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CAPABILITIES, BUSINESS PROCESSES, AND COMPETITIVE ADVANTAGE: CHOOSING THE DEPENDENT VARIABLE IN EMPIRICAL TESTS OF THE RESOURCE-BASED VIEW

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A growing body of empirical literature supports key assertions of the resource-based view. However, most of this work examines the impact of firm-specific resources on the overall performance of a firm. In this paper it is argued that, in some circumstances, adopting the effectiveness of business processes as a dependent variable may be more appropriate than adopting overall firm performance as a dependent variable. This idea is tested by examining the determinants of the effectiveness of the customer service business process in a sample of North American insurance companies. Results are consistent with resource-based expectations, and they show that distinctive advantages observable at the process level are not necessarily reflected in firm level performance. The implications of these findings for research and practice are discussed along with a discussion of the relationship between resources and capabilities, on the one hand, and business processes, activities, and routines, on the other.

The resource-based view (RBV) asserts that firms gain and sustain competitive advantages by deploying valuable resources and capabilities that are inelastic in supply (Wernerfelt, 1984; Barney, 1986, 1991; Peteraf, 1993). Since the earliest conceptual work published in the 1980s, there have been continuing calls for empirical tests of this central resource-based assertion. Indeed, through much of the decade of the 1990s, it seemed that every empirical test of resource-based logic began by observing that relatively few empirical tests of this assertion had yet to be published.

Fortunately, over the years, these empirical tests have begun to accumulate (Barney and Arikan, 2001). While the specific methodologies used to examine resource-based logic have been extremely varied, most quantitative tests of this theory have adopted a common underlying approach. This approach has been to develop measures of a firm's resources and capabilities and the extent to which they meet the criteria established in the theoretical literature for generating sustained competitive advantages, and then correlating these measures with some measures of firm performance. Most of this empirical work has been consistent with resource-based theory (Barney and Arikan, 2001).

This approach has been used to examine the empirical implications of resource-based logic for both business and corporate strategies. Examples at the business strategy level of analysis include Huselid, Jackson, and Schuler's (1997) analysis of the relationship between a firm's human resource management capabilities and its performance and Barnett, Greve, and Park's (1994) analysis of the relationship between historical experiences with competition and a firm's current performance.

Key words: resource-based view; information technology; business processes; insurance; competitive advantage
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Examples of this approach at the corporate level of analysis include Markides and Williamson's (1994) analysis of the relationship between different types of corporate assets and a firm's return on sales and Farjoun's (1998) analysis of the relationship between corporate physical and skill assets and four measures of firm performance.

While this approach to studying the resource-based view has much to recommend it, it has at least one important limitation. With few exceptions, this approach has focused on what is, in fact, a highly aggregated dependent variable, namely, firm performance. And while this aggregated dependent variable may be of intrinsic interest to both scholars and managers, it may not always be the best way to test resource-based theory.

For example, because firms can have competitive advantages in some business activities and competitive disadvantages in others, examining the relationship between resources associated with different processes within a firm and a firm's overall performance can lead to misleading conclusions. Also, a firm may have competitive advantages in some business activities, but various stakeholders may have appropriated the profits these competitive advantages might have generated before they can affect a firm's overall performance. Or, a firm may have resources that have the potential for generating competitive advantages but not fully realize this potential through its businesses activities.

In each of these settings, simply examining the relationship between a firm's resources and capabilities and its overall performance can lead to misleading conclusions with regard to resource-based theory. In this paper, an alternative class of dependent variables—the effectiveness of business processes—is proposed as a way to test resource-based logic.

At least two prior studies have adopted this disaggregated dependent variable in examining the empirical implications of the RBV. In the first, Henderson and Cockburn (1994) examined how a firm's 'architectural competence' affected its ability to develop new products by examining the new drug development process in pharmaceutical firms. Later, Schroeder, Bates, and Junttila (2002) examined how a firm's manufacturing capabilities affected manufacturing effectiveness by studying a sample of manufacturing firms. Following in this tradition, this paper examines how a firm's resources affect its customer service activities for a sample of North American insurance companies.

THEORY

Defining resources and business processes

The literature is replete with definitions of the terms 'resources,' 'capabilities,' and 'business processes.' For purposes of the research reported here, the following definitions have been adopted. First, 'resources' and 'capabilities' are used interchangeably and refer to the tangible and intangible assets firms use to develop and implement their strategies.

'Business processes' are actions that firms engage in to accomplish some business purpose or objective. Thus, business processes can be thought of as the routines or activities that a firm develops in order to get something done (Nelson and Winter, 1982; Porter, 1991).[1] Examples of business processes include the process for acquiring supplies and other raw materials, the process of producing products or services, the process of delivering products or services to customers, and the process of providing after sales service (Porter, 1985).

The effect of multiple business processes on firm performance

As suggested earlier, one reason to adopt the effectiveness of business processes as the dependent variable in resource-based research is that a firm may excel in some of its business processes, be only average in others, and be below average in still others. A firm's overall performance depends on, among other things, the net effect of these business processes on a firm's position in the market place.

Imagine, for example, that the successful implementation of a firm's strategy only depends on two business processes: process A and process B. Suppose that this firm has a sustained competitive advantage in process A, but is at a competitive disadvantage in process B. The net effect of

[1] Differences in terminology reflect differences in theoretical traditions. Those who have adopted an evolutionary economics approach tend to describe these phenomena as routines; those who have adopted an approach based on the structure, conduct, and performance model in industrial organization economics tend to describe these phenomena as activities. Our preference is for the more traditional business term 'business processes,' although all these terms describe very similar phenomena.

these two processes in the market place may be that this firm only enjoys average levels of performance. If scholars were to measure the attributes of the resources and capabilities that enable this firm to excel in process *A*, and correlate these with this firm's overall performance, they might conclude that resource-based predictions were not supported; i.e., firm performance is lower than predicted by resource-based logic. On the other hand, if scholars were to measure the attributes of the resources and capabilities that make it difficult for this firm to obtain even competitive parity in process *B* and correlated these with this firm's overall performance, they might conclude that resource-based predications were also not supported, but in a different way; i.e., firm performance is higher than predicted by resource-based logic. Both of these findings apparently contradict resource-based logic, even though, at the level of business processes in a firm, resource-based logic is entirely supported.

Of course, reality is much more complicated than this simple example. Indeed, a firm's overall performance often depends on, among other things, how it implements numerous business processes. Each of these business processes can have the effect of increasing or decreasing a firm's overall performance. Aggregating the outcomes of these numerous processes can make it very difficult to examine whether a particular set of firm resources and capabilities actually creates competitive advantages for a firm. In this setting, a more appropriate way to test the implications of the RBV is to adopt the performance of a business process as the dependent variable, and to examine the kinds of resources and capabilities that can generate competitive advantages at this level of analysis.

Appropriating profits associated with competitive advantages

A second reason to adopt the effectiveness of business processes as the dependent variable in resource-based research is that it is possible for a firm's stakeholders to appropriate the economic profits that can be generated by a firm's business processes before those profits are reflected in a firm's overall profitability. As Coff (1999) notes, that we do not observe a firm experiencing high levels of performance does not mean, necessarily, that profits are not being generated. Rather, what may be occurring is that a firm's stakeholders may be appropriating any profits that business processes are generating before they affect a firm's overall performance.

Shifting attention from explaining a firm's overall performance to explaining the existence of competitive advantages at the level of business processes within a firm helps avoid this difficult appropriation problem. Consider, for example, Henderson and Cockburn's (1994) study of the research productivity of pharmaceutical firms. If scientists in these firms are able to appropriate the value their expertise generates—perhaps in the form of higher compensation—it may be the case that the financial performance of these firms will not be high, even though they may enjoy important competitive advantages in the research process.

In fact, in many cases it may be necessary for the firm to make above-average payments to several of its stakeholders to induce these stakeholders to make the firm-specific investments that can create resources that can be sources of sustained competitive advantage. In this situation, at least some of the profits created by exploiting firm-specific skills would be appropriated by those who made investments to create those firm-specific skills. These payments to stakeholders would reduce the overall level of firm performance, even though these firm-specific resources may provide a competitive advantage in the process where they are deployed.

Of course, if it was possible to anticipate which of a firm's stakeholders are able to appropriate the profits a firm generates through its business processes, then researchers could examine how the wealth of these different stakeholders was affected by these competitive advantages. This information could then be used to reconstruct the size of the economic profit that was generated by a firm. However, this approach has difficult measurement problems associated with it (Coff, 1999). It will often be easier to determine if particular business processes are or are not a source of competitive advantage for a firm rather than attempting to estimate the size of the profits these processes have generated since a firm's stakeholders may have appropriated some of these profits.

Resources, business processes, and competitive advantage

A final reason to adopt the effectiveness of business processes as a dependent variable in resource-based research is that business processes are the

way that the competitive potential of a firm's resources and capabilities are realized and deserve study in their own right. Most scholars acknowledge that resources, by themselves, cannot be a source of competitive advantage. That is, resources can only be a source of competitive advantage if they are used to 'do something;' i.e., if those resources are exploited through business processes. Stalk, Evans, and Shulman (1992: 62), for example, state that 'the building blocks of corporate strategy are not products and markets but business processes.' Porter (1991: 108) argued that 'resources are not valuable in and of themselves, but they are valuable because they allow firms to perform activities ... business processes are the source of competitive advantage.'

Of course, not all business processes will be a source of competitive advantage for a firm. Resource-based logic suggests that business processes that exploit valuable but common resources can only be a source of competitive parity; business processes that exploit valuable and rare resources can be a source of temporary competitive advantage; and business processes that exploit valuable, rare, and costly-to-imitate resources can be a source of sustained competitive advantage (Barney, 1991). In addition, to realize the full competitive potential of its resources and capabilities, a firm must organize its business processes efficiently and effectively (Barney and Wright, 1998).

Because they tend to be path dependent, socially complex, and causally ambiguous, it is reasonable to expect that business processes that exploit intangible firm resources are more likely to be a source of competitive advantage than business processes that exploit tangible firm resources (Lippman and Rumelt, 1982; Itami, 1987; Dierickx and Cool 1989; Barney, 1991).[2] Of course, in real organizations, intangible and tangible resources will often be bundled together to enable the execution of a particular business process. Thus, for example, computer hardware and software (tangible resources and capabilities with limited potential for sustained competitive advantage) may be bundled with an organization's commitment to customer service (an intangible resource and capability with the potential to generate such advantages) to enable the execution of customer service, an important business process in at least some firms. Resource-based logic suggests that while the former resources are often important in enabling a firm to execute a business process, of these two types of resources, only the latter are likely to be a source of sustained competitive advantage.

Firms that fail to efficiently and effectively translate their resources and capabilities into business processes cannot expect to realize the competitive advantage potential of these resources. While these resources may retain the potential for generating competitive advantage for some period of time, that potential can be realized only if used in business processes, for it is through business processes that a firm's resources and capabilities get exposed to the market, where their value can be recognized. In the long run, the failure to exploit resources and capabilities through business processes may result in the deterioration of their ability to generate competitive advantages. On the other hand, in the course of exploiting current resources through business processes, new resources can be developed and refined, thereby enabling a firm to develop new sources of competitive advantage.

In this paper, resource-based predictions are tested using the effectiveness of the customer service process in insurance companies as the dependent variable. This particular business process was chosen for several reasons. First, in the highly competitive insurance industry, customer service is widely seen as an important aspect of the strategy of many firms (*National Underwriter*, 1990; *Best's Review*, 1994). Second, there is a high level of variance in the reported ability of firms in this industry to satisfy their customers, suggesting that some firms may enjoy competitive advantages (and competitive disadvantages) in executing this business process (Teal, 1991; Garvin, 1995). Third, the execution of this business process relies on the exploitation of several different resources and capabilities. Finally, some of these resources are intangible in character, while some are tangible in character. This makes it possible to test some of the core assertions of the RBV at the level of an important business process.

[2] Note that the theory does not predict that all intangible resources will be sources of sustained competitive advantage. If numerous competing firms possess the same, or substitute, intangible resources, then those resources will not be a source of competitive advantage. Rather, the theory asserts that in the search for sources of sustained competitive advantage, it will often be helpful to look to intangible rather than tangible resources.

DATA AND METHOD

The empirical analysis is based on the performance of the customer service process in the life and health insurance segments of the insurance industry in North America. For this study, customer service is defined as activities that involve episodes of interaction between customers (and agents acting on behalf of customers) and company employees when customers make inquiries, request changes to a policy, or conduct financial transactions.

Sample

Data on the customer service business process were collected from firms in the life and health insurance industry in North America. A list of firms in this industry was obtained from two sources: (1) the membership list of the Life Office Management Association (LOMA), one of the largest trade associations in the insurance industry; and (2) the Dun and Bradstreet database[3]. LOMA includes 350 members. However, membership in this organization is biased towards larger firms in the industry and towards life insurance firms as against health insurance firms. In order to ensure complete coverage of the firms in the industry, all other life/health insurance companies (as classified by their SIC codes) from the Dun and Bradstreet (1999) database that are not members of LOMA, and which had over 100 employees, were included in the sample. Firms with fewer than 100 employees were not included in the sample because these firms often do not have a separately identifiable customer service unit.

Overall there were 800 companies in the combined sample: 350 from LOMA, and 450 from the Dun and Bradstreet database. Attributes of this sample of firms are presented in Table 1.

Data were obtained from a total of 104 different firms, for an overall response rate of 13 percent. To assess the external validity of the sample, companies in the final sample were compared with companies in the AM Best Listing of Life and Health insurance companies, on the basis of their AM Best Rating and their Financial Size Category (FSC), using the nonparametric Kolmogorov–Smirinov test. The null hypothesis that the firms in the sample and the general population have the same distribution of AM Best Ratings cannot be rejected at the 0.10 level. However, the null hypothesis that the sample and the population have the same financial size characteristics can be rejected at the 0.01 level. This is to be expected because the membership of LOMA is biased towards larger organizations in the industry and because only firms with more than 100 employees were selected from the Dun and Bradstreet database. Therefore, it appears that this sample is representative of the life and health insurance industry, though it is biased towards larger companies.

Table 1. Attributes of the firms included in the sample

Variable	Sample mean	Sample median	Sample S.D.
Total assets (mil. $)	12,622.9	858.0	39,006.7
Total equity (mil. $)	1,111.1	143.5	3,918.6
Total premiums (mil. $)	947.6	170.0	1,896.9
Annual CS budget (mil. $)	11.7	2.5	31.4
Annual IT budget (mil. $)	41.5	8.0	128.6
Company age (years)	57.28	50.00	40.22
No. of CS employees	184	49	506
No. of IS employees	240	50	712
Total employees	3,207	525	9,928
No. of products sold	4.25	4.00	2.67

Hypotheses

Previous research on the effectiveness of customer service processes within firms and interviews with managers in insurance companies suggested at least four resources and capabilities that can influence the performance of the customer service process in an insurance firm: service climate, managerial information technology knowledge, technology resources used in the process, and investments in the customer service process. The first two of these resources—service climate and managerial information technology knowledge—tend to be more intangible in character, while the second two—technology resources and investments in the customer service process—are more tangible.

Service climate

An extensive literature argues that organizational climate influences firm performance (Hansen and

[3] The Life Office Management Association (LOMA) was a co-sponsor of this research effort.

Wernerfelt, 1989; Powell and Dent-Micallef, 1997). In the area of customer service, organizational climate is referred to as service climate (Schneider, Wheeler, and Cox, 1992; Schneider, White, and Paul, 1998). Service climate is defined as employee perceptions of the practices, procedures, and behaviors that are expected, supported, and rewarded with regard to customer service and customer service quality (Schneider *et al*., 1998). Schneider *et al*. (1998) show that there are two dimensions of service climate: (i) motivators, and (ii) facilitators of service climate. The motivators of service climate include the extent to which the customer service unit has clear standards for the quality of service to be delivered, measures the quality of service delivered, and recognizes and rewards the delivery of quality service. The facilitators of service climate include how adequately the customer service representatives are trained to handle different situations that are likely to arise in the customer service function, the communication and coordination within the customer service unit and between other internal units to provide quality customer service, and the extent to which the customer service unit has the policies and procedures that make it easy to deliver excellent customer service.

Service climate is a team-embodied, socially complex organizational resource. Similarly, since service climate depends on employee perceptions, it is an intangible resource, which may influence the performance of the customer service process. Therefore, even if this resource is valuable, if it is heterogeneously distributed across firms, it is unlikely that all competing firms in this industry will be able to imitate it at low cost. These observations lead to the first hypothesis tested in this paper:

> *Hypothesis 1: Service climate in the customer service unit will be positively related to the performance of the customer service process.*

Managerial information technology (IT) knowledge

IT is crucial to the performance of the customer service process in insurance companies. This process involves significant information processing when employees interact with customers, when customers make inquiries, request changes to a policy, or conduct financial transactions. Strategic use of IT in this business process requires the creation and implementation of a portfolio of IT applications. However, some firms exhibit greater success than others in their ability to leverage IT.

It is often argued that it is the shared knowledge between line and IT managers that determines the strategic use of IT. Using absorptive capacity (Cohen and Levinthal, 1990) as a theoretical basis, Boynton, Zmud, and Jacobs (1994) show that the level of IT use is influenced by the presence of a mosaic of IT-related knowledge that binds the firm's IT and line managers. A major component of absorptive capacity regarding IT is represented by the conjunction of IT and business-related knowledge possessed by and exchanged among IT and line managers. It is this overlapping pool of shared knowledge (i.e., the knowledge that the IT manager possesses about the business process, and the knowledge that the line manager possesses about the potential opportunities to apply IT to improve process performance) and common understanding regarding how IT may be used to improve the process, that represents the construct of managerial IT knowledge. Managerial IT knowledge is therefore an important capability that enables the organization to conceive, develop, and use firm-specific applications of IT that improve process performance.

Drawing on resource-based logic, Mata, Fuerst, and Barney (1995) argue that amongst the commonly discussed IT resources, only 'managerial IT skills' can be a source of sustainable competitive advantage. Managerial IT skills or knowledge is developed over long periods of time. The trust, interpersonal relationship, and a shared body of firm-specific knowledge between the IT and the line manager at a level where they are able to effectively work together to conceive, develop, and implement novel applications of IT can take years to develop. Thus the development of managerial IT knowledge is often a path-dependent and socially complex process. To the extent that this shared knowledge is valuable and heterogeneously distributed across firms, it can be a source of sustainable competitive advantage, since it is not subject to low-cost imitation. These observations lead to the next hypothesis examined here:

> *Hypothesis 2: Managerial information technology knowledge will be positively related to the performance of that firm's customer service process.*

Technology resources in customer service

Technology resources are process-specific ITs that are used to support specific processes. Technology resources refer to the set of well-known computing technologies in an industry that are available from factor markets and understood to have a positive impact on the performance of specific processes. The technology resources used in customer service refer to technologies such as networks with agents, computer–telephony integration, use of scanning technology to store and retrieve policies, web-enabled customer interaction, and so forth. These technologies are used to support the customer service business process. Therefore, technology resources are valuable physical capital resources that may improve customer service performance. However, it is believed that fairly efficient factor markets exist for these technologies. Thus, while technology resources may be a valuable resource, they—according to resource-based logic—will not explain significant variation in the performance of customer service processes, as they are not costly to imitate (Powell and Dent-Micallef, 1997). This leads to the third hypothesis:

Hypothesis 3: Technology resources used in the customer service process will not be related to the performance of that process.

Investments in customer service

One possible determinant of the performance of the customer service process is simply the investment in this process. In general, the greater this investment, the higher the expected quality of this process. However, there are at least two reasons why this simple relationship between investment in customer service and the quality of the customer service process may not hold.

First, it may well be the case that the worst-performing customer service processes require additional investments by a firm. For this reason, total investment in customer service processes and the quality of those processes may actually be negatively correlated. Second, investments in customer service are very tangible. To the extent that they generate value, they are not costly to imitate. In the long run, resource-based logic suggests that such investments will not be a source of sustained competitive advantage.

Which of these two arguments hold is ultimately an empirical question. However, since the insurance industry is quite mature, it seems reasonable to believe that much of the competitive imitation that could have taken place with respect to investments in customer service has already taken place, and thus that the second argument is more likely to hold. This leads to the last hypothesis examined in this paper:

Hypothesis 4: Total investment in the customer service business process will not be related to the performance of that process.

Measurement and survey administration

Data used to measure independent and dependent variables in this study were collected through the use of a survey. In addition, some nonsurvey measures of customer service quality were also used. The survey had two main components: (1) a customer service component (to be completed by the customer service manager); and (2) an information systems component (to be completed by the information systems manager of the organization).

Survey development and administration

To assess the content validity of the items in the survey, the initial survey instrument was pre-tested and refined by administering the customer service component to three customer service managers and the information systems component to two CIOs, in insurance companies with headquarters in the mid-west. After the preliminary testing, a pilot study was conducted with 30 insurance companies to evaluate the questionnaire as well as the process for administrating the questionnaire. The respondents were given 1 month to respond, and 11 complete responses were received: five from CIOs and six from customer service managers. Using these responses, a few of the items were reworded to improve their clarity. Overall it appeared that respondents had no difficulty in understanding the items or the instructions provided to complete and return the questionnaire.

The first mailing of the questionnaire was done during the month of January 2000. The respondents were given 1 month to respond to the survey. After 1 month, a second mailing was sent giving the respondents another month to respond to the survey. After another month, a third mailing

was sent. This time, only a one-page letter was sent requesting the manager to respond to the survey. The CIOs and the customer service managers returned their responses independently. In all the mailings, the respondents were promised complete confidentiality of the data provided by them. They were also promised a summary statement indicating their position with respect to the other respondents and a summary of the statistical analysis.

Independent variable measures

As is shown in Table 2, service climate was measured using a scale adapted from the one developed by Schneider *et al*. (1992, 1998).[4] This instrument was completed by the customer service manager in each of the firms in the sample.

Managerial IT knowledge was measured using an instrument adapted from Boynton *et al*. (1994). The instrument consisted of two parts, one of which is completed by the manager responsible for

[4] As indicated earlier, there are two dimensions of service climate: (i) motivators, and (ii) facilitators of service climate. We collected data on both dimensions. However, we only present the scale and analysis of the facilitators of service climate. Analysis with motivators of service climate leads to same results. Sample size limitations preclude us from including *both* dimensions of service climate in one model.

Table 2. Statistics for measurement scales: independent variables

	Item mean/ median/S.D.
A. Service climate: a 4-item scale measuring the responses to the following statements concerning service climate (where 1 = strongly disagree and 5 = strongly agree)	
1. Customer service representatives are adequately trained to handle different situations that are likely to arise in the customer service function	4.06/4.0/0.69
2. There is open communication and teamwork in the customer service unit	4.23/4.0/0.59
3. There is coordination between internal departments to provide quality customer service	3.76/4.0/0.78
4. The policies and procedures in the customer service unit make it easy to deliver excellent customer service	3.55/4.0/0.86
Reliability coefficient alpha = 0.75	
B. Managerial IT knowledge: a 4-item scale (2 items for each part of the dyadic construct) measuring the responses to the following statements concerning the degree of shared knowledge and understanding between CS and IT managers (where 1 = strongly disagree and 5 = strongly agree)	
1. Managers in the information systems unit understand the business operations of the customer service unit	3.55/4.0/0.88
2. There is a common understanding between managers in customer service and information systems units regarding how to use information technology to improve customer service	3.45/4.0/0.88
3. Managers in the customer service unit recognize the potential of IT as a tool to increase the productivity (efficiency) of the customer service representatives	4.18/4.0/0.70
4. There is a common understanding between managers in the information systems and customer service units regarding how to use IT to improve customer service	3.57/4.0/0.82
Reliability: coefficient alpha = 0.75	
C. Technology resources in customer service: a 6-item scale measuring the range and scope of the technology resources/applications deployed to support CS (where 0 = Don't intend to implement; 1 = Not yet begun; 3 = Standard/common implementation; 5 = Highly advanced implementation)	
1. Scanning/imaging technology	2.38/3.0/1.47
2. Network with agents/brokers	2.59/3.0/1.44
3. Web-enabled customer interaction	2.04/1.0/1.27
4. Call tracking/customer relationship management system	2.23/2.0/1.30
5. Computer telephony integration (CTI)	1.63/1.0/1.29
6. Customer service expert/knowledge-based system	1.35/1.0/1.25
Reliability: coefficient alpha = 0 .65	
D. Investment in customer service:	
1. What is the annual budget of the customer service unit? (in millions)	11.67/2.5/31.40
2. What is your annual IT budget? (in millions)	41.48/8.0/128.63
Reliability: coefficient alpha = 0 .78	

customer service and the other by the chief information officer (CIO) in each of the firms in the sample. The customer service manager answered questions regarding the IT manager's knowledge of the operations of the customer service unit and about the level of a shared understanding with the IT manager regarding how IT can be used to improve the quality of customer service. The IT manager answered questions regarding his/her assessment of the customer service manager's understanding of IT and how IT can be used to improve the performance of the customer service process, and about the level of a shared understanding with the customer service manager regarding how IT can be used to improve customer service.

A new scale was developed to measure the range and scope of the technology resources used to support the customer service process. Interviews with managers were used to identify the range of different technologies that are used in the customer service process. Six technologies were identified: scanning/imaging technology, network with agents, web-enabled customer interaction, call-tracking system, computer telephony integration, and customer service knowledge base system. The scope of the implementation was assessed using a six-point scale with four anchors (don't intend to implement, not yet begun, standard implementation, highly advanced implementation). This scale is in the spirit of the scale used by Powell and Dent-Micallef (1997) to measure technology resources. This instrument was completed by the IT manager of each firm.

The annual customer service and IT budget were used to assess the investment in the customer service process. This information was collected from the customer service and IT managers of each firm.

Dependent variable measures

Performance of the customer service process is the key dependent variable in this study. However, customer service is a very broad concept and there is no perfect measure of customer service performance. Therefore, as shown in Table 3, multiple measures were used to assess customer service performance.

The first measure of customer service performance is based on the scale developed by Parasuraman, Zeithaml, and Berry (1985, 1988, 1991, 1994) from the marketing literature. This instrument is intended to be administered to an organization's customers to assess its customer service quality. However, since the design adopted here required the measurement of customer service performance for a large number of companies, it was not possible to administer the instrument directly to the customers of these companies. Therefore, a modified version of this instrument was developed and completed by a firm's customer service manager. This measure of customer service performance is referred to as 'PZB' (for Parasuraman, Zeithaml, and Berry) in the rest of this paper.

Customer service is regarded as an important activity in the insurance industry. Therefore, insurance companies conduct periodic surveys to measure the quality of service provided by their customer service unit. The second measure of customer service performance used in this study is an organization's own assessment of the quality of the customer service provided by its customer service unit. This measure is called 'self-assessment' in the rest of the paper.

Customer service performance is also reflected in the ability of firms to retain policy holders. If a company provides superior customer service it is able to retain policy holders over a period of time. The third measure of customer service used in this study is the retention ratio weighted by the volume of business in different lines of insurance (life/health), for the policies sold in the previous calendar year. This measure of customer service performance is called 'retention ratio' in the rest of the paper.

The National Association of Insurance Commissioners (NAIC) is a regulatory support body created by state regulators to address the need to coordinate regulation of multi-state insurers. One measure of customer service maintained by the NAIC is the complaints ratio. The complaints ratio of a company is defined as the ratio of premiums written to the number of complaints received by the company, classified by the type of insurance activity (life/health). The complaints ratio has been found to be correlated with direct measures of customer service quality (Wells and Stafford, 1995) as assessed using the instrument developed by Parasuraman *et al*. (1985). Therefore, the complaints ratios with respect to life and health business lines, as aggregated by NAIC, were used as the fourth and fifth measures of customer service performance. One limitation of

Table 3. Statistics for dependent variables

	Item mean/ median/S.D.
A. Customer Service Quality (PZB): a 9-item scale measuring the responses to the following statements concerning customer service quality (where 1 = strongly agree and 5 = strongly disagree)	
1. The customer service unit gives customers prompt service	4.21/4.0/0.75
2. Customer service representatives are never too busy to respond to customers	3.50/4.0/1.00
3. Customer service representatives are consistently courteous with customers	4.06/4.0/0.65
4. Customer service representatives have the knowledge to answer customers' questions	4.00/4.0/0.59
5. Customer service representatives are empowered to solve customers' problems	3.79/4.0/0.81
6. When the customer service unit promises to do something for a customer by a certain time, it does so	4.03/4.0/0.67
7. When a customer has a problem, the customer service unit shows sincere interest in solving it	4.23/4.0/0.55
8. The customer service unit performs the service accurately the first time	3.82/4.0/0.58
9. Customer service representatives understand customers' specific needs	3.91/4.0/0.67
Reliability: coefficient alpha = 0 .86	
B. Self-assessment: a 1-item scale soliciting the overall result of quality assessment conducted by the company itself (coded on a 10-point scale, where 1 = extremely poor and 10 = extremely good)	
1. If the company conducts customer surveys to evaluate its customer service quality, what was the overall customer service quality rating in the last survey?	7.70/8.0/1.40
C. Weighted retention ratio: retention ratio weighted by the volume of business in different lines of insurance (life/health), for the policies sold in the previous calendar year	
1. What is your policy retention/persistence rate (in percent) over the most recent 1-year period?	89.76/92.94/9.91
Individual life _____% Group life _____%	
Health/disability _____% Property/casualty _____%	
D. Complaints ratios, as tallied by NAIC: the ratio of premiums written (in millions) to the number of complaints received by the company, classified by the type of insurance activity (life/health)	
D1. Life complaints ratio	25.23/9.31/45.14
D2. Health complaints ratio	3.02/1.37/3.81

these last two measures of customer service quality is that only 28 states collect complaint statistics. Therefore, if a company operates only in the other states, this statistic is not available for that company.

Measurement reliability

The reliability of each of the variables was estimated. As is shown in Tables 2 and 3, all these measures except technology resources had reliabilities above the generally accepted level of 0.70. The scale for technology resources is intended to assess the variety and scope of technologies implemented to support customer service. This scale is in the spirit of a scale developed by Powell and Dent-Micallef (1997) to measure technology resources. As such, variances among the items in this scale may not be as homogeneous as would be expected in the other scales, leading to a marginally lower alpha. Nevertheless, the alpha coefficient for this scale (0.65) is close to the widely accepted cut-off value of 0.70 and greater than the minimum recommended (0.60) for newly developed scales (Nunnally, 1988).

As noted earlier, customer service is a broad concept and there is no perfect measure of customer service; therefore, multiple measures are used in this study. It is believed that if the measures used have information about the quality of the customer service delivered, there would be positive correlations amongst them, and such correlations were found. Customer service as measured using PZB is correlated with other measures of customer service: self-assessment ($p = 0.000$), retention ratio ($p = 0.005$), life complaints ratio

($p = 0.045$), and health complaints ratio ($p = 0.042$). Self-assessment has a significant positive correlation with retention ($p = 0.059$), and health complaints ratio ($p = 0.028$), and life and health complaints ratio were also positively correlated ($p = 0.001$).

DATA ANALYSIS

Models

Descriptive statistics for each of the independent and dependent variables included in the study are presented in Table 4. Since many of the variables in the study are latent constructs, it was necessary to test the hypotheses using structural equation modeling. Models were estimated for each of the five measures of customer service performance independently: Model 1 to Model 5 in Table 4. In addition, a model was estimated that examines the relationship between the four independent variables and firm performance, measured in terms of return on assets (Model 6).

Results

Model fit is evaluated using the maximum likelihood (ML) method. The ML method is the most frequently used estimation technique in structural equation modeling and the normal distribution of manifest variables suggests that this is an appropriate method in this context. Table 4 shows the model fit measured using the root mean square error of approximation (RMSEA), test of close fit, chi-square per degree of freedom, and two incremental fit measures: Tucker–Lewis Index (Tucker and Lewis, 1973; Bentler and Bonett, 1980), and the Comparative Fit Index (CFI) (Bentler, 1990). The RMSEA is the root mean square discrepancy between the population covariance matrix and the covariance matrix obtained by fitting the model in the population, per degree of freedom (Browne and Cudeck, 1993). The test of close fit tests the null hypothesis that RMSEA ≤ 0.05. A chi-square per degree of freedom of less than two also indicates a reasonable fit (Marsh and Hocevar, 1985; Byrne, 1989).

Table 4. Result of using structural equation modeling with independent variables (i) service climate, (ii) managerial IT knowledge, (iii) information technology applications, and (iv) investment in customer service, and measures of customer service and firm performance (ROA) as the dependent variables

Variables/models	Level of analysis					
	Process					Firm
	Customer Service (PZB) (Model 1) Estimate *t*-value	Self-assessment (Model 2) Estimate *t*-value	Retention ratio (Model 3) Estimate *t*-value	Life compts ratio (Model 4) Estimate *t*-value	Health compts ratio (Model 5) Estimate *t*-value	Return on Assets (Model 6) Estimate *t*-value
Service climate	0.787	0.559	0.061	0.459	0.138	0.028
	3.658	3.482	0.413	2.423	0.966	0.184
Managerial IT knowledge	0.417	0.107	0.383	−0.042	0.639	−0.119
	2.682	0.690	2.029	−0.200	3.517	−0.645
Technology resources	−0.222	−0.077	−0.063	0.468	0.090	0.299
	−1.163	−0.354	−0.243	1.545	0.382	1.170
Investment in customer service	0.050	−0.340	0.015	−0.374	−0.307	−0.137
	0.356	−2.139	0.080	−1.744	−1.810	−0.754
RMSEA	0.061	0.054	0.062	0.067	0.066	0.064
90% CI for RMSEA	(0.045, 0.075)	(0.023, 0.077)	(0.036, 0.084)	(0.044, 0.089)	(0.042, 0.087)	(0.039, 0.086)
Test of close fit (RMSEA $\leq$ .05)	0.122	0.393	0.201	0.104	0.127	0.157
Chi-square/degree of freedom	1.382	1.296	1.393	1.468	1.447	1.423
Tucker–Lewis Index	0.980	0.987	0.983	0.978	0.979	0.980
Comparative Fit Index (CFI)	0.983	0.990	0.987	0.984	0.984	0.985

The Tucker–Lewis Index (also called the Non-Normed Fit Index, NNFI) compares the model under study to two reference models: (1) a worst-case model, and (2) an ideal model. The worst-case model (or the null model) is the model where all the manifest variables are uncorrelated. The ideal model is the model that holds exactly in the population. The Tucker–Lewis Index is the ratio of the difference in fit between the model under consideration and the null model to the difference in fit between the ideal model and the null model. An index of 1 (0) indicates the ideal (worst-case) model. NNFI over 0.90 indicates good fit. Similarly, the CFI indexes the relative reduction in lack of fit as estimated by a noncentral chi-square distribution of a target model vs. a baseline model. It overcomes the shortcomings of the Normed Fit Index (NFI) by replacing the central with a noncentral chi-square. CFI close to 1 indicates a very good fit.

All the models pass the test of close fit and have chi-square per degree of freedom of less than 2. Similarly, all the six models have a Tucker–Lewis Index and CFI of around 0.98, indicating good model fit. Table 4 also shows the standardized regression weights reflecting the relationship between the independent variables (service climate, managerial IT knowledge, technology resources in customer service, and investment in customer service) and the dependent variable customer service performance, measured five different ways (Model 1 through Model 5). With regard to the hypotheses, results in Table 4 reveal that service climate has positive regression weights in all of these five models, suggesting a positive relationship between service climate and customer service performance. The t-statistic for this variable is significant at the 0.05 level for three out of these five models. These results generally support Hypothesis 1.

Similarly, managerial IT knowledge has positive regression weights for four out of these five models. These coefficients reach statistical significance in three out of the five models, suggesting a positive relationship between managerial IT knowledge and customer service performance. These results support Hypothesis 2.

The technology resources used in customer service did not have statistical significance in any of these five models. Similarly, the coefficients of investment in customer service were also not significant in any of these five models. Thus, Hypotheses 3 and 4 are supported.

The results in Model 6 examining the relationship between the independent variables (service climate, managerial IT knowledge, technology resources in customer service, and investment in customer service) and the dependent variable firm performance measured as return on assets are also quite interesting. While no specific hypotheses were made with respect to the relationship between the four independent variables and firm performance, it is interesting to note that despite support of Hypotheses 1 and 2, there is no significant relationship between service climate and managerial IT knowledge, on one hand, and firm performance, on the other. The results in Tables 4 suggest that competitive advantages may exist at the level of businesses processes within a firm, and that these competitive advantages can be explained using resource-based logic, but that these advantages may not manifest themselves in a firm's overall performance.

DISCUSSION

This paper has had two objectives. The first has been to argue that in some circumstances adopting the effectiveness of business process as a dependent variable is a more appropriate way to test resource-based logic than adopting overall firm performance as a dependent variable. The second was to provide a specific test of resource-based logic at the business process level. However, in accomplishing these objectives, the paper raises some important issues about some traditionally competing explanations of superior firm performance.

Disaggregating firm performance and testing the resource-based view

The empirical findings presented in this paper suggest that, in fact, firms may possess competitive advantages at the level of business processes that are not reflected in a firm's overall performance. If competitive advantages in one business process are offset by competitive disadvantages in other business processes, or if any profits generated by a firm's business process are appropriated by a firm's stakeholders and not reflected in a firm's overall performance, there may be no relationship

between the valuable, rare, and costly-to-imitate resources and capabilities that enable a firm to gain competitive advantages from a particular business process and a firm's overall performance. This can be the case even though the basic logic of the resource-based view holds.

Resource-based logic and business processes

As important, the results presented also constitute a test of resource-based logic at the business process unit of analysis. Results reported here are consistent with resource-based expectations. Intangible and socially complex capabilities—service climate and managerial IT knowledge—are positively related to customer service performance. Tangible and nonsocially complex resources—technology resources and investment in customer service—do not seem to explain variation in customer service performance.

Of course, these results do not mean that firms should not invest in technology resources and other tangible aspect of customer service. Clearly, these kinds of resources are required if a firm is to have any customer service operation. However, because these resources are not costly to imitate, most firms in a mature industry like the insurance industry will already have them in place, and thus they will not be a source of competitive advantage. Only those resources that are costly to imitate—service climate and managerial IT knowledge—are likely to continue to provide competitive advantages for firms, and thus only these resources are related to customer service performance. Thus, this paper also extends the growing number of empirical tests of resource-based logic.

Competing explanations of firm performance

For some time now, a conflict has existed in the strategic management literature concerning the most appropriate way to analyze sources of superior firm performance. On the one hand, one group of scholars has argued for the primacy of 'activities' or 'routines' as the source of a firm's competitive advantage. Work on the relationship between activities and firm performance has generally applied value chain techniques to understand how a firm's activities can affect its competitive positioning (Porter, 1985). Work on the relationship between routines and firm performance draws mainly from evolutionary economic theories of firm behavior (Nelson and Winter, 1982). This perspective suggests that firms excel because of what they do.

On the other hand, another group of scholars has argued for the primacy of a firm's 'resources and capabilities' as the source of a firm's competitive advantages (Wernerfelt, 1984; Rumelt, 1984; Barney, 1986, 1991). As described in this paper, much of this work has examined the relationship between resources the theory predicts should generate competitive advantages and a firm's overall performance. This perspective suggests that firms excel because of what they are.

This paper recognizes important common ground between these two perspectives. On the one hand, the paper acknowledges that resources and capabilities that are not translated into activities, routines, or business processes cannot have a positive impact on a firm's performance. Activities, routines, and business processes are the mechanisms through which resources and capabilities get exposed to market processes where their ultimate value and ability to generate competitive advantages are realized.

On the other hand, the paper also recognizes that the ability of firms to pursue certain activities, routines, or business processes may be limited by the resources and capabilities they control. That is, firms are not 'empty canvasses' upon which any activity, routine, or business process can be drawn, and the differential effectiveness of these firm processes depends critically on the resources and capabilities a firm possesses.

Indeed, the research reported here not only recognizes this common ground, but suggests that understanding the relationship between a firm's resources and the effectiveness of its activities, routines, or business processes is particularly fruitful ground for analyzing the empirical implications of resource-based theory. Thus, adopting a disaggregated dependent variable not only facilitates the theoretical and empirical integration of two previously competing perspectives in the strategic management literature, but it also facilitates the testing of resource-based logic.

This theoretical integration has implications that move well beyond the reported research. For example, this paper has examined how a firm's resources and capabilities can condition its ability to implement specific activities, routines, or business processes. However, a firm's activities, routines, or business processes could also be an

important determinant of a firm's resources and capabilities (Porter, 1991). In this sense, prior activities, routines, and business practices can become part of the path-dependent process through which a firm develops its resources and capabilities, which in turn condition its ability to implement future activities, routines, and business practices.

From the perspective of managers, research on understanding why some activities, routines, or business practices are able to generate competitive advantages while others cannot is likely to be more helpful than research that examines just the relationship between resources and firm performance at a more aggregate level. By focusing on activities, routines, and business processes where resources are deployed and where their first-order effects are expected to be realized, managers might be in a better position to benchmark the resource endowment of their firms and identify critical resources that should be exploited, developed, and protected. And while a firm may have limited ability to change its endowment of resources in the short to medium term, managers may have the ability to redesign some of a firm's activities, routines, and business processes to more efficiently and effectively exploit resources and capabilities it already possesses. In this sense, integrating these previously competing explanations of firm performance may ultimately enhance the applicability of the field of strategic management.

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