Performance Effects of Physicians' Involvement in Hospital Strategic Decisions

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In recent years, many hospitals have moved to a professional management model from one of physician dominance. One result has been that physicians in some hospitals are alienated from the strategic processes of the hospital. Extant literature suggests that both physician involvement in strategic processes and investment in capability-building programs are associated with improved performance. The literature also suggests that there is an interaction between physician involvement and capability-building investments that is positively associated with performance. We explore these notions empirically using data from a sample of hospitals to evaluate the extent to which physician involvement in strategic decision making and investments in operational capabilities are associated with hospital performance. Results indicate that such proactive involvement of physicians in strategic decision making significantly affects hospital performance. In addition, investments in capability building related to employee development also affect hospital performance.

Keywords: *operations proactiveness; operations strategy; hospitals; infrastructure; employee development*

Service strategy is critical for any service organization. Internally, the service strategy drives development of organizational capabilities used to deliver the designed service. Externally, the service strategy influences customer expectations of the service. Investments in operations structure and capabilities are important components of a service strategy (Chase and Hayes 1991). These investments provide an immediate assessment of the organization's capabilities in terms of what it can deliver through its service. In this article, we consider strategic processes and their linkage to the operations function in one particular service industry—hospitals.

In an era of continuing advancements in health care delivery, hospitals' strategies must respond to the competi-

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tive challenges they face. Strategies drive operational decisions regarding investments in structure, infrastructure, and employee development, resulting in new or enhanced capabilities. Research in the operations literature has long suggested that such investments are often not sufficient to deliver desired performance improvements (e.g., Hayes and Wheelwright 1984; Swamidass and Newell 1987). Rather, it is argued, the effectiveness of such investments is moderated by the involvement of operations leaders in organizational strategy-making processes. In this way, the organization's strategy and investments are melded, yielding a more effective set of capabilities and better performance. One characterization of the involvement of the operations function in setting organizational strategy and in making investments that are targeted for building capabilities is *operations proactiveness* (Hayes and Wheelwright 1984; Ward, Leong, and Boyer 1994).

This study extends the notion of proactiveness to services by considering the role of physicians in making key decisions in hospitals. Specifically, we empirically evaluate the role of physicians in hospitals' strategic processes. In addition, we assess the extent of investment in operations capability building that is present. We test whether such dimensions of proactiveness are associated with performance. The question is particularly salient because the role of physicians in hospital management has evolved, and understanding of the strategic repercussions of this change is emerging.

Professional (nonphysician) management of hospitals has supplanted the old model of physician management, and as a result, physicians can become relatively alienated from strategic decision-making processes when compared to earlier years when physicians 'ran' hospitals (Battistella and Weil 1998; LeTourneau and Curry 1997, 1998, pp. 1-14). And although the new professional management shifted strategies toward a focus on cost cutting and efficiency, alienated physicians often did not support these strategic decisions through their clinical practice (Molinari et al. 1995). The balance of power between professional management and physician management of hospitals has shifted in favor of professional management in recent years, as documented in the literature. For example, Light and Levine (1988) described how physicians have been deprofessionalized as "the front office monitors the financial performance of clinicians [i.e., physicians] with increased stringency" (p. 10). Likewise, LeTourneau and Curry (1998) stated, "Once the decision-making captains, both clinically and administratively, of the healthcare ship, physicians have seen their authority and influence slip over the past decades" (p. 1). Similarly, numerous popular press accounts describe professional administration wielding increased authority in hospitals.

We address whether there is a price that is paid in lower overall business performance when physicians are alienated from important strategic decisions in hospitals. Specifically, we explore whether physician involvement in specifying hospital strategies affects hospital performance. We also seek to understand whether there is a relationship between such physician involvement and the efficacy of capability-building programs.

Numerous researchers address the need to involve the operations function in the strategic decision-making processes of their organizations (Chase and Hayes 1991; Hayes and Abernathy 1980; Hill 1994; Leong, Snyder, and Ward 1990; Roth and van der Velde 1991; Skinner 1969). This strategic involvement helps ensure that sufficient resources are devoted to the operations function. In addition, operations becomes an integral component in an organization's competitive capabilities when a commitment to investments in equipment and long-term capability-building programs exists. In service organizations, and specifically hospitals that are studied here, equipment, technologies, capabilities, and infrastructure support systems along with service workers such as physicians and nurses using their skills, knowledge, and effort enable these organizations to deliver services to customers.

Building on the familiar notion from operations that it is beneficial to include the viewpoint of operational leadership in strategic processes, we develop two dimensions: (1) the degree of involvement of physicians in strategic processes of the firm and (2) the degree of commitment to capability-building investments in structure and infrastructure (Ward, Leong, and Boyer 1994). Our study uses empirical methods to assess the interplay of these two dimensions in service organizations, specifically hospitals, and their effect on organizational performance.

Following, a review of literature related to physician involvement in strategic decision making and investments in equipment and people is discussed here. The research propositions and methodology are presented next, followed by the results and discussion.

BACKGROUND

Evidence from research in manufacturing organizations shows that it is not strategy itself that directly influences business performance but rather the indirect effects of operations executives' influence and involvement in setting strategy through the alignment between the manufacturing and business strategies (Papke-Shields and Malhotra 2001). Operations involvement in strategic decision making and the benefits of tying the operations function to strategic investment decisions have been addressed

in the manufacturing environment as documented in the literature (Hayes and Wheelwright 1984; Swamidass and Newell 1987; Ward, Leong, and Boyer 1994). But the concept of operations proactiveness in service firms has been only indirectly discussed. Do similar relationships among strategy, operations, and performance exist for service organizations? We use data from hospitals to address this research question. A brief review of related work in the management literature is presented here, followed by a discussion of relevant research from the health care literature.

In the infancy of academic attention to issues of operations strategy, Hayes and Wheelwright (1984) developed a conceptual stage model of manufacturing involvement in strategic processes, describing a progression from operations as a neutral force (Stage 1) to using operations proactively to compete (Stage 4). In the fourth stage, the operations function anticipates new practices and technologies, is included in major marketing and technical decisions, and builds capabilities in advance of their needs.

Drawing analogies between the manufacturing and service strategy literatures (Chase and Garvin 1989; Giffi, Roth, and Seal 1990), Chase and Hayes (1991) present a four-stage conceptual model of development of service firm operational competitiveness in which a firm's stage indicates their service delivery effectiveness. In Stage 1, operations is reactive, whereas the continuum to Stage 4 is defined by the development of a firm's operations capabilities that are not only superior to its competitors but allow for rapid changes and improvements. Chase and Hayes propose that the stage in which a service firm exists is determined by a composite of strategic choices on the following dimensions: customer selection; workforce capabilities; and the management of service quality, technology, frontline workers and their back office.

Roth and van der Velde (1991) empirically tested corresponding stages in service delivery system capability development representing a progression from "revolving doors" (Stage 1), in which operations capabilities are used for internal control but add no value, to "golden handcuffs" (Stage 4), where the capabilities pose significant barriers to entry and the customer has a long-term and loyal relationship with the service firm. It is in Stage 4 that "operations functions proactively to retain and attract customers" (Roth and van der Velde 1991, pp. 308-309). In empirical validation of their model, they conclude that operations strategy development in services parallels that observed in manufacturing in terms of critical success factors (i.e., competitive priorities) and linkages between strategy and performance. They propose that future research should address the fit between operations choices, critical success factors (i.e., delivered competitive priorities), and business performance.

Smith and Reece (1999) similarly concluded that much of the conceptual work on operations strategy that has been reported in the literature may be applicable to service operations as well as manufacturing. Furthermore, Verma (2000) found empirical support for focusing on management challenges related to technology management and employee training and work methods in service shops (Schmenner 1986), the typical classification for hospitals.

Ward, Leong, and Boyer (1994) built on the conceptual work of Hayes and Wheelwright (1984) and others by further developing the concept of operations proactiveness and testing it empirically. In essence, Ward, Leong, and Boyer posited two dimensions that define proactiveness: (1) the degree of involvement of the operations function in strategic processes of the firm and (2) the degree of commitment to capability-building investments in structure and infrastructure. Ward, Leong, and Boyer found that operations proactiveness is positively linked with organizational performance.

The proactiveness dimensions and their performance links are well supported in the literature. For example, Swamidass and Newell (1987) showed that performance is improved when manufacturing managers are involved in strategic decision making, supporting Ward, Leong, and Boyer's (1994) first dimension. Ward, Leong, and Boyer (1994) operationally defined structural investments as investments in specific manufacturing technologies and infrastructural investments as investment in various types of skill-building, employee development programs. Similarly, support for the second dimension of operations proactiveness exists in the literature describing successful capability-building programs supported by investments in either structure (e.g., tangible hardware) or infrastructure (e.g., "invisible" investments in systems and people). For example, Schonberger (1986) and Giffi, Roth, and Seal (1990) documented a number of such cases. Venkatraman (1989) reported that a related operationalization of strategic proactiveness is positively related to performance.

Similar strategy-performance linkages have been identified in research in the service environment. Smith and Reece (1999) found that the degree to which operational elements match the business strategy is of greater importance in directly predicting performance than the particular choice of strategy. Customer service strategy influences business performance indirectly through operations productivity for 30 independent branches of a product distributor to industrial and commercial markets.

The service profit chain literature (Hallowell and Schlesinger 2000; Heskett et al. 1994; Heskett, Sasser, and Schlesinger 1997; Schlesinger and Heskett 1991a, 1991b, 1991c) also provides conceptual and empirical support for strategy-performance linkages. The profit chain notion of

"internal service quality," in essence the operations strategy of the firm, is modeled as the driver of internal results, which in turn drive customer-related and financial performance results. Goldstein (2003) reported empirical support for relationships among internal service quality, internal outcomes, and customer satisfaction using hospital data, whereas Nelson et al. (1992) linked customer and financial outcomes in hospitals.

Operations Proactiveness and Hospitals

We extend the notion of operations proactiveness to hospitals because it provides a useful framework for considering the performance effects of the juxtaposition of functional (clinical) leadership and capability building. To accomplish this extension, we modify the framework by substituting senior operations leadership with physicians, arguably the clinical leaders in hospitals, and the types of capability-building that are considered. The following discussion provides a basis of support for the dimensions and domain content of proactiveness. The first dimension of operations proactiveness is involvement of physicians in strategy planning for the organization. We define physicians as the lead service providers in the hospital environment as they play the primary leadership role in the clinical function in hospitals. While nurses and other care-providing personnel tend to have more contact time with patients, they are generally carrying out the instructions of physicians who are the key decision makers in determining the services to be delivered to each patient.

The second dimension of operations proactiveness is organizations' commitment to investments in operations structure and infrastructure to improve their capabilities. Operations structure includes "bricks and mortar" investments in facilities, capacity, equipment, and technologies. Infrastructure includes systems for employee development, inventory control, and quality control (Hayes and Wheelwright 1984). We focus in this study on infrastructure investments, rather than structural investments, for the following reason. Small manufacturing firms often have specialized equipment or production capabilities that enable them to successfully defend a niche in the marketplace. Positioning themselves to serve a niche or niches, they can exist in an industry among larger firms because their unique capabilities provide their strategic advantage. In contrast, small hospitals generally have a *subset* of the capabilities provided by structural investments of larger hospitals, namely, a subset of the medical technologies and capabilities of larger hospitals. The survival of small hospitals may be based to a large extent on their geographic location rather than possession of unique capabilities (Goldstein et al. 2002). From an empirical standpoint, a hospital's likelihood of investing in particular medical technologies may be highly correlated with its size, and therefore, the size construct would predict the structural investments that define one dimension of operations proactiveness. For this reason, we focus on infrastructure investments and systems instead.

The infrastructure investments studied here are used to build and improve hospital systems including information systems and inventory control systems. In addition, these investments include systems to develop skills and improve the work environment for nonphysician employees. Each of these aspects is discussed below.

Physician Involvement

Physicians are the clinical leaders of hospital operations. As noted, nonphysician managers have often supplanted physician leadership in nonclinical functions and in overall direction of the hospital. This movement toward professional management yields many benefits but also has the potential to engender a greater degree of bureaucracy and rivalries between clinical operations and other functions (Succi and Alexander 1999).

The involvement of physicians in strategic decision making is one of the critical links between strategic planning and the clinical function. Physicians play a more prominent role in this function of their organizations than in some other business functions as evidenced by their greater involvement in operations decisions (Ashmos and McDaniel 1991). Physicians are the primary users or prescribers of technology, determining for each patient which technologies and equipment will be used to deliver services, and seek to have their preferences met through planning at the strategic level.

Physician involvement in strategic decision making means that the involvement gives physicians a strong voice in critical decisions that are made by hospital management. One of the ways physicians elevate their role in strategic decision making is by serving on their hospitals' governing boards along with nonphysician professional managers (Succi and Alexander 1999). Physician involvement on boards may be beneficial to hospitals, as Molinari et al. (1995) reported that operating margins are significantly higher (measured during a 4-year period) in hospitals with physicians on their governing boards (after controlling for hospital location, size, and ownership).

As hospitals have shifted from physician management to professional management, hospital administrators have pursued other types of relationships with physicians in an effort to maintain their patient referral basis via the physicians (Kocher, Kumar, and Subramanian 1998). The rela-

tionships include joint ventures and management service organizations, in which hospitals provide administrative services for physician practices. However, this tactic results in benefits beyond patient referrals. Kocher, Kumar, and Subramanian report that hospitals with more physician-hospital contractual arrangements also have greater physician involvement in capital budgeting and decision making. This type of involvement of operational practitioners in strategic decision making is evidence of operations proactiveness in hospitals. Research on the balance of power between physicians and hospital administrators shows that physicians have more trust in hospital administrators when physicians are involved in strategic and partnership decisions (Succi et al. 1998). This trust may result in improved performance as physicians and managers bridge the gap of their diverse cultures and interests to create strategies with input from both sides (Goes and Zhan 1995; Molinari et al. 1995).

In summary, physicians are defined as the *principal service providers* for hospitals. Although many hospitals have shifted toward a paradigm in which professional management controls strategic processes, evidence in the literature suggests that involving physicians in strategic decision-making processes may result in beneficial outcomes for hospitals.

Infrastructure

Infrastructure includes the systems and practices used by an organization to improve its capabilities and to support production of its core products or services. These systems and practices address inventory control, materials handling, accounting support systems, and employee management and development, among other issues. Developing capabilities through strategic infrastructure investments is critical for sustainable competitive advantage, as structural investments in capital assets are more easily matched by competitors (Stading, Flores, and Olson 2001). Employee development is discussed separately in the following section.

In addition to medical technologies, infrastructure or systems technologies are also major and frequent expenditures for hospitals ("Hospitals Spending More" 1996). There is little research reported in the literature on the financial or capability-building aspects of these types of investments. However, overall, the health care literature documents that investment in technologies and other capital assets seem to be beneficial to hospital performance. Furthermore, although hospitals have often used technologies to attract physicians (Wagner 1989, 1990), long-term strategic planning that includes investment in infrastructure systems is likely to enhance hospital performance.

Employee Development

The manufacturing study reported by Ward, Leong, and Boyer (1994) considers programs that improve worker skills, training, and motivation. Similar programs are essential to the training of hospitals employees (Fernberg 1993; Morris 1974). In the study reported here, *employees* are defined as nonphysician workers such as nurses, technicians, and other staff.

Under the pressure of their competitive environment, hospitals try to strengthen the service orientation of their employees while continuing to reduce costs (Hesketh 1998). The value of hospital employees is in their knowledge, skills, and flexibility. Hospitals focused on building long-term capabilities must provide training and opportunities that enable employees to develop and maintain their knowledge and skills while providing flexibility in how they perform their jobs (Artes 1996; King 1995).

The benefits of focusing on employee development have also been studied and discussed in the service profit chain literature (Hallowell and Schlesinger 2000; Heskett et al. 1994; Heskett, Sasser, and Schlesinger 1997; Schlesinger and Heskett 1991a, 1991b, 1991c).

In short, we are beginning to identify the critical elements of proactiveness in the health care environment, including physician involvement in strategic decision making and organizations' commitments to investments that build long-term capabilities. We evaluate the linkages among physician involvement in strategic decision making, capability-building investments, and hospital performance. Extant literature suggests that both physician involvement in strategic processes and investments in capability-building programs are associated with improved performance. The literature also suggests that there is an interaction between physician involvement in strategy making and capability-building investments that is positively associated with performance.

RESEARCH DESIGN

This study empirically investigates the dimensions of proactiveness and how the main and interaction effects of its dimensions are linked to hospital performance. A mailed questionnaire was used to gather data on physician involvement, infrastructure systems investments, and employee development. Hospital performance data are obtained from the questionnaire and a published source.

Research Propositions

The effects on performance of physician involvement in strategic decision making and a commitment to in-

vestments that build capabilities are analyzed. The main effects of physician involvement in strategic planning and two types of capability-building investments are evaluated, as well as the interactions between physician involvement and those investments. The following propositions are evaluated:

Proposition 1: Hospitals with greater physician involvement in strategic planning are better performers.
Proposition 2: Hospitals with a stronger commitment to investments that build capabilities are better performers.
Proposition 3: Hospitals with both greater physician involvement *and* a stronger commitment to investments that build capabilities are better performers than hospitals that do only one or the other.

In effect, Propositions 1 and 2 test for main effects of physician involvement and commitment to investments that build capabilities, while Proposition 3 addresses the interaction between these two dimensions. Our research questions are stated as propositions rather than hypotheses because we use multiple analyses to evaluate the effects of these dimensions on performance. We are not drawing conclusions from single hypothesis tests.

Study Sample

Data are obtained from a questionnaire that was mailed to all Michigan hospitals (N = 200). These data were gathered as part of a larger study on strategic practices in this population. Questionnaires were mailed to two individuals at each hospital, CEOs and vice presidents of operations. Seventy-five hospitals returned at least one questionnaire, for a response rate of 37.5%, whereas 34 hospitals returned two completed questionnaires. Data from hospitals with two responses were used to test interrater reliability.

Boyer and Verma (1999) proposed several methods for testing interrater reliability in Operations Management research, and we adopt Shortell and Zajac's (1990) method for responses on Likert-type scales of measuring the proportion of paired responses from one organization that are within one response category of one another. Using this method, we find agreement within 1 point (on a 7-point scale) in 71% of cases for the measure of Physician Involvement (described below). An average of 72% and 76% of cases are within 1 point for the Infrastructure and Employee Development scale items, respectively (see Tables 1 and 2 and descriptions below). These results establish interrater reliability as the proportions are within reasonable limits, particularly given the relatively small sample studied here. One response from each hospital is used in the analysis reported here, and for those hospitals with two responses, we use the response with fewer missing values to preserve observations. Performance data are collected from the questionnaire and a secondary source.

TABLE 1
Infrastructure Investment Scale Items and Loadings

Item[a]	Mean	Standard Deviation	Loading[b]
Office automation technology	5.1	1.1	.560
Inventory control systems	4.4	1.6	.773
Accounting systems	4.7	1.6	.783
Integrated information systems	5.9	1.2	.631
Bar coding/automatic identification	4.2	1.5	.652
Redesigning layout to improve patient flows	5.0	1.5	.595
Cronbach's coefficient alpha = .76			

a. Items measured on a 7-point Likert-type scale; respondents were asked the degree of emphasis placed on this investment in the next 2 years.
b. Loading on first component from principal components analysis.

TABLE 2
Employee Development Scale Items and Loadings

Item[a]	Mean	Standard Deviation	Loading
Giving workers a broader range of tasks	5.4	1.1	.821
Giving workers more planning responsibility	5.2	1.2	.743
Giving workers more quality control responsibility	5.5	0.9	.590
Employee empowerment programs	5.4	1.2	.671
Provide cross-training	5.8	1.1	.683
Improving supervisor training	5.7	1.2	.688
Implementing job sharing	4.3	1.6	.598
Cronbach's coefficient alpha = .80			

a. Items measured on a 7-point Likert-type scale; respondents were asked the degree of emphasis placed on this investment in the next 2 years.

Nonrespondent bias is assessed to determine whether respondents differ from the surveyed population. We compare the average number of hospital beds, an indicator of hospital size, for respondent and nonrespondent hospitals. A t test shows a marginally significant difference in the number of beds for these two groups ($t = 1.67$, $p = .10$), indicating respondent hospitals are slightly larger on average (215 beds) than nonrespondent hospitals (171 beds). There are for-profit, nonprofit, and government-owned hospitals in the sample used here, and a chi-square test statistic is calculated to determine if the expected and actual number of responses are significantly different for the three ownership types. The test is not significant (χ^2 =

2.28, $df = 2$, $p = .32$), so no bias in response rate by hospital type is identified.

Operational Measures

Commitment to capability-building investments is further defined by two separate constructs: (a) commitment to infrastructure systems investments and (b) commitment to investments in employee development. Infrastructure investments, which include information systems and inventory control systems, enable hospitals to develop management and support systems that help build a competitive advantage based on cost or responsiveness. Employee development investments increase employee skills in patient care and other processes. Measurement scales for these two constructs are described below.

Infrastructure Investments. A measurement scale was developed to measure infrastructure investments aimed at building system capabilities, including technologies that improve information flow and layout to improve patient flow. Respondents were asked to indicate on a 7-point Likert-type scale the degree of emphasis their hospital will place on specific infrastructure investments in the upcoming 2 years. The measurement items are shown in Table 1, including the mean and standard deviation of each item.

The measurement items were analyzed for reliability using several techniques. First, Cronbach's (1951) coefficient alpha was assessed. An alpha of .70 or greater is considered adequate for most measurement scales in management research (Flynn et al. 1990; Nunnally and Bernstein 1994), and alpha for the Infrastructure Investments Scale is .76, a level considered adequate. Scale unidimensionality, to ensure that the scale measures a single construct, was evaluated using Carmines and Zeller's (1979) guidelines. The first guideline is that the first component (from principal component analysis) should explain at least 40% of the variance in the items, and we find that 45% of variance is accounted for by the first component of the Infrastructure Investments Scale. Second, subsequent components should explain significantly less but fairly equal proportions of the remaining variance. This guideline is also met, as eigenvalues for the first and subsequent components are 2.7, 0.9, 0.8, 0.7, 0.5, and 0.3. Finally, Carmines and Zeller propose that most of the items should have loadings of at least .30 on the first component, and most of the items should have larger loadings on the first component than on subsequent components. Item loadings on the first component are reported in Table 1 and support these guidelines as well. Based on analysis of data from the hospitals in the study, this scale meets Carmines and Zeller's guidelines, providing further evidence of scale reliability.

Employee Development Investments. This measurement scale summarizes hospitals' commitment to programs aimed at increasing employee skills and involvement and is patterned after a similar scale used by Ward, Leong, and Boyer (1994). The scale items, means, standard deviations, and their loadings on the first component are shown in Table 2. Cronbach's alpha for this scale is .80. The Employee Development Scale was also assessed using Carmines and Zeller's (1979) guidelines, which resulted in two items being dropped from the scale. The dropped items, which loaded higher on a second component, addressed worker flextime and job automation and are not shown in Table 2. The first component explains 48% of the variance in the scale items, with component eigenvalues of 3.3, 1.2, 0.7, 0.6, 0.5, 0.4, and 0.2.

With Cronbach's alpha values of .76 and .80, the two scales used to measure capability-building investments have sufficient reliability (Flynn et al. 1990; Nunnally and Bernstein 1994). Principal component analysis, a data reduction technique that summarizes most of the original item variance in a single score (Hair et al. 1995), was used to reduce Infrastructure and Employee Development Investment item responses to standardized component scores. Due to the limited sample available here and our desire to achieve enough statistical power to capture the effects of proactiveness practices, we split the sample into two groups for each type of investment. Hospitals with lower-than-average Infrastructure and Employee Development scores are coded 0, and hospitals with higher-than-average scores are coded 1, splitting the sample approximately equally between low and high investors for the investment measures.

Physician Involvement. Data on the extent of physician involvement in strategic decision making are obtained from the questionnaire described above. Respondents were asked to indicate on a 7-point Likert-type scale the extent to which physician leaders are involved in specifying hospital strategy (Ward, Leong, and Boyer 1994). Like the investment measures described above, hospitals are split into two groups based on their Physician Involvement score. The mean score for this variable is 4.9, so scores of 1 through 4 on the Likert-type scale are coded 0, and scores of 5 through 7 are coded 1.

Performance. Hospital performance can be difficult to assess because finding performance measures appropriate for this predominantly nonprofit industry is challenging. In addition, we sought performance measures that reflect the effects of the operations proactiveness variables assessed in the studied hospitals.

Occupancy rate, the average proportion of used bed capacity, is an industry-specific measure that has been used frequently in health care research as an indicator of perfor-

TABLE 3
Descriptive Statistics and Correlation for Dependent Variables

	Mean	Standard Deviation	Correlation* Occupancy Rate	Correlation* Market Share
Occupancy rate ($n = 71$)	56.6	19.4	1.00	
Market share ($n = 68$)	4.4	1.3	0.21	1.00

* Correlation not significant at $p < .05$.

mance (e.g., Goes and Meyer 1990; Ketchen, Thomas, and Snow 1993; Nath and Sudharshan 1994). Research has shown occupancy rate to be an important indicator of hospital performance. Nath and Sudharshan (1994) have shown that hospitals using coherent strategies have higher occupancy rates than hospitals with less coherent strategies, providing evidence that organization-level strategy and occupancy rate are closely linked. Descriptive statistics for occupancy rate are reported in Table 3.

The second performance measure used is market share. Market share is a commonly used performance measure in strategic management research (Venkatraman and Ramanujan 1987). Most hospitals draw a customer base from the geographic region surrounding their facility, thus attracting and maintaining market share are particularly critical to organizational success (Ketchen, Thomas, and Snow 1993; Ward, Leong, and Boyer 1994).

We adopt occupancy rate and market share as the performance measures for this study. Data for occupancy rate are obtained from a published source (American Hospital Association 1995), and market share data are obtained from the study survey in which participants were asked to indicate their market share relative to their competitors (7-point scale from *significantly lower* to *significantly higher*).

RESULTS

The research propositions are evaluated by assessing the main and interaction effects of physician involvement in strategic decision making and commitment to capability-building investments on hospital performance. Analysis of variance (ANOVA) is used to determine the main and interaction effects that are statistically significant for the dependent variables—occupancy rate and market share.

When conducting research using data from U.S. hospitals, control variables are often used to capture unique industry effects that can significantly predict or explain performance. Typically, these control variables include hospital size (number of beds), ownership (for-profit, nonprofit), teaching status (nonteaching, resident-only teaching, major teaching), and location (urban, rural). These control variables are included in the ANOVA models using occupancy rate and market share as the performance variables. Published availability of these control variables, along with availability of performance data, limits the original sample of 75 hospitals to 71 and 68 hospitals, respectively (see Table 3). The effects of the control variables included in the analyzed models are not directly relevant to the management practices analyzed here. After accounting for the control variable effects, the additional effects of the independent variables related to management practices test the research propositions.

TABLE 4
Results of ANOVA for Main and Interaction Effects on Occupancy Rate

Source	df	SS	F	p
Physician involvement (PI)	1	2,315.5	10.56	.002***
Infrastructure investments	1	376.2	1.72	.20
PI × Infrastructure	1	1,305.3	5.95	.02**
Control variables				
Size	1	1,326.7	6.05	.02**
Ownership	2	471.0	1.07	.35
Teaching	2	438.3	1.00	.37
Location (urban/rural)	1	587.1	2.68	.11
Physician involvement	1	1,862.7	8.85	.004***
Employee development	1	697.1	3.31	.07*
PI × Employee Development	1	1,703.2	8.10	.006***
Control variables				
Size	1	1,398.5	6.65	.01**
Ownership	2	578.9	1.38	.26
Teaching	2	321.3	0.76	.47
Location (urban/rural)	1	421.5	2.00	.16

Dependent variable: Occupancy rate

* Significant at $p < .10$. ** Significant at $p < .05$. *** Significant at $p < .01$.

The first two research propositions are tested by evaluating the significance of the main effects on performance for each independent variable. The third research proposition is tested by evaluating the significance of the interaction effects on performance for physician involvement in strategic planning and each of the two investment measures. Two models are developed—one with Physician Involvement and Infrastructure and their interaction and the second with Physician Involvement and Employee Development and their interaction. (Both models include industry control variables.) Results of ANOVA are reported in Tables 4 and 5.

The effect of Physician Involvement on hospital performance is statistically significant in both models for occupancy rate, when paired with investments for Infra-

TABLE 5
Results of ANOVA for Main and Interaction Effects for Market Share

Source	df	SS	F	p
Physician involvement (PI)	1	9.94	6.09	.02**
Infrastructure investments	1	0.00	0.00	.99
PI × Infrastructure	1	1.69	1.03	.31
Control variables				
Size	1	5.66	3.47	.07*
Ownership	2	5.37	1.64	.20
Teaching	2	0.10	0.03	.97
Location (urban/rural)	1	1.41	0.87	.36
Physician involvement	1	9.77	6.21	.02**
Employee development	1	5.10	3.24	.08*
PI × Employee Development	1	0.07	0.04	.84
Control variables				
Size	1	3.86	2.45	.12
Ownership	2	4.37	1.39	.26
Teaching	2	0.29	0.09	.91
Location (urban/rural)	1	2.31	1.47	.23

Dependent variable: Market share

* Significant at $p < .10$. ** Significant at $p < .05$. *** Significant at $p < .01$.

structure ($F = 10.56$, $p = .002$) and Employee Development ($F = 8.85$, $p = .004$). Physician Involvement is also significant in both models for market share, when paired with Infrastructure ($F = 6.09$, $p = .02$) and Employee Development ($F = 6.21$, $p = .02$). See Tables 4 and 5 for these results. Therefore, Proposition 1 is supported.

To evaluate Proposition 2, the statistical significance of the two investment variables is considered. The results show that the main effect of Infrastructure is nonsignificant for occupancy rate ($F = 1.72$, $p = .20$) and market share ($F = 0.00$, $p = .99$). Employee Development is significant for both occupancy rate ($F = 3.31$, $p = .07$, allowing an alpha level of .10 for the limited sample size analyzed here) and market share ($F = 3.24$, $p = .08$). Therefore, Proposition 2 is supported for investments in Employee Development, but not for investments in Infrastructure.

The interaction effects between Physician Involvement and the investment variables address Proposition 3. The interaction between Physician Involvement and Infrastructure Investments is significant for occupancy rate ($F = 5.95$, $p = .02$), but not for market share ($F = 1.03$, $p = .31$). Likewise, the interaction between Physician Involvement and Employee Development is significant for occupancy rate ($F = 8.10$, $p = .006$), but not for market share ($F = 0.04$, $p = .84$). The interaction effects are shown in Figure 1. However, these interaction effects do not clearly indicate improved performance, as we hypothesize in Proposition 3. In the two significant interactions, the Physician Involvement variable effectively masks the effect on performance of the capability-building investment. In other words, although we see significant positive effects on hospital occupancy rate of capability-building investments, these investment effects are not apparent if the hospital also has a high level of physician involvement in strategic processes. Therefore, Proposition 3 is not supported.

DISCUSSION

The analyses presented here suggest that the dimensions of operations proactiveness are associated with performance in hospitals. Although the sample we use is relatively small, the results bear out that strategic moves by the operations function are positively linked with two dimensions of organizational performance—occupancy rate and market share. These findings have a bearing on theory development in operations as well as practical implications for how hospitals are managed.

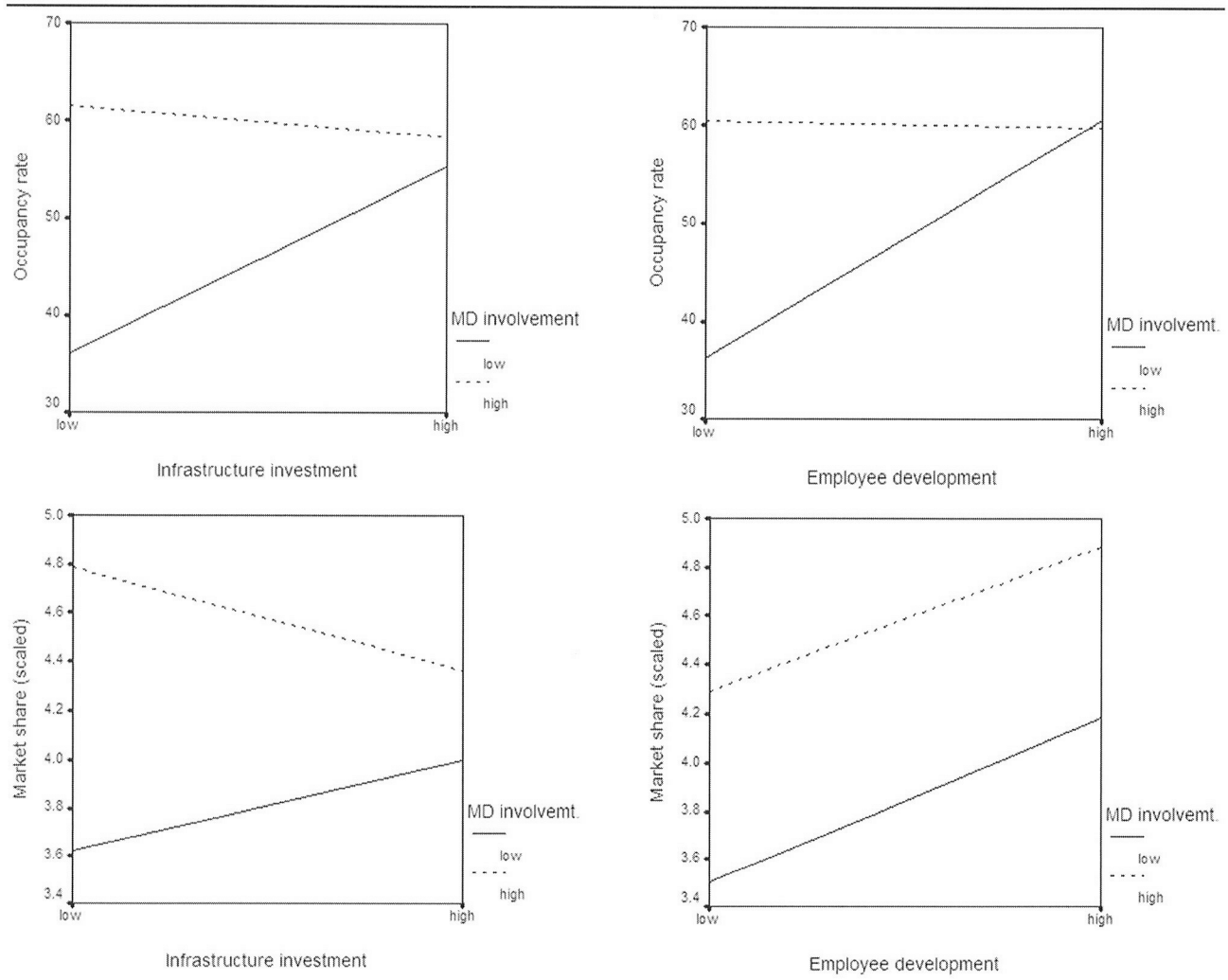
Implications for Theory

The notion of operations proactiveness introduced by Hayes and Wheelwright (1984) appears to have applicability when extended to the service setting presented by hospitals as well as in manufacturing settings where the ideas were first developed. The concept of proactiveness as it applies in hospitals is straightforward—hospitals that involve physicians in strategic planning and decision making and that invest in operations capability building are better performers than those that do not. Strategies that are informed by physicians are better strategies. Investments in operational capabilities that reflect the strategic nuances of the organization are better investments.

The findings presented here largely support this conceptual argument. The main effects of physician involvement in strategic processes and investments in employee development are significant. These findings buttress theoretical plausibility of operations proactiveness in a service domain quite removed from its manufacturing origins.

The main effect of infrastructure investments is not significant in either of the tested models, whereas the main effect of employee development is significant in both tested models. It is interesting to note that, overall, the influence of capability-building investments is somewhat different than expected. Although employee development main effects are significant in a straightforward manner, in the infrastructure models, these effects are masked by the effect of physician involvement observed in these analyses. We can conclude that investments in employee development appear to assert a positive influence on performance. However, physician involvement in strategic processes may compensate for lack of investments in infrastructure.

FIGURE 1
Interaction Effects on Performance Variables Between Physician (MD) Involvement and Investments in Infrastructure and Employee Development



Finally, the lack of support for Proposition 3, which addresses the interaction between physician involvement and investments in infrastructure and employee development, contrasts with results from the manufacturing literature on operations proactiveness. Future studies may address the issue of the role of investments relative to other dimensions of proactiveness.

An implication of this study for future research and theory development is the evidence of a significant relationship between managerial practices and firm performance for service organizations. Enhancements or changes in managerial practices often are not realized through improved performance until some period of time well after the managerial practices have been implemented, and most research, like this study, is cross-sectional in nature. Although we find significant performance effects of some operations proactiveness elements in this study, evaluating organizations in terms of their current performance may be less informative than understanding their ability to learn and develop long-term capabilities.

Implications for Practice

The results of this study are clear in their implications for hospital management practice. First, hospital managers should include physicians in key strategic processes. In particular, the finding that physician involvement is associated with hospital performance suggests that managing the balance of influence between professional managers and physicians is very important. Relegating the clinical

leadership of hospitals to a purely technical role by leaving physicians out of important strategic decisions appears to be associated with lower performance. Succi and Alexander (1999) provided an informative discussion of empirical findings on the types of physicians (i.e., characteristics, skills) that provide the most beneficial input into strategic processes. Furthermore, placing physicians in upper management positions is not sufficient if these physicians embrace their management role at the expense of continued involvement in clinical interests (Hoff 1999). The results achieved in the study reported here parallel the conceptual and empirical findings reported in the manufacturing literature that suggest that ignoring the strategic potential of operations negatively affects firm performance.

Another important implication for hospital management is that investments in some operational capabilities appear to pay off in terms of better performance. And to some extent, physician involvement in strategic processes may compensate for low investments in operational capabilities. These results support those found by Heineke (1995) in which decisions regarding HMO infrastructure were related to clinical performance. Our results indicate that attention to investment in operations capabilities, particularly investments in employee development, are significantly linked with occupancy rate and market share performance.

Finally, this study provides evidence of the benefits of operations proactiveness in a service environment quite removed from its origins in manufacturing. Other service industries may also find that a closer linkage among strategic planning, operations leadership, and operations investments will improve their organizational performance.

Limitations

The results of this study may be limited by several factors. First, this study is cross-sectional in design and therefore, its results imply association rather than cause and effect. Second, the sample used in this study is limited to hospitals in Michigan, reducing the size and geographic dispersion of the sample. However, we find no evidence to indicate that the selection of the sample biased the results of the study. Finally, we used nonfinancial measures of performance in part because many of the hospitals in this study are nonprofit organizations.

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