freeman 2001) and personal computer industry (Bayus and Putsis 1999) supports complexity theory's prediction that product proliferation is not successful in high-growth, technologically dynamic, and competitively fragmented product-markets. Under these conditions, proliferation does not deter entry and leads to higher costs and likelihood of organizational failure; instead, firms should focus on introducing newer technologies with higher prices and avoid the costs of proliferation.

To summarize, following complexity simulation results that are supported by conceptual and empirical evidence, we propose that a product proliferation strategy offers the best fit in low competition conditions and a product innovation strategy offers the best fit in high competition conditions. The implicit logic is that firms in complex, dynamic markets can use exploration and innovation to reduce direct competition and firms in stable, low-density markets can use exploitation and proliferation to reduce both product and competitive complexity. We now extend these propositions to hypothesize that the value of each strategic learning orientation is moderated by the competitive density of the external environment.

The Value of Strategic Learning Orientations as a Function of Competitive Density

Grant (1996) argues that the primary role of the firm is to integrate and utilize knowledge, a dynamic capability that Cohen and Levinthal (1990) refer to as absorptive capacity. Strategic learning orientations are routines that build a firm's absorptive capacity by acquiring knowledge from external sources and by investing in internal knowledge assimilation and transformation (Henderson and Cockburn 1998; Zahra and George 2002). Customer, competitor, and supplier learning orientations focus on acquiring knowledge from the external environment, and innovation and adaptive learning orientations focus on internal knowledge assimilation and transformation.

Consistent with Day and Nedungadi (1994), we expect that firms tend to place greater emphasis on certain elements of the environment, to the exclusion of others. This position is consistent with complexity theory and simulations, which suggest that too much complexity diminishes learning so that, regardless of the level of internal and external complexity, firms gain little advantage from pursuing more than a couple simultaneous changes (McKelvey 1999; see also Barnett and Freeman 2001; Levinthal and March 1993; Miner, Amburgey, and Stearns 1990). We use this insight to support our fundamental assumption that an attempt to simultaneously maximize strategic learning on all dimensions will be counterproductive. Instead, firms maximize performance by focusing on strategic learning orientations that are consistent with the external environment to the exclusion of orientations that are not. Furthermore, we expect that the relationship between firm performance and each learning orientation will vary depending on the level of competitive density. In stable, low-density markets, firms should institute small variations that exploit current knowledge and capabilities, whereas in dynamic, complex markets, firms should develop dynamic capabilities that explore fresh, real-time, situation-specific knowledge (Eisenhardt and Martin 2000).

Customer learning orientation. A customer learning orientation is a routine focused on incorporating customer expectations and preferences in developing and modifying product offerings. A customer learning orientation promotes close interactions with current customers and incremental improvements that move products ever closer to optimal levels of quality and cost. This focus on evolving customer desires is particularly effective in achieving customer satisfaction and competitive advantage in stable environments (Slater and Narver 1998). Because an intense customer focus may lead to inertia, myopia, and missed product or market opportunities (e.g., Chandy and Tellis 2000; Christensen and Bower 1996; Voss and Voss 2000), it may be less effective in delivering competitive advantage in dynamic environments. This suggests that a customer learning orientation is more consistent with a product proliferation strategy under low competitive density conditions and less consistent with a product innovation strategy under high competitive density conditions. More formally, we hypothesize:

H_1 Competitive density moderates (attenuates) the relationship between a customer learning orientation and firm performance.

Competitor learning orientation. A competitor learning orientation is a routine focused on collecting intelligence on competitive actions and industry trends. There are opposing perspectives as to whether a competitor orientation is more valuable when there are few or many competitors. One perspective argues that the actions of any one competitor have a greater impact when there are a small number of competitors (i.e., head to head competition). However, conceptual and empirical evidence suggests that oligopolies in stable markets avoid head-to-head competition and focus instead on high prices, brand proliferation and advertising (e.g., Schmalensee 1978). This evidence is consistent with Levinthal and Warglien (1999) arguments that the landscape becomes more rugged, with greater space between peaks, as interdependency increases. As competitive density increases, on the other hand, the landscape becomes less rugged and firms are more directly impacted by multiple competitor actions. This pressures firms to learn more about their competitors in order to formulate appropriate responses to competitor actions (Han, Kim, and Srivastava 1998; Jaworski and Kohli 1993). By extension, ignoring competitor actions would have a greater negative impact on performance in competitively dense markets than it would in less competitive markets. Finally, competitor actions in complex markets are more dynamic so that greater knowledge can be gleaned from implementing a competitor learning orientation. This suggests that:

H_2 Competitive density moderates (enhances) the relationship between a competitor learning orientation and firm performance.

Innovation learning orientation. An innovation learning orientation is a routine that emphasizes the importance of generating and cultivating new ideas that result in innovative new product offerings. Cohen and Levinthal (1990) view a focus on new product research and development as a critical activity underlying a firm's absorptive capacity. Eisenhardt and Martin (2000) view innovation routines as one of the keys to developing dynamic capabilities in "high-velocity" markets. We believe that an innovation learning orientation should be more important – and more positively associated with performance -- under high competitive density conditions that emphasize product innovation and less important under low competitive density conditions that emphasize product proliferation. The following hypothesis formalizes the expected relationship.

H_3 Competitive density moderates (enhances) the relationship between an innovation learning orientation and firm performance.

Supplier learning orientation. A supplier learning orientation is a routine that generates knowledge and insights from more (versus fewer) supplier relationships. We expect that a supplier learning orientation emphasizing a larger number of supplier relationships will be more beneficial for a product proliferation strategy under low competitive density conditions than it will be for a product innovation strategy under high competitive density conditions. We base this expectation on two lines of reasoning. First, multiple suppliers provide the requisite variety to implement a product proliferation strategy. Because there is low product and competitive complexity, it is easier to incorporate the relational complexity of using multiple suppliers. In addition, there is no clear advantage to using multiple suppliers for a product innovation strategy where it would be more important to identify a small number of innovative suppliers rather than a large number of suppliers offering variety. Coupling high supplier relational complexity with high internal product complexity runs the risk of creating a chaotic, unmanageable supply chain (Hilbert and Wilkinson 1994). We therefore hypothesize:

H_4 Competitive density moderates (attenuates) the relationship between a supplier learning orientation and firm performance.

Adaptive learning orientation. An adaptive learning orientation is a routine that emphasizes a structured, self-evaluation process designed to enhance performance by changing behavior or knowledge. Adaptive learning is consistent with experimental learning (Miner, Bassof, and Moorman 2001) or a selectionism approach to product development, in which various alternatives are developed in parallel and evaluated, with the best solution ultimately selected (Sommer and Loch 2004). This structured, linear approach to decision-making and learning is appropriate when complexity is low, markets are relatively stable, and perfect trials are available (Eisenhardt and Martin 2000; Sommer and Loch 2004). In complex, dynamic markets, where change is unpredictable and at times nonlinear, building on existing knowledge may be a disadvantage; instead, trial and error prototyping, which may involve high levels of improvisation and where learning may not even be the goal, is more appropriate (Eisenhardt and Martin 2000; Miner, Bassoff, and Moorman 2001). Collectively, this suggests that an adaptive learning orientation will be more beneficial for a product proliferation strategy under low competitive density conditions than it will be for a product innovation strategy under high competitive density conditions.

H_5 Competitive density moderates (attenuates) the relationship between an adaptive learning orientation and firm performance.

The Use of Relational Strategies to Absorb Competitive Complexity

At high levels of competitive density, both customers and firms may be motivated to reduce complexity. For customers, relational behavior reduces risk and simplifies complex decisions (Sheth and Parvatiyar 1995; Menon and Kahn 1995; Van Trijp, Hoyer, and Inman 1996; Voss, Montoya-Weiss, and Voss 2006). For sellers, relational exchange reduces uncertainty by replacing competitive interdependence with more seller-buyer interdependence, effectively absorbing some of the overall network complexity (Boisot and Child 1999).

Although there are various forms of relational exchange, explicit buyer-seller contracts are particularly effective in reducing competitive complexity. Explicit contracts build formal bonds and erect switching barriers, which provide advantage that is insulated from competitor actions. Explicit contracts also reflect a long-term orientation between buyers and sellers (e.g., Lusch and Brown 1996). We expect that relational contracts will reduce competitive complexity and its effects, so that the moderating effects of competitive density will be mitigated. More formally,

H_6 Explicit contracts moderate (attenuate) the moderating effects of competitive density, such that competitive density will have stronger moderating effects on firm performance in transactional market segments than in contractual market segments.

The Research Program

We chose the nonprofit professional theater industry in the United States as the context to examine the linkage between strategic learning orientations and firm performance. Given that the theoretical advantages of different strategic learning orientations hinge on adapting to diverse environmental demands, it is important to test the effects of multiple identities in environments characterized by instability and ambiguity. Like other cultural industries, the nonprofit professional theater industry is marked by changing, ambiguous, and unstable environments because (a) it has experienced significant declines in federal, state, and local funding, and (b) its products are interpretive and experimental, meaning that nonprofit professional theaters must cope with uncertain consumer demand, rapidly changing products and production processes, and unpredictable product success (Voss, Montoya-Weiss, and Voss 2006).

In the present study, we focused on theaters that are members of Theatre Communications Group (TCG). TCG is the largest service organization to the nonprofit professional theater industry in the United States, and membership is open to all nonprofit professional theaters with annual budgets of $50,000 or more. Each year, TCG conducts a survey of its members' fiscal and operating performance, verifying each theater's information against external accounting audits and daily house management reports to insure accuracy. In 2003, TCG member theaters constituted a $903-million industry, producing over 66,000 performances for 18.2 million ticket buyers, and employing approximately 43,685 individuals (Voss et al. 2004). Focusing on TCG member theaters is useful because it increases firm comparability by setting a minimum size and fiscal responsibility.

Measurement

We tested the hypotheses by combining survey data (regarding theaters' strategic learning orientations) with performance data collected by TCG, and we designed the timing of the study to remove concerns of endogeneity and simultaneity. At the end of fiscal year (FY) 2002, we mailed strategic learning orientation surveys to the managing director at each of the 287 TCG member theaters and made two follow-up contacts with nonrespondents. We received responses from 152 managing directors (53% response rate). At the end of FY2003, TCG collected financial performance measures for each theater. This two-wave design ensures temporal ordering that is consistent with the theoretical prediction that strategic learning orientation leads to organizational performance. Our final analyses are based on the 128 theaters for which we received survey responses and subsequent year's performance data from TCG. We present descriptive statistics and a correlation matrix for the variables of interest in Table 1.

---------- Insert Table 1 about here ---------

Market Segment Revenues. We used objective ticket revenues to measure firm performance. Total ticket revenue represents overall ticket sales to transactional and relational customers. Single ticket revenue comes from transactional customers who purchase tickets for a single performance. Subscriber ticket revenue comes from relational customers who prepurchase a package of plays, typically an entire season. Eighteen theaters did not offer subscription packages, reducing the sample size to 110 for the subscriber ticket revenue analysis. To control for firm size effects, we divided the revenue measures by the theater's total annual seating capacity, that is, the total number of seats available at all performances during the year.

Strategic Learning Orientations. To measure the five strategic learning orientations, we used multiple-item scales that were drawn from the literature and adapted to the nonprofit theater industry, resulting in scales that reflect strategic learning orientations in the theater industry. Appendix B presents descriptions of the items and the factor analysis results. The factor analysis produced five factors with eigen values greater than 1, which collectively explained 71% of total variance. Items for each scale loaded together on a single factor, none of the cross-factor loadings exceeded .30, and all of the scale reliabilities exceeded .70.

Competitive density. We used secondary measures of competitive density compiled by *Money* magazine for its 2003 annual ranking of the "Best Places to Live in America" (see http://money.cnn.com/best/bplive/). Rankings are provided for a variety of categories, including a measure of the number of theaters within 30 miles of the city center. Competitive density scores for our sample ranged from 3 to 1153.

Control variables. We included controls for firm-level and market-level heterogeneity. To control for firm-level heterogeneity, we included the lagged dependent variable in each analysis to control for initial conditions and current-year promotion expenditures (divided by total annual capacity to control for firm size) along with a quadratic term to allow for curvilinearity. To control for market-level heterogeneity, we included the local market population reported in the *Money* magazine annual rankings of cities. We also implemented the Heckman (1979) two-step procedure to control for selection bias; however, the selection control variable was not significant, which indicates that selection bias was not a serious concern, so we omitted it from our final analyses.

Hypothesis Tests

We used moderator regression analysis to test the hypotheses (see Table 2). To minimize collinearity, we mean-centered the lower-order terms before creating interaction terms. The largest variance inflation factor was less than 10, suggesting that collinearity was not a serious problem. To test $H_{1\text{-}5}$, we examine the results with total ticket revenue, single ticket revenue and subscriber revenue as the dependent variable. To test H_6, we compare the results for single ticket revenue and subscriber revenue.

---------- Insert Table 2 about here ---------

H_1 predicted that competitive density would attenuate the relationship between firm performance and customer learning orientation. This hypothesis is supported by the analyses with total ticket revenue ($\beta = -.13$; $p < .01$) and single ticket revenue ($\beta = -.20$; $p < .01$) as the dependent variable but not with subscriber ticket revenue. To facilitate interpretation of the interaction, we plotted the customer learning orientation × competitive density interaction with single ticket revenue as the dependent variable. As depicted in Figure 2, Panel A, the relationship between customer learning orientation and single ticket revenue is positive at lower levels of competitive density but is negative at higher levels of competitive density.

H_2, which predicted that competitive density would enhance the relationship between firm performance and competitor learning orientation, is supported by the analyses with total ticket revenue ($\beta = .13$; $p < .05$) and single ticket revenue ($\beta = .16$; $p < .05$) as the dependent variable but not with subscriber ticket revenue. Figure 2, Panel B shows that the relationship between competitor learning orientation and single ticket revenue is nonsignificant at lower levels of competitive density but is positive at higher levels of competitive density.

-------- Insert Figure 2 about here --------

H_3 predicted that competitive density would enhance the relationship between firm performance and innovation learning orientation. This hypothesis is supported by the analyses with total ticket revenue ($\beta = .08$; $p < .10$) and single ticket revenue ($\beta = .17$; $p < .05$) as the dependent variable but not with subscriber ticket revenue. As depicted in Figure 2, Panel C, the relationship between innovation learning orientation and single ticket revenue is nonsignificant at lower levels of competitive density but is significantly positive at higher levels of competitive density.

H_4, which predicted that competitive density would attenuate the relationship between firm performance and supplier learning orientation, is supported in the analyses with total ticket revenue ($\beta = -.14$; $p < .01$) and single ticket revenue ($\beta = -.25$; $p < .01$) but not with subscriber ticket revenue. Figure 2, Panel D, indicates that the relationship between supplier learning orientation and single ticket revenue is positive at lower levels of competitive density and negative at higher levels of competitive density.

H_5, which predicted that competitive density would moderate (attenuate) the relationship between firm performance and adaptive learning orientation, is supported in the analyses with total ticket revenue ($\beta = -.09$; $p < .10$) and single ticket revenue ($\beta = -.13$; $p < .05$) but not with subscriber ticket revenue. As depicted in Figure 2, Panel E, the relationship between adaptive learning orientation and single ticket revenue is positive at lower levels of competitive density and negative at higher levels of competitive density.

H_6 predicted that explicit contracts would attenuate the moderating effects of competitive density. We test this hypothesis by comparing the results with single ticket revenue as the dependent variable with the results with subscriber ticket revenue as the dependent variable. Consistent with H_6, competitive density significantly moderates the relationships between single ticket revenues and all of the strategic learning orientations and does not significantly moderate the relationships between subscriber ticket revenue and any of the strategic learning orientations. The F-value testing the significance of all five moderating effects is significant in the analysis with single ticket revenue as the dependent variable (F-value = 4.83, $p < .01$) but not in the analysis with subscriber ticket revenue (F-value = 1.87, $p > .10$).

Discussion

This paper relies on complexity theory and relational exchange theory to advance two central themes, each of which is supported by our results. First, there are various sources of knowledge available to firms and the value of each strategic learning orientation in terms of firm performance is contingent on the competitive density of the market. Complexity theory predicts that in low competition markets, firms achieve maximum fitness by implementing a product proliferation strategy that emphasizes low innovation and incremental product modification. This strategy satisfies customers with variety and an optimal configuration of features. Consistent with expectations, firms operating in low complexity markets perform better if they adopt customer, supplier, and adaptive learning orientations; competitor and innovation learning orientations offer no performance advantages (see Figure 2).

In high competition markets, complexity theory predicts that firms achieve maximum fitness by implementing a product innovation strategy that clearly differentiates the firm's offerings from competitors. Consistent with expectations, firms operating in complex markets perform better if they adopt competitor and innovation learning orientations; customer, supplier, and adaptive learning orientations actually lead to lower performance (see Figure 2). These findings support Eisenhardt and Martin's (2000) contention that high levels of environmental dynamism require firms to focus on simple, dynamic, real-time capabilities and to ignore the "…cacophony of information and possibilities" (p. 1112). In other words, attempts to integrate multiple sources of knowledge under conditions of high product and competitive complexity lead to complexity catastrophe.

Second, firms can use relational strategies to mitigate the effect of competitive density, effectively absorbing some of the relational complexity and insulating firms from competitive actions. Consistent with expectations, competitive density exerted no significant moderating effects on the link between any strategic learning orientation and performance with relational market segments. The results suggest that relational segments respond similarly to the various strategic learning orientations across markets whereas transactional segments vary. The significant main effects indicate that, regardless of competitive density, firms perform significantly better with relational segments if they adopt a competitor learning orientation ($\beta = .16$; $p < .05$) and significantly worse if they adopt an innovation learning orientation ($\beta = -.18$; $p < .01$); customer, supplier, and adaptive learning orientations have no significant effect on performance in relational segments (see Table 2). The negative relationship between innovation learning orientation and performance in relational segments is consistent with prior research suggesting that maintaining close relationships with customers can lead to core rigidities in innovation (e.g., Christensen and Bower 1996). The implication is that close relationships with current customers may stifle firm innovation *and* that high levels of innovation may compromise a firm's ability to develop close, ongoing relationships with its customers (Voss, Montoya-Weiss, and Voss 2006).

Implications

In an even-handed assessment of the value of complexity in organizational research, Cohen (1991, p. 375) recognizes the challenges of measurement, definition, and empirical validation, but concludes that, "Although the theory of complexity is not in hand, the collection of insights and tools we do have is a valuable resource that embodies a distinctive point of view, and suggests new kinds of questions." Our study represents one of the first successful attempts to empirically validate complexity theory predictions and simulation results. We hope that the results will encourage other marketing researchers to take up the challenge.

The results also lend support to recent conceptual advances in the dynamic capabilities literature. Eisenhardt and Martin (2000) criticize prior literature for being too vague and tautological in defining dynamic capabilities, and they argue that dynamic capabilities are specific organizational processes or routines whose value depends on the dynamics of the marketplace. In this study, we conceptualize and operationalize five distinct capabilities and demonstrate that the value of *each* capability depends on the dynamics of the marketplace. These findings should energize researchers to more clearly articulate and expand conceptualizations of firm capabilities and the contingencies that may moderate their impact on firm performance.

The implications for managers are direct. Although our study examined the performance of relatively small firms that compete in a single geographic market, the results generate insights for larger organizations that compete in multiple geographic and product markets. The results call for distinctly different strategies in markets that feature different levels of competitive density. This could translate as urban versus rural markets, advanced versus developing international markets, or even related but distinctly different product markets. In low density markets, firms want to flood the market with low complexity product variations matching local customer needs. In high density markets, firms want to introduce innovations that are clearly differentiated from competitors.

Our results, coupled with various theoretical perspectives, also hint that firms should organize divergent strategic thrusts as independent business units. Our results demonstrate that successfully implementing a product innovation strategy in complex markets requires distinctly different strategic learning orientations than does a product proliferation strategy in less complex markets. Complexity theory would argue that attempting to integrate these disparate activities and capabilities would push the firm toward chaos; instead, the organization should deliberately reduce internal interdependencies by creating structural holes (e.g., separate business units) that facilitate innovative entrepreneurial behavior (Burt 1992; McKelvey 1999). This thinking is consistent with recent organizational (e.g., Benner and Tushman 2003) and innovation theory (e.g., Christenson and Bower 1996).

Based on our findings, we speculate that firms can use a competitor learning orientation to establish and maintain competitive advantage during market transitions from higher to lower product and competitive complexity. This type of transition can produce a shakeout as less capable and less endowed firms fail. A key challenge during transition is determining how firms can translate early-mover advantages accrued in dynamic markets into long-term advantages that persist after the market has stabilized. A competitor learning orientation has a positive impact on performance in relational segments in both high-complexity and low-complexity markets as well as a positive impact on performance in transactional segments in high-complexity markets, which becomes nonsignificant in low-complexity markets. This suggests that a competitor learning orientation is a dynamic capability that offers competitive advantage that likely persists as the market matures.

The use of relational strategies offers another opportunity for establishing and maintaining competitive advantage. Although relational contracts may not be practical in all industries, performance in relational segments increased significantly ($\beta = .26$; $p < .05$, Table 2) as competitive density increased in this industry. This suggests that firms and/or customers are motivated to engage in relational exchange as a mechanism to reduce competitive complexity. Buyer-seller contracts reduce complexity for customers, simplifying their decision-making by reducing their evoked set of vendor choice. At the same time, a relational strategy reduces the effects of competition for the firm, erecting switching barriers that insulate from competitor actions. Establishing customer relationships early creates a resource advantage that competitors may have difficulty attacking as the market stabilizes.

At the same time, successfully transitioning from a high to low complexity market requires changes in dynamic capabilities. Specifically, an innovation learning orientation is less valuable and a customer learning orientation is more valuable in low complexity markets. Firms may experience difficulties implementing a customer learning orientation and the impact on performance may not be positive if the change is poorly executed *or* poorly timed (see Day 2005).

Limitations and Future Research Directions

Although we speculate about evolving dynamic capabilities in response to transitioning markets, our research focused on firm capabilities and performance in a single industry over a single year. Future research should examine temporal changes in demand and product and competitive complexity and how the value of different strategic learning orientations changes over time. For example, increasing gas prices have created a profound shift in consumer preferences for automobile technologies in the U.S. The increasing demand for gas-saving technologies is pressuring US automobile manufacturers (who generally lag the Japanese rivals) to change their strategies. To increase product innovation, US automobile manufacturers have cut their supplier learning orientation (i.e., cut the number of suppliers), a move consistent with our hypotheses and results. Our results suggest that the US automobile manufacturers also should cut the number of car models and increase competitor and innovation learning orientations to successfully transition from a product proliferation strategy to a product innovation strategy. We clearly need additional research exploring the causal ambiguity linking strategic learning orientations to firm performance under different environmental conditions.

Although the use of a single industry enhances the study's internal validity, caution should be used when generalizing the findings to other industries. This underscores the need to examine complexity theory using different industries and with different samples. We suspect that findings with respect to environmental factors such as competitive density will be particularly difficult to extend across different industries. What is dense competition in one industry may represent low or moderate density in another. Indeed, the use of samples of respondents from multiple industries and self-report measures of environmental conditions may explain why prior market orientation studies have produced equivocal results for hypothesized environmental moderating effects. We hope that the results of this study will encourage researchers to re-examine moderating effects that provide fresh insights as to *when* different learning orientations likely lead to enhanced firm performance.

Table 1
Descriptive Statistics and Correlation Matrix for Variables of Interest*

		Mean (Standard Deviation)	I	II	III	IV	V	VI	VII	VIII
I	Total ticket revenue +	13.74 (7.25)	NA							
II	Single ticket revenue +	7.61 (4.23)	.67	NA						
III	Subscriber ticket revenue +	6.13 (5.43)	.81	.12	NA					
IV	Customer learning orientation	3.26 (1.23)	-.20	-.12	-.17	.73				
V	Competitor learning orientation	5.00 (1.27)	.17	.03	.22	-.12	.82			
VI	Innovation learning orientation	5.16 (1.75)	.13	.05	.16	-.12	.31	.86		
VII	Supplier learning orientation	3.59 (1.02)	.28	.11	.27	.09	.20	.16	.72	
VIII	Adaptive learning orientation	5.27 (1.10)	-.11	.01	-.07	.19	.28	-.03	.04	.74
IX	Competitive density	218.55 (341.08)	.08	.03	.03	-.05	.05	.15	.06	-.03

Notes: Coefficient alphas are presented on the diagonal for latent constructs (NA=Not applicable)
* Correlations > |.22| are significant at $p < .01$; > |.17| are significant at $p < .05$ (two-tailed test).
+ The revenue variables are expressed as dollars per available seat; these variables were log transformed to improve distribution prior to hypothesis testing.

Table 2
Regression Analysis Results

		Expected Sign	Total Ticket Revenue	Single Ticket Revenue	Subscriber Ticket Revenue
H_1	Customer learning orientation × Competitive density	-	-.13[a]	-.20[a]	-.06
H_2	Competitor learning orientation × Competitive density	+	.13[b]	.16[b]	.05
H_3	Innovation learning orientation × Competitive density	+	.08[c]	.17[b]	-.13
H_4	Supplier learning orientation × Competitive density	-	-.14[a]	-.25[a]	.08
H_5	Adaptive learning orientation × Competitive density	-	-.09[c]	-.13[b]	-.05
Main effects					
	Customer learning orientation		.03	-.02	.08
	Competitor learning orientation		.09[b]	.12[b]	.16[b]
	Innovation learning orientation		.04	.14[b]	-.18[a]
	Supplier learning orientation		.01	-.04	.04
	Adaptive learning orientation		-.02	-.01	-.03
	Competitive density		.23[b]	.13	.26[b]
Control variables					
	Lagged dependent variable		.64[a]	.73[a]	.70[a]
	Promotion expenditures		.37[a]	.35[a]	.34[a]
	Promotion expenditures squared		-.18[a]	-.19[a]	-.24[a]
	Population		-.50[a]	-.47[a]	-.32[b]
Model fit					
	R^2		.81[a]	.70[a]	.77[a]
	Adjusted R^2		.79[a]	.67[a]	.73[a]
	F-value testing competitive density moderation		3.24[a]	4.83[a]	1.17
	F-test degrees of freedom		5/112	5/112	5/94

[a] Significant at $p < .01$; [b] significant at $p < .05$; [c] significant at $p < .10$ (F test or one-tailed t-test);

Figure 1
Conceptualizing the Moderating Roles of Competitive Density and Relational Contracts

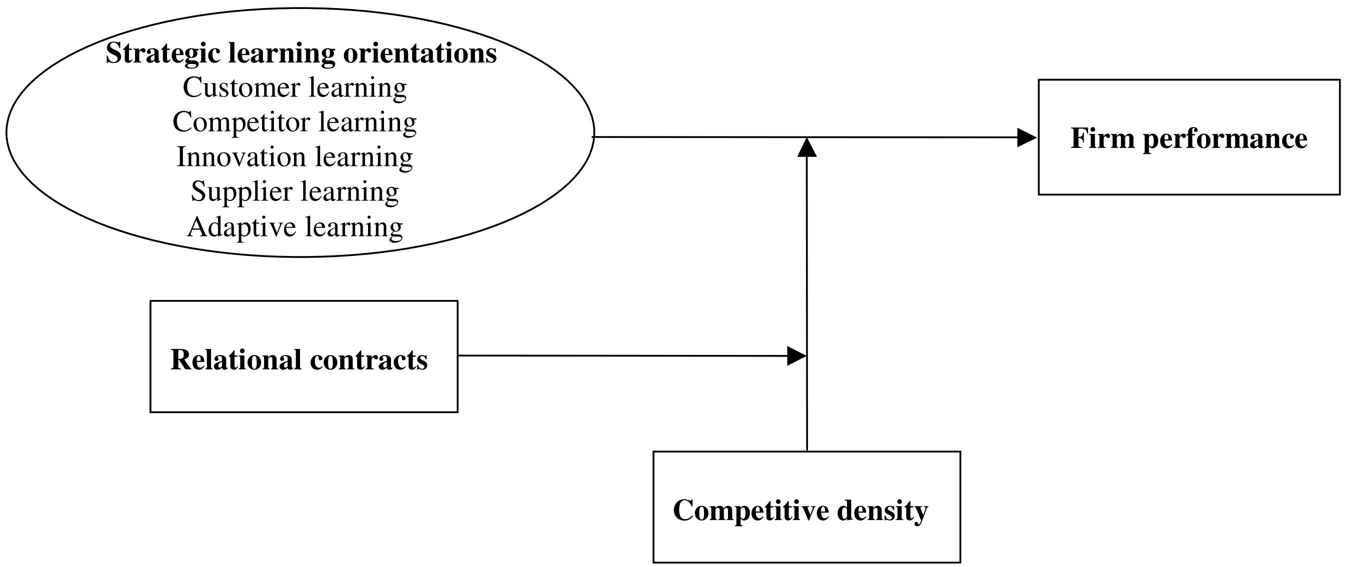
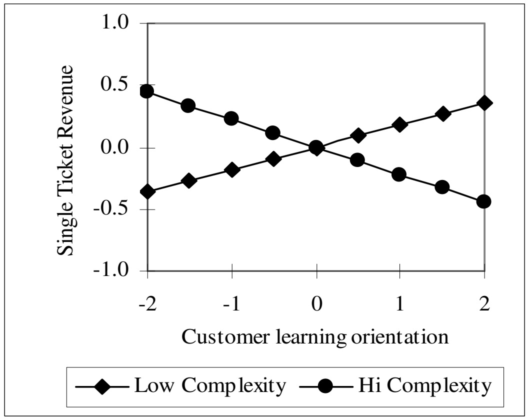
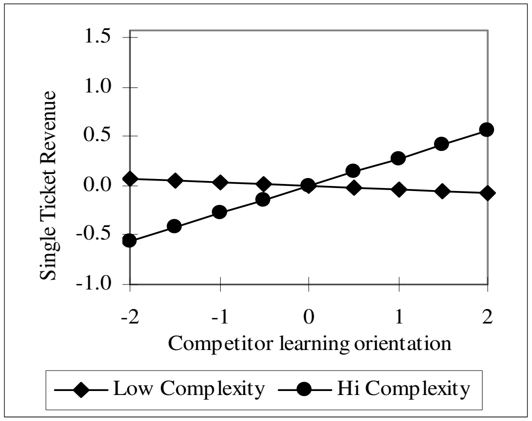


Figure 2
Plotting Significant Interaction Effects

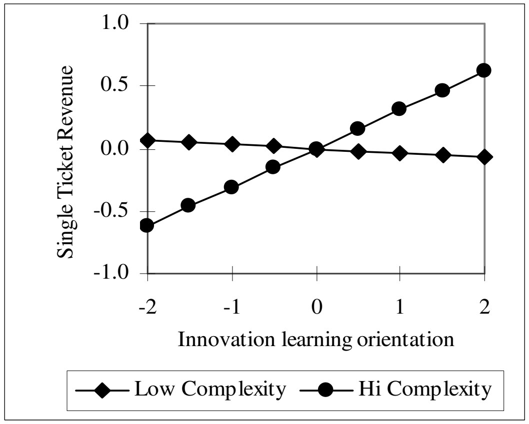
A: Plotting the Effect of Competitive Density and Customer Learning Orientation on Single Ticket Revenue



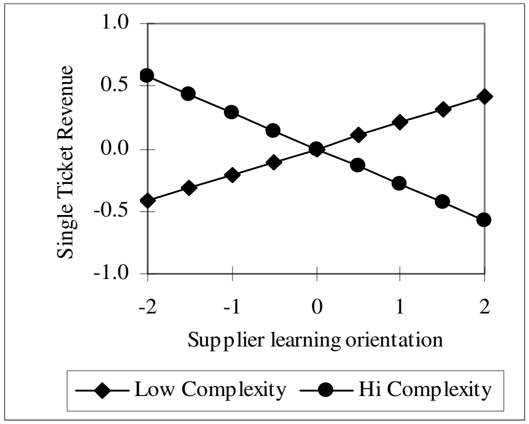
B: Plotting the Effect of Competitive Density and Competitor Learning Orientation on Single Ticket Revenue



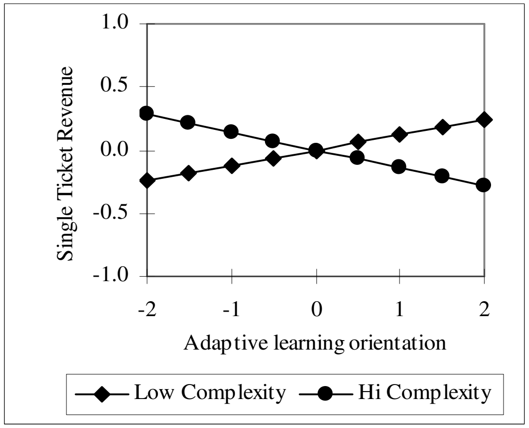
C: Plotting the Effect of Competitive Density and Innovation Learning Orientation on Single Ticket Revenue



D: Plotting the Effect of Competitive Density and Supplier Learning Orientation on Single Ticket Revenue



E: Plotting the Effect of Competitive Density and Adaptive Learning Orientation on Single Ticket Revenue



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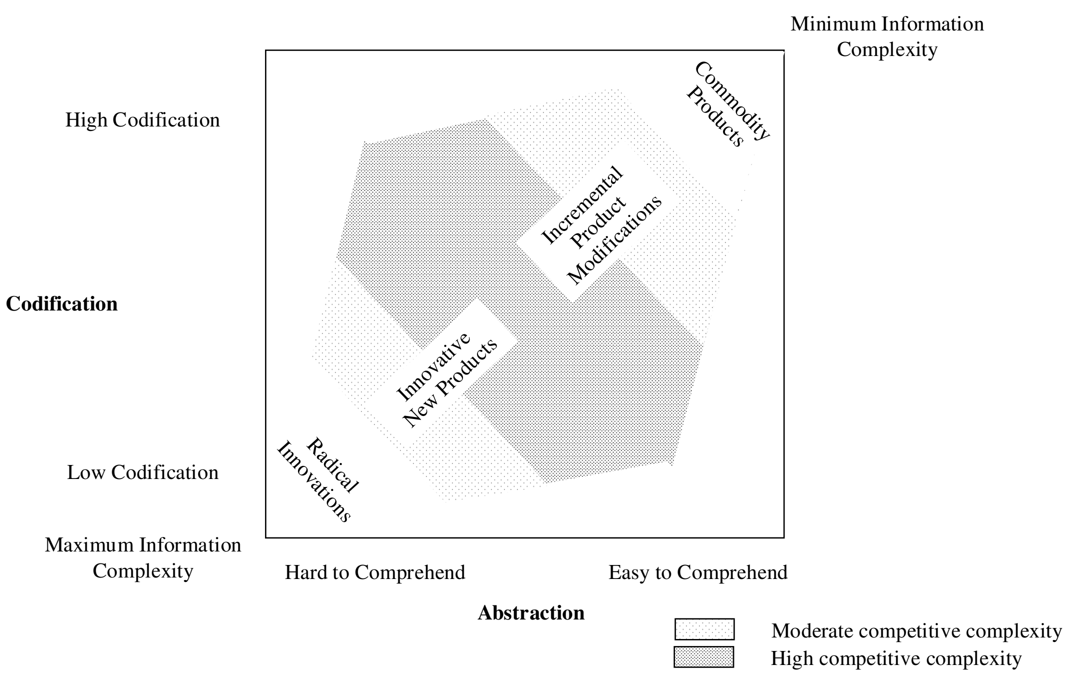
Appendix A

Conceptualizing Product and Competitive Complexity in Information Space

We conceptualize the fit between a firm's products and the external environment in the marketspace presented in Figure A1. The vertical and horizontal axes project product offerings in an information space proposed by Boisot and Child (1999). The vertical axis captures a continuum representing the degree to which products are codified. Products that exhibit low (high) codification have many (few) exceptions and are difficult (easy) to standardize, routinize, and classify. The horizontal axis captures abstraction, or the ease with which products are understood at an intuitive level. Because the structure and functioning of a difficult-to-comprehend product are obscure, comprehending it requires an analysis of component parts or what Boisot and Child (1999) refer to as concrete understanding. The structure and functioning of easy-to-comprehend products are transparent and intuitive, so that understanding occurs at an abstract level that requires little information or data processing (Boisot and Child 1999).

Figure A1

Conceptualizing Marketspace as a Function of Product and Competitive Complexity



Codification and abstraction work together to reduce the complexity of information, so that noncodified, hard-to-comprehend information is most complex and might be termed tacit information; codified, easy-to-comprehend information is least complex and might be termed explicit information. Noncodified, hard-to-comprehend products would include radical innovations and complex personalized services (e.g., open-heart surgery), which involve a high level of improvisation and tacit knowledge. Codified, easy-to-comprehend products include commodities and fully standardized services (e.g., a vending machine) that involve little flexibility or exceptions.

The codification and abstraction dimensions in Figure A1 capture the internal cognitive complexity associated with developing and delivering different types of product portfolios. In complexity theory parlance as developed by Kauffman (1993; see also McKelvey 1999), this space reflects the coevolutionary *NK* Boolean space of the firm, where *N* represents internal firm activities (e.g., competencies, products, value chains, etc.), *K* represents the inherent complexity of the firm's activities, and internal complexity increases as a function of *NK*. For our analysis, we define *N* as the number of products in the firm's portfolio and *K* as the cognitive complexity (based on codification and abstraction) of the products in the firm's portfolio.[1]

The number of activities (*N*) increases as the firm expands the size or density of the area it occupies within the product space; for example, by developing extensive product portfolios that feature product offerings positioned at different points in the product space. The level of internal complexity (*K*) increases as the complexity of the product portfolio increases. Thus, a firm that attempts to occupy the entire product space, simultaneously developing, producing, and delivering radical innovations, incremental product modifications, and commodity products faces an increasingly complex internal product management task, which has prompted calls for simplicity as a means to increase adaptability and innovativeness (see McKelvey 1999 for a brief overview).

Conceptualizing Competitive Complexity in Information Space

The codification and abstraction dimensions in Figure A1 capture product portfolio complexity, but market complexity also involves external complexity that accompanies exchange. In complexity theory parlance, overall complexity is a function of *NK(C)*, where

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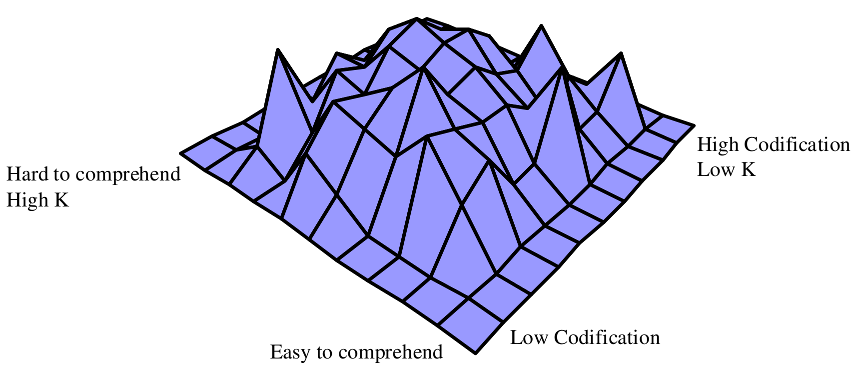
[1] We believe that conceptualizing internal complexity as cognitive rather than relational is particularly valuable for single product line business units. Internal relational complexity likely becomes more important as diversification increases.

external coevolutionary density (*C*) represents interdependencies between competing coevolving firms (Kauffman 1993; McKelvey 1999; Levinthal and Warglien 1999). We use shading to depict an inverted U-shaped relationship between product and competitive complexity in Figure A1. We now offer arguments for why the relationship likely holds.

Relational complexity increases as a function of the number of customers because the amount of information that must be exchanged increases (Boisot and Child 1999). To conceptualize relational complexity, we begin with the assumption that demand is a normally distributed function of product complexity, with demand peaking at moderate levels of codification and abstraction. We also expect that competitive density in the marketspace will roughly correspond with the relational density depicted in Figure A2. Complexity theory predicts that firms will adapt to increase efficiency and effectiveness by automatically responding to feedback from the environment so that successful firms would migrate their product positions to match relational density. The implication is that overall network and competitive complexity follows the demand curve.

Figure A2
Projecting Network Complexity into Information Space



Normally distributed demand and supply curves would produce a single-peak smooth landscape. Maintaining a smooth landscape would require perfect information and independent, perfectly mobile resources, which violates the assumptions of comparative advantage theory (Hunt and Morgan 1995). Instead, firms follow normative marketing prescriptions and segment, target, and position their offerings within the marketspace.

Following the assumptions of comparative advantage theory and the normative assumptions of basic marketing theory, we would expect a rugged landscape to evolve, with firms positioning their product offerings in the marketspace and attracting buyers from the nearby landscape (see Figure A2).

Levinthal and Warglien (1999) argue that the landscape becomes more rugged as complexity increases, producing higher peaks and lower valleys. It also is clear that a firm is surrounded by more direct competitors when the landscape is smooth than when it is rugged. This idea receives support from spatial modeling results from economics, which demonstrate that less complex products (i.e., products exhibiting less that four distinct characteristics) face "localized" (i.e., limited) competition (e.g. Archibald and Rosenbluth 1975); beyond that, the number of direct competitors increases significantly. These different theoretical perspectives support the idea that competitive complexity increases as a function of product complexity, at least until the point that a product becomes so complex as to be noncomparable (e.g., a radical innovation).

Assessing the Validity of the Product and Competitive Complexity Marketspace

In this section, we assess the validity of the product and competitive complexity marketspace. For expositional purposes, we have created 4 categories of products – radical innovations, innovative new products, incremental product modifications, and commodity products -- along the diagonal in Figure A1. This diagonal corresponds to the product life cycle, from the introduction of a radical innovation to the growth of competition and innovative new products to the maturity of incremental product modifications and to competitive shakeout and decline into commodity products. This diagonal also reflects market structure characteristics ranging from monopoly (radical innovation) to monopolistic competition (innovative new products and incremental product modifications) to perfect competition (commodity products). In both cases, the endpoints of the diagonal represent diametrically opposed strategies and/or market characteristics.

The other diagonal in the marketspace also is interesting, although there is little marketing theory that corresponds to it. Codified, hard-to-comprehend products are fundamentally complex products that follow simple rules (Cramer 1993; McKelvey 1999). Examples include proprietary technical products such as software or an automated voice service. Computer users who remember early Microsoft DOS systems will recognize an example of a codified, hard-to-comprehend product that became hugely successful after it increased its "user-friendliness," which is equivalent to saying that it became easier to comprehend. Many call centers use simple-rule-driven, automated voice services, but because they are not obviously intuitive to users (i.e., they are fundamentally complex and hard to comprehend), callers who encounter them are frequently dissatisfied and seek to avoid them. This brief analysis suggests that the codified, hard-to-comprehend corner is a temporary stage for technical products that must increase ease-of-use in order to achieve success in the mass market.

Mass customized products and simple improvised services are relatively noncodified and easy-to-comprehend. The extreme corner represents diffused personal services that are difficult to organize efficiently unless some level of codification is instituted. For example, mass customized clothing replaces personal tailoring services that were historically delivered by a very fragmented industry. Although there are large numbers of exceptions accommodated by mass customized clothing offerings, there is still modular codification that enables efficient production. Similarly, national chains such as Molly Maid and AAA have organized fragmented service industries by increasing the codification of easy-to-comprehend housekeeping and roadside assistance services. Without some codification, easy-to-comprehend products and services likely remain fragmented industries that are incapable of self-organizing or evolving into complex adaptive systems.[2]

The idea that competitive complexity increases between radical innovation and monopolistic competition (innovative new products and incremental product modifications) and then decreases between monopolistic competition and commodity products, is consistent with McKelvey's (1999) position that meaningfully adapting the concept of external network complexity to competitive interdependence requires that competitive complexity exhibit an inverted U-shaped relationship with interdependence. It also is consistent with general economic theory. In monopoly conditions (radical innovation), there is zero interdependence and in perfect competition (commodity products) there is complete interdependence; competitive complexity is low in monopoly conditions because there is only one competitor and low in perfect competition because price is the only distinguishing piece of information.

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[2] Boisot and Child (1999) maintain that the prevalence (or lack) of uncodified, easy-to-comprehend business activity is at least partially dependent on culture. They argue that this type of economic activity is common in China, where it is organized in the form of clans that emphasize face-to-face, personal relationships and a sharing of goals and values. Because this activity requires high levels of cognitive and relational complexity, it operates on the edge of chaos. To understand how market failure and chaos can occur, consider the market for roadside assistance service without a relational partner like AAA. In this situation, the stranded motorist is at the mercy of the independent tow truck driver.

In monopolistic competition, interdependence is at moderate levels and competitive complexity is at its highest levels.

These three states correspond to Cramer's (1993) three levels of complexity: subcritical complexity (like perfect competition) describes complex systems that follow deterministic, Newtonian-type rules of behavior; fundamental complexity (like radical innovation) describes stochastic, probabilistic systems that cannot be reduced to simple rules; and critical complexity (like monopolistic competition) describes a fundamentally complex system within which simple rules may emerge. Complexity theory defines critically complex systems (McKelvey 1999, p. 300, emphasis original) "…as being in a state *far from equilibrium* or *at the edge of chaos*." Thus, meaningful applications of complexity theory should be limited to the shaded areas in Figure A1 that correspond to critical complexity. In these areas, overall complexity (1) for innovative new products is high product complexity, moderate-to-high competitive complexity; and (2) for incremental product modifications is low product complexity, moderate-to-high competitive complexity.

Appendix B
Strategic Learning Orientation Items and Factor Analysis Results

	Factor Loadings				
Customer learning orientation					
Audience preferences are a key factor in our play selection.	**0.82**	0.01	0.02	0.03	0.13
We survey audiences to find out which plays they would like to see in the future.	**0.74**	-0.04	-0.21	0.05	-0.01
Audience satisfaction is our highest priority in deciding what to produce.	**0.82**	-0.06	0.09	0.06	0.17
Competitor learning orientation					
We pay close attention to competitors' fundraising activities.	-0.07	**0.90**	0.15	0.05	0.11
We keep a close eye on our competitors' audience development tactics.	-0.03	**0.91**	0.08	0.16	0.10
We keep abreast of industry trends.	0.01	**0.61**	0.26	0.23	0.28
Innovation learning orientation					
We actively solicit and develop new plays.	0.03	0.13	**0.90**	0.15	-0.02
A key component of our artistic mission is to develop innovative new works.	-0.15	0.08	**0.87**	-0.04	0.03
We are constantly on the lookout for outstanding new playwrights and plays.	0.01	0.19	**0.80**	0.14	-0.09
Supplier learning orientation					
The directors we select for our mainstage productions are mostly … the same/new.	0.11	0.08	0.13	**0.83**	-0.01
The designers we select for our mainstage productions are mostly … the same/new.	0.10	0.15	-0.06	**0.80**	0.05
The actors we select for our mainstage productions are mostly … the same/new.	-0.06	0.08	0.15	**0.74**	-0.08
Adaptive learning orientation					
We use knowledge gained from past experiences to modify our production processes.	0.00	0.01	0.04	0.01	**0.91**
In planning a season, we draw heavily upon what we have learned from past experiences.	0.12	0.20	-0.01	0.00	**0.87**
At the end of each season, we conduct a systematic analysis of what succeeded and failed.	0.15	0.14	-0.09	-0.04	**0.58**

Notes: Loadings greater than .30 are bolded for visual clarity.