Abstract—This paper presents some extensive, albeit preliminary, data on the strategic use of information resources in a field that has had little or no empirical work. An important distinction was made between the strategic use of information versus information technology. The results of a survey of 84 senior IS executives suggest that business firms do recognize this distinction. Organizational factors that facilitate and inhibit the strategic use of information resources and the processes leading up to their adoption were also analyzed. The evidence suggests that formal organizational processes have not been instituted for assessing and implementing business strategies that are based on information resources.

INTRODUCTION

TODAY there is little disagreement on the potential uses of information technology as a competitive weapon. The literature on information systems (IS) is replete with anecdotes describing applications that have transformed the competitive position of firms and restructured the industry in which they compete [1]. A myriad of planning frameworks have been proposed for identifying opportunities [2]-[4], prioritizing applications [5], [6], and evaluating risk [7]. While these frameworks do have utility in providing a common language for researchers, they are primarily descriptive and are marked by an absence of testable models based on relevant theory.

The reference discipline that has been very useful in structuring notions of competitive advantage has been in industrial organization economics [8]. Several papers have applied the concepts of generic competitive strategies, key competitive forces, and the value chain, in this field. More recently, the notion of sustainable competitive advantage has become popular and work is being done on understanding organizational differences that contribute to the sustainability of the advantage [9], [10].

It is unfortunate, however, that while many powerful concepts are being brought to the forefront, literature in the area continues to suffer from two major limitations. First, in most of the studies dealing with the strategic use of information resources, two types of resources, namely information and information technology (IT), are discussed interchangeably. By pooling these two quite different varieties of information resources, researchers have failed to develop the most effective frameworks for guiding thinking, planning, and decision making. Secondly, almost all the work in the area is anecdotal. There is very little that has been done by way of broader empirical research. While prescriptions on organizational processes leading up to successful deployment of technology abound, they are inevitably based on case studies or sample sizes of less than five. Given the increasing pervasiveness of strategic IS applications, it is surprising that broader empirical studies that profile the nature of these applications are virtually nonexistent.

This study represents a significant, albeit preliminary, attempt to address these limitations. Specifically, the objectives are to:

1) make a case for the need to distinguish between the two types of information resources, information and IT, in the context of competitive strategy;
2) provide preliminary empirical validation for the distinction based on a survey of senior IS executives representing 84 large U.S. corporations;
3) analyze the organizational factors that facilitate or inhibit the use of information resources;
4) report on the organizational decision-making processes currently being used by business firms for strategic IS applications.

INFORMATION VS. INFORMATION TECHNOLOGY

The concept of information has traditionally been viewed by computer science from an information-theoretic perspective. These views have a strong mathematical orientation and isolate information from its semantic context. For instance, Shannon's perspective on information was as a quantifiable entity that provided an encoding of various states of the world [11]. Savage [12] extended this concept by introducing the utility function of the individual who is viewed as playing a game against nature. More recently, Mason and Mitroff [13], who have been very influential in laying the foundation for MIS research, build the notion of information around the concept of "inquiry" which values information based on its behavioral context. In the context of MIS, this behavioral view of information is relevant as value should be placed on information depending on the use to which it is put within the parameters of the person, problem, or organizational context, rather than on its structural content.

Perrow [14] defines technology as a structural variable that describes the way organizational resources are managed in order to get the work done. A process-based view of technology in a production context would define it as that which is...
involved in the storage, transportation, and transformation of raw materials toward a final product. Similarly, information technology can be defined based on both its structure (organization) and its functionality, with information as the raw material.

Bakopoulos [15] summarizes this line of thinking and provides definitions of information and IT that are useful in highlighting the distinction between the two concepts: 

*Information* is defined as data plus a context-providing model.

*IT* is defined to include the set of nonhuman resources dedicated to the processing, storage and communication of information and the way in which these resources are organized into a system capable of performing a set of tasks.

It is unfortunate that in most of the literature concerning the strategic uses of information resources, information and IT are often discussed interchangeably. For instance, Porter and Millar [1] define IT to include information that a business creates or uses as well as the myriad of convergent technologies that exist to process the information. By collectively considering these two different types of information resources we are limiting our perspective on strategic applications. In the following sections we will first highlight the dichotomy and then discuss its relevance for competitive applications.

*The Dichotomy*

Information technology and information are distinct entities having different characteristics. Therefore, it is not unreasonable to assume that they would be different in terms of their potential for creating comparative advantage. Indeed, real-world experience suggests that decision-making processes often tend to focus on information technology rather than information since technology is more tangible and often must be developed and implemented before information can be produced. To deal with the two entities collectively in a decision-making process often relegates the one—information—to a position of lesser importance when, in fact, the opportunities that are presented by information may have far more potential than those offered by technology.

This experience-based notion can be dealt with more precisely in terms of distinctions between information and information technology based on visibility, functionality, potential for evaluation, interrelationship, and the role of software.

*Visibility:* Because of its hardware components, information technology is obviously more visible than is the abstraction called information which may exist in the form of encoded symbols, sounds, or only in the minds of people. This means that it is generally rather easy for people to understand what technology is and what it looks like. Visualization of information is much more difficult.

*Functionality:* IT can be defined in terms of its functionality or the functions that it performs—storage, processing, and communication. Information has no such well-defined range of functionality; it can serve as many purposes and ends as the human mind can conceive.

*Potential for Evaluation:* Since technology serves these basic functionalities, each can be evaluated in terms of cost, speed, capacity, etc. Such conduciveness to direct evaluation makes IT applications assessable in tangible terms. Another way of looking at it is to view IT as a "production process," that performs value-adding activities on the "raw material", or data. How well it performs these functions or processes can often be assessed in terms of the replacement of human activities or capabilities. As discussed by Bakopoulos [15], IT essentially extends the bounds of human rationality by increasing human capacity for storage, communication, and processing. Therefore, it may be evaluated in terms of the range of functions it performs, the number of people it communicates with, the ease of use, etc. Information, on the other hand, does not extend the bounds of human rationality but influences human thought processes. The nature of this influence is complex and could take many different forms.

*Interrelationships:* The existence or development of IT is often a necessary precursor to the effective use of information. Researchers who place a "value" on information often do so in terms of the dimensionality of the concept—i.e., its form, content, and timeliness [16]. However, the form, time, and place utility may have been provided by the IT that captured, stored, and processed the information. To identify the source of value it is necessary to remove the "value added" by the IT and see if the same use can be made of the information.

*Role of Software:* A source of confusion with this dichotomy is in its ability to classify software. Systems software which controls and monitors hardware operations, i.e., facilitates movement of data without concern for its specific content or use, such as operating system software or compilers could be classified with technology and assessed in terms of processing speed, reliability, etc. Analytic software is clearly more like information than IT, in that IT is unique to the problem at hand, and its effectiveness is difficult to assess. The benefits that such software produces may take a variety of forms and be contingent on factors such as the value it can provide to the customer, the ability of competitors to reproduce it, the ability of the organization to fully exploit it, etc.

While there are difficulties in drawing the line between information and information technology, it appears to be valid and useful to do so based on both practical and conceptual grounds. For our purposes in this study the distinction is important since the potential strategic applications of each kind of resource may be quite different. By focusing only on the technology, a firm may display a kind of "information resources myopia," i.e., defining the information resource so narrowly that opportunities are lost. The following discussion emphasizes this point.

*The Differential Roles of Information and IT in Creating Competitive Advantage*

While a number of planning frameworks for opportunity identification have been forwarded in the literature, it is clear that they are simpler to apply in the case of IT. For example, opportunities can be identified based on a need for storage, communication, or processing. Planning for using information for competitive advantage is relatively more difficult for a number of reasons:
Different people value information differently. There is a need to recognize organizational stakeholders and what information they value, and selectively provide it to them. Gone are the days when MIS used to push loads of information onto managers desks. Now, information is a resource that is valued based on user need. Firms should expand the domain of users to incorporate the competitive elements in the market with which the firm interacts, recognize needs, and effectively channel information flows.

Evaluation Filters have to be determined. What level of aggregation of the information? How can dimensionality be reduced? How can IT be used to provide evaluation filters?

Information is often two sides of the same coin. It can be used as a manipulative tool, a self delusional tool and a means to enhance credibility and instigate secrets [17]. These roles of information need to be recognized for effective use of information as a strategic resource.

These anomalies of information and the lack of a theory of information make it difficult to identify information-based opportunities. However, there is a need to identify information-based opportunities, as distinct from IT-based opportunities, if a firm is to attain sustainable competitive advantage.

A simple way to see the difference between information and information technology in terms of their potential for strategic application is shown in Fig. 1, which makes use of a framework of competitive advantage as prosposed by Bakos and Treacy [18]. Unlike the frameworks intended for opportunity identification, which look at dimensions across which opportunities can be identified (e.g., McFarlan and Mckenney's strategic grid, Benjamin et al.'s strategic opportunities framework, etc.), Bakos and Treacy [18] identify the fundamental components of competitive advantage. They argue that by "increasing their bargaining power" (items 1, 2, and 3) and by "increasing relative efficiency" (items 4 and 5), a firm can create competitive advantage. The blank cells in the figure can be used to illustrate the differential roles of information and IT in creating competitive advantage.

A firm should aim to become a monopoly by increasing its customers search-related costs and switching costs and by emphasizing the uniqueness of its offering. For example, by providing regular information to customers on ones price relative to other suppliers and by increasing the information content of the product to emphasize its uniqueness, information can enhance bargaining power with respect to customers. Porter and Millar [1] discuss the concept of "information intensity" and describe the trend toward increasing the information content of products and services. By providing information to customers that they would otherwise have to incur costs to obtain, firms can decrease the transaction costs of customers, thereby decreasing the customers bargaining power. By maintaining control over the information to be provided to customers, a firm can use this resource strategically. For instance, General Electric uses a database that includes the accumulated experience and knowledge of its appliance service engineers to provide support to its customers by phone.

Similar approaches can be adopted to increase bargaining power over suppliers (i.e., become a monopsony). In these cases, IT could be used to effectively communicate and present this information, but it is the information that provides the competitive advantage. This is easily seen by recognizing that if the information could somehow be provided without the technology, it would add essentially the same value. For instance, if a company maintains large updated databases on price and quality of raw materials provided by potential suppliers, it might be able to reduce supplier bargaining power.

On the other hand, if a company installs equipment in the customers premises to facilitate order entry, increasing the customer's switching costs and search-related costs and the uniqueness of their service, then it is the technology (the hardware and systems software) that is providing the "tie-in" value-added. Similarly, in the large network structures in place for airline reservation systems it is the technology that provides the value, as without the technology travel agents would not be able to benefit from reduced search-related costs or unique information product offerings (e.g., tie-in to car rental and hotel reservation systems).

With regard to the relative efficiency area of Fig. 1, IT applications are apparent in terms of production technologies, networks, and resource sharing. However, tapping the masses of data in the organization for effective use in decision making and internal planning and control processes is a challenging task because of the various forms in which it exists, i.e., formal vs. informal, centralized vs. decentralized, etc. Therefore, an effective Information Requirements Analysis [19] process can provide internal-efficiency-based competitive advantage. In many cases proprietary information may lead to more effective decision making.

Interorganizational efficiency refers to the sharing of information resources by two or more organizations so that both can benefit. While IT applications have been discussed extensively in the literature, information-based advantages will stem only on the ability of the firm to recognize that set of information to share with customers or suppliers that will benefit both parties. For instance, enabling customers to use product classification codes consistent with its supplier(s) would not only facilitate better inventory control for the supplier but also may allow customers better product-tracking and accounting capabilities.
Clearly, the framework in Fig. 1 validates different thinking for the two sets of information resources. It also provides a good basis for identifying opportunities for information and information technology by narrowing domains and opening up questions:

- What information can we provide to customers to reduce their transaction costs?
- How can we increase customer-switching costs through IT?
- How can we reduce dependencies on one supplier—what information do we need?
- What information needs to be captured for strategic decision-making processes?
- How can we evaluate existing databases to recognize information for interorganizational efficiency?

Johnston and Carrico [20], in their discussion with senior executives on this area, succinctly summarize our line of thinking, with a question that reflects major concerns of these executives: How can we capture and use information that exists in our organization or in our customers, distributors, or suppliers to improve either the coordination of Value Added Chain (VAC) relationships or the internal operations of our company or another member of the VAC? In other words, how do we identify information-based competitive opportunities, rather than only those based on IT?

To summarize, since information and information technology are so different, it is important to make the distinction because it helps us think in different terms, with different models and expectations about the two varieties of information resources. We would also expect that strategic applications based on each type of resource would focus on different application areas.

**Application Areas**

One objective of this study was to provide preliminary empirical evidence to validate the distinction between the two kinds of information resources. Because it’s widespread use and acceptability, Porter’s framework was adopted and modified to identify areas of strategic application for both kinds of information resources. From the five primary forces and three generic strategies, six nonoverlapping areas of application were identified as customer service, supplier relations, product/service differentiation, cost competitiveness, new product planning, and market segmentation. The latter two were used to incorporate most aspects of Porter’s Focus strategy [8], spawning new businesses and competitive scope [1]. Competitive advantage could be obtained in each of the six areas by increasing bargaining power and relative efficiency, as proposed by the Bakos and Treacy [19] model. While it would be too early, given the exploratory nature of this study, to formally propose hypotheses, we can summarize this line of thinking in the following proposition:

**Proposition 1:** The strategic application profile for information and information technology will be different.

**Implementation Research: Facilitators and Inhibitors**

Regardless of the nature of information resource used (whether it be information or IT), there are a number of contextual factors that allow or prevent firms from active search of strategic opportunities and effective deployment of information resources toward achieving them. These organizational facilitators and inhibitors could be similar to those that have been studied in the literature on IS implementation (e.g., [21]) or could be specific to the strategic IS context.

IS implementation research can be categorized into three major research streams [22]. Most studies fall into the factor stream which try to identify those factors related to IS success and failure. Top management support and user involvement have been the prominent variables studied [23]. The findings indicate that successful IS implementation occurs when sufficient organizational resources (funding, technical skills, support) are directed toward implementation. Some researchers view implementation as a social change activity [24] and suggest that implementation success depends on commitment to change and well-defined objectives and planning [25]. The political research stream focuses on the diverse motives sought by multiple stakeholders in IS implementation and how these diverse interests affect the IS [26], [27]. Collectively, these streams provide a sparse but complete view of IS implementation research.

Recently, IS researchers have also been drawing functional parallels between IS implementation and diffusion of technological innovation, emphasizing the need to view IS implementation from the context of the organizational introduction of a technological innovation [28], [29], [22]. This is especially true for strategic IS, which are often discussed as technological innovations. In fact, there is some converging empirical evidence that shows a marked similarity between their characteristics and those that characterize successful innovations [30]. On reviewing the innovation literature [31], [22] we find a host of additional factors that characterize organizational innovation. For instance, external environmental factors like uncertainty, heterogeneity, and competition have been found to spurn innovation [32], [33], [34]. Also, technological compatibility, relative advantage, and complexity have shown consistent relationships with innovativeness [31]. These factors along with the implementation factors above provide a more comprehensive view of potential facilitators and inhibitors of strategic IS.

Finally, the literature on strategic IS itself, although primarily anecdotal in nature, has provided a variety of frameworks and prescriptions for understanding and deploying these systems. The frameworks have had two primary emphasis, namely, to raise awareness [35] about the importance of the strategic IS concept and to facilitate planning [36]. The general recommendations from this literature are to actively involve top management, raise awareness of the concept throughout the organization, and effectively plan for these systems.

To summarize, if we can consider the process behind a strategic IS from an innovation standpoint comprised of three phases: initiation, adoption, and implementation [32], then the three literature sources reviewed above focus on different phases. The strategic IS literature is primarily concerned with initiation (raising awareness, identifying opportunities, planning), the innovation literature focuses on adoption behavior...
(factors leading to adoption), while the IS implementation literature is concerned with factors influencing implementation and use. These three literature sources cover the process spectrum and significant factors influencing initiation, adoption, and implementation provide a good starting point for the identification of organizational facilitators and inhibitors of strategic IS. Table 1 lists a set of potential factors identified from these sources. These were used in the empirical part of the study and assessed for their relative importance.1

Organizational Processes
While there is no dearth of examples of strategic systems, very little is known about the processes used by organizations to identify opportunities for such systems. Boynton and Zmud [38] concluded that there is no universal way to plan for these systems and the process used should vary with the context. Huff and Munro [39], in a study of 10 Canadian companies, found three models prevalent for technology adoption. Issue-driven models start from the top and formally identify issues (opportunities) before searching for technological solutions. On the other hand, technology-driven models are “bottom-up” and interesting technologies are identified before a problem or opportunity for application is identified. Opportunistic models are the most prevalent in which ad hoc or learn as we go approaches are used. It should be noted that these models are not atypical compared to the models of strategy making discussed in the management literature. For instance, there has been considerable debate on the process of strategic decision making with advocates for “synoptic formal” (comprehensive planning toward a goal) approaches and for “logical incremental” (ad hoc response to problem or need) approaches as the two ends of a continuum [40]. Mintzberg [41] describes an entrepreneurial mode of strategy making which involves active search for new opportunities, an adaptive mode characterized by decision making in response to environmental changes, and the planning mode, which involves periodic formal planning. Similarly, Fahey and King [42] describe environmental scanning behavior as continuous, periodic, or ad hoc monitoring of the environment in search for opportunities.

A second aspect of the process used for identifying strategic opportunities is the planning domain involved. Many IS researchers advocate the need to make the search for IS opportunities an integral part of the business-planning process [3], [43] However, we would suspect that in general this has not been accomplished and assessment of opportunities is either not formally conducted or is an element of normal information systems planning.

Based on the above discussion, if we can describe the frequency of the process used for opportunity assessment as continuous, periodic (or regular), ad hoc (or irregular), or no formal assessment, then the following proposition can be stated:

Proposition 2(a): The existence of strategic applications of information resources will be related to the frequency of opportunity assessment, with continuous monitoring leading to the most applications.

Also, if the nature of the process used to identify opportunities falls within business planning, IS planning, or no formal process, then we can state the following:

Proposition 2(b): The existence of strategic applications of information resources will be related to the nature of opportunity assessment, with business planning leading to the most applications.

Gathering Empirical Data
Having discussed the distinction between the two major types of information resources, potential organization inhibitors and facilitators and the processes used by firms to plan for the strategic use of information resources, empirical data were gathered to describe the strategic use of information resources in U.S. companies. Fig. 2 provides a conceptual picture of the major themes of the study.

Instrument
The instrument used was divided into three major sections, consistent with the objectives of this study—identifying areas of application of information resources, identifying the organizational factors that facilitate or inhibit the use of information resources, and identifying the frequency and nature of the processes used for developing strategic uses of information resources. Consistent with the exploratory nature of the study, the questionnaire was deliberately kept simple through the use of dichotomous, nominal, and 5-point Likert-type scales.

Given the nature of the study it was important that the respondents make the distinction between the strategic use of IT and information. To facilitate this, the following steps were taken:

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1 For a detailed discussion on overall facilitators and inhibitors, please see King, Grover, and Hufnagel [37].

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<table>
<thead>
<tr>
<th>TABLE 1</th>
<th>LIST OF ORGANIZATIONAL INHIBITORS AND FACILITATORS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inhibitors</strong></td>
<td></td>
</tr>
<tr>
<td>1. Lack of Appropriate Planning</td>
<td></td>
</tr>
<tr>
<td>2. Low Perceived Importance of Concept</td>
<td></td>
</tr>
<tr>
<td>3. Lack of Appropriate Technical Support</td>
<td></td>
</tr>
<tr>
<td>4. Budgetary Constraints</td>
<td></td>
</tr>
<tr>
<td>5. Difficulty in Assessing Tangible Contribution</td>
<td></td>
</tr>
<tr>
<td>6. Complexity of the Concept</td>
<td></td>
</tr>
<tr>
<td>7. High Potential Start-up Difficulties</td>
<td></td>
</tr>
<tr>
<td>8. Lack of Organizational/Top Management Support</td>
<td></td>
</tr>
<tr>
<td>9. Power and Politics in the Firm</td>
<td></td>
</tr>
<tr>
<td>10. Nature of External Environment or Industry</td>
<td></td>
</tr>
<tr>
<td>11. Ill-Defined Management Objectives</td>
<td></td>
</tr>
<tr>
<td>12. Other Priorities (are more important)</td>
<td></td>
</tr>
</tbody>
</table>

| **Facilitators** |
| 1. Strong Market Position of the Firm |
| 2. Existing Information Technology Leadership Position |
| 3. Strong Planning Capability of the Firm |
| 4. Extensive Computer Facilities within the Firm |
| 5. Strong Organizational/Top Management Support |
| 6. Pressure from Competition |
| 7. Strong Technical Support/Expertise within the Firm |
| 8. Strong Financial Position of the Firm |
| 9. Need for Uniqueness or Innovation |
1. Respondents were provided with a one-and-a-half page description of the distinction between the two kinds of information resources. Examples were provided that illustrated organizations that had used each kind of resource and both kinds of resources to achieve competitive advantage.

2. The instrument was pilot tested with a number of doctoral students and care was taken to ensure that the description clarified the distinction.

3. The instrument was field tested with senior IS executives from large corporations in the Pittsburgh area. This involved face-to-face interviews of over 1 hour to ensure that the distinction proposed was valid and communicated in the instrument as intended.

Respondents were then asked whether or not their firms had made strategic use of information or information technology within each of the six application areas discussed earlier. A free format was provided for respondents to substantiate any positive responses they gave by providing their own examples.

Facilitators and inhibitors (described earlier) were measured using items with a corresponding five-point scale ranging from "not an inhibiting factor" to "greatly inhibiting," for the inhibitors, and respondents were asked for their judgment with respect to their own company. Similar presentation was followed for the facilitators.

Categorical scales were provided to capture the frequency (continuous, periodic, ad hoc or no formal) and nature (business planning, IS planning, no formal) of planning. Questions were also asked on whether any formal processes existed for soliciting ideas, funding idea exploration, administrative support, and evaluation of benefits. Nominal scales were provided for responses.

Respondents

In total, 414 questionnaires were mailed to SIM (Society for Information Management) members. SIM is a major professional organization comprising mainly of senior IS executives representing a wide variety of industries. It is assumed that SIM membership is fairly representative of the population and it has been widely used in other IS studies [44]-[46]. Further, the seniority of members makes it appropriate for purposes of this study, where organizational variables related to strategic IS are being assessed.

Eighty-four (20.2%) completed responses were received. Table II provides a profile of the respondents. Manufacturers are represented somewhat heavily in the responses and this bias should be kept in mind while interpreting the results. Also, it should be noted that almost 80% of the respondents were at the Vice President or Director of IS level, ideally in the best position to respond to items in the study. While nonresponse bias was not directly assessed, other SIM surveys [44], [47] have a very similar breakdown proportion of respondents, suggesting the absence of any significant bias.

Results

Areas of Application of IT and Information

Without distinguishing between the two types of information resources, respondents were asked to identify and rank the three application areas (of the six listed) where they felt information resources had the greatest strategic potential for their firm. Table III describes the percentage of respondents ranking each area.

Customer service is, by far, the area of greatest importance to business firms with 57.14% of the respondents ranking it first and only 10.71% eliminating it from the top three. Cost competitiveness or competing to be a low cost producer of goods and services is also generally considered important, 66% of the respondents ranking it in the top three, while product/service differentiation also had over a 50% ranking putting it in the top three. Market segmentation was relatively less important with only one-third of the respondents ranking it in the top three. Surprisingly, supplier relations and new product planning, two areas of which cases abound in the literature are not included in the top three by over 80% of the respondents.

Table IV separates the proportion of respondents having strategic IT and information-based applications across the six areas. Overall, the results are fairly consistent with the rankings discussed earlier, i.e., customer service being the dominant area where over 64% of the respondents claimed to have both IT and information-based applications. However, as the table clearly illustrates, the profiles of the two information resources are quite different. Some of the disparate results are discussed below.

IT and Information for Supplier Relations: The use of IT for supplier relations (28.6%) is lower than the use of information (40.5%). Most of the information-based responses deal with "vendor evaluation," "bulk purchasing," and "special databases"—i.e., information use to increase the monopsonic power of the firm by decreasing the bargaining power of suppliers. The IT-based applications involve sophisticated database technologies and vendor links to coordinate production and reduce delivery time. While it seems that organizations are using the two types of information resources differently, the low proportion of IT applications in this area is surprising, given their emphasis in the IS literature.
KING AND GROVER: USE OF INFORMATION RESOURCES

TABLE II
PROFILE OF RESPONDENTS BY LINE OF BUSINESS AND ORGANIZATIONAL POSITION

<table>
<thead>
<tr>
<th>Line of Business</th>
<th>Number</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer</td>
<td>32</td>
<td>(38.1)</td>
</tr>
<tr>
<td>Finance/Insurance/Real Estate</td>
<td>10</td>
<td>(11.9)</td>
</tr>
<tr>
<td>Medicine/Law/Education</td>
<td>2</td>
<td>(2.4)</td>
</tr>
<tr>
<td>Wholesale/Retail/Trade</td>
<td>7</td>
<td>(8.3)</td>
</tr>
<tr>
<td>Business Services</td>
<td>6</td>
<td>(7.1)</td>
</tr>
<tr>
<td>Government</td>
<td>2</td>
<td>(2.4)</td>
</tr>
<tr>
<td>Public Utility/Communication/Transportation</td>
<td>11</td>
<td>(13.1)</td>
</tr>
<tr>
<td>Mining/Construction/Petroleum</td>
<td>12</td>
<td>(14.3)</td>
</tr>
<tr>
<td>Publisher</td>
<td>1</td>
<td>(1.2)</td>
</tr>
<tr>
<td>No Response</td>
<td>-</td>
<td>(1.2)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>84</td>
<td>(100)</td>
</tr>
</tbody>
</table>

TABLE III
PERCENTAGE OF RESPONDENTS RANKING AREAS OF APPLICATION

<table>
<thead>
<tr>
<th>Area of Application</th>
<th>First</th>
<th>Second</th>
<th>Third</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer Service</td>
<td>57.14</td>
<td>21.43</td>
<td>9.52</td>
<td>10.71</td>
</tr>
<tr>
<td>Supplier Relations</td>
<td>0.00</td>
<td>9.52</td>
<td>7.14</td>
<td>82.14</td>
</tr>
<tr>
<td>Product/Service</td>
<td>9.52</td>
<td>23.81</td>
<td>16.67</td>
<td>48.81</td>
</tr>
<tr>
<td>Differentiation</td>
<td>3.57</td>
<td>5.95</td>
<td>3.57</td>
<td>85.71</td>
</tr>
<tr>
<td>New Product Planning</td>
<td>5.95</td>
<td>10.71</td>
<td>14.29</td>
<td>67.86</td>
</tr>
<tr>
<td>Market Segmentation</td>
<td>17.86</td>
<td>22.62</td>
<td>25.00</td>
<td>33.33</td>
</tr>
</tbody>
</table>

Only the top three areas were ranked by respondents. The sum of the row percentages is 100.

TABLE IV
USE OF INFORMATION TECHNOLOGY AND INFORMATION AS A STRATEGIC RESOURCE BY APPLICATION (n = 84)

<table>
<thead>
<tr>
<th>Information Technology</th>
<th>Customer Service</th>
<th>Supplier Relations</th>
<th>Product/Service</th>
<th>Differentiation</th>
<th>New Product Planning</th>
<th>Market Segmentation</th>
<th>Cost Competitiveness</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information (%)</td>
<td>64.29</td>
<td>28.57</td>
<td>45.24</td>
<td>32.14</td>
<td>41.67</td>
<td>66.67</td>
<td>26.19</td>
<td>15.48</td>
</tr>
</tbody>
</table>

Use is depicted by the percentage of respondents that have applications within an area.

IT and Information for Cost Competitiveness: While 66.7% of the respondents claim IT-based applications, only 39.3% claim information-based applications in the area of cost competitiveness. On analyzing the open-ended responses it is found that a large number of cost reduction IT applica-

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The phi coefficient is based on the chi square statistic and incorporates the variation in the number of observations. Table V shows the association between areas of application, independently for information and information technology.

The strongest relationship for IT is observed between customer service and product/service differentiation. A close analysis of some of the open-ended responses revealed that many respondents had described similar applications for both categories. Therefore the product/service differentiation category was also dominated with telecommunications-based "order entry," "order status," "telemarketing," and other inquiry systems. The high correlation suggests that most of the customer service applications are viewed as unique to the extent of providing the company "differentiation" with respect to competitors.

Respondents claiming the use of IT to focus on a market segment also claim the use of IT for evaluating new products. Most of the applications in these areas stemmed from a marketing thrust and included special models for product and market analysis.

The number of significant associations for information is three times that for information technology. This is because, while most of the IT applications are relatively more specialized and, therefore, used in one area, the information-based applications involve general data that can be used for many different application areas. For example, the high association between the use of information for market segmentation and new product planning is because of the common market, customer sales, and public databases used in both areas.

Surprisingly, information-based applications for supplier relations and cost competitiveness did not correlate highly with the other application areas. A possible explanation for this could be the fact that applications in these areas are one step removed from product, customer, marketing, and other downstream value chain activities.

To check whether respondents who claimed IT applications in an area also claimed information applications in the same area, a phi coefficient for each area was calculated. Table VI illustrates these results. The strong correlations for all areas (p < .05) except customer service implies that firms generally use both types of information resources together within an application area. The absence of a significant relationship for customer service suggests that firms are typically not using information and IT concurrently for strategic advantage in this area. It would be expected that to sustain competitive advantage, the "order-entry" type transactional linkages described by respondents would have to be enhanced by channeling appropriate information down the established channel.

Firms will need to begin thinking about how both these types of information resources can be used together to enhance bargaining power or relative efficiency. In cost competitiveness, while the claimed use of IT is much higher than the use of information, the high correlation suggests that most firms that use information strategically in the area also use IT. It is interesting to speculate on the possibility that this is an area in which it is necessary to achieve a given level of IT implementation before information advantages can begin to be exploited.

Facilitators and Inhibitors

The top four inhibitors and facilitators, and their average scores (on 5-point scales) by the four main lines of business represented in the sample are illustrated in Table VII. The relative importance of strategic resources as a priority for the organization, the difficulty in assessing tangible contribution, lack of appropriate planning, and lack of top management support are the major inhibitors in the total sample. These results strongly suggest that planning for information resources has not received adequate attention from top management and has not been integrated into the strategic milieu of the organization. While the top four inhibitors for the various lines of business are similar, only the utility/communication/transportation grouping includes the complexity of the concept and budgetary constraints as major inhibitors.

Strong technical support, infrastructure, and leadership, along with competitive pressure are the major overall facilitators for strategic systems. Manufacturing firms listed competitive pressures and a strong technical, financial, and market position as primary facilitators while finance firms felt that a strong technical and computer infrastructure as well as pressure from competition provided the major impetus for strategic utilization of information resources.

In order to simplify the dimensionality of the 12 inhibitors and nine facilitators and to observe which ones are naturally correlated, factor analysis (with varimax rotation) was performed. Table VIII summarizes the separate results for inhibitors and facilitators. The names given are arbitrary and attempt to capture the essence of each factor.

The four generic classes of inhibitors can be summarized as (a) the low perceived importance of strategic IS, as reflected by the lack of planning or organizational support, (b) the difficulty in making an assessment about the appropriateness of strategic IS, given the organizational context, (c) political problems, generally as a result of ambiguous objectives, and (d) lack of resources to allocate to strategic IS, given other priorities. Factors 1 and 2 are the dominant inhibitors.

Factor analysis yielded three generic classes of facilitators: (a) a dominant position, whether it be technological, market or financial, (b) strong planning and organizational support for the concept, and (c) competitive pressure which spurs the need to innovate to stay ahead of competitors.

Organizational Processes

Table IX illustrates the processes being used to identify and select opportunities for the strategic use of information resources. Nearly 55% reported either "irregular" or "no formal process," suggesting that analyses dealing with information technology and information as a strategic resource have not yet become a routine and regular part of the planning process. This is confirmed by the responses to a question of whether these analyses were done as a regular element of the IS-planning process, the business-planning process, or "no formal" process. While 28.57% indicated "IS planning," 15.48% indicated "business planning" and 51.19% indicated "no formal process."

With regard to whether formal approaches exist for idea
TABLE V
THE USE OF INFORMATION TECHNOLOGY AND INFORMATION: ASSOCIATION1 BETWEEN APPLICATION AREAS

<table>
<thead>
<tr>
<th>Application Area</th>
<th>Customer Service</th>
<th>Supplier Relations</th>
<th>Product/Service Differentiation</th>
<th>New Product Planning</th>
<th>Market Segmentation</th>
<th>Cost Competitiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer Service</td>
<td>XXX</td>
<td>0.229</td>
<td>0.405**</td>
<td>0.025</td>
<td>0.218</td>
<td>0.148</td>
</tr>
<tr>
<td>Supplier Relations</td>
<td>XXX</td>
<td>0.061</td>
<td>0.108</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product/Service/ Differentiation</td>
<td>XXX</td>
<td>0.209</td>
<td>0.155</td>
<td>0.299*</td>
<td>0.075</td>
<td></td>
</tr>
<tr>
<td>New Product Planning</td>
<td>XXX</td>
<td>0.303*</td>
<td>0.308*</td>
<td>0.224</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market Segmentation</td>
<td>XXX</td>
<td>0.224</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Information

<table>
<thead>
<tr>
<th>Application Area</th>
<th>Customer Service</th>
<th>Supplier Relations</th>
<th>Product/Service Differentiation</th>
<th>New Product Planning</th>
<th>Market Segmentation</th>
<th>Cost Competitiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer Service</td>
<td>XXX</td>
<td>0.183</td>
<td>0.287*</td>
<td>0.308*</td>
<td>0.303*</td>
<td>0.224</td>
</tr>
<tr>
<td>Supplier Relations</td>
<td>XXX</td>
<td>0.203</td>
<td>0.189</td>
<td>0.124</td>
<td></td>
<td>0.116</td>
</tr>
<tr>
<td>Product/Service/ Differentiation</td>
<td>XXX</td>
<td>0.307*</td>
<td>0.350*</td>
<td>0.231</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Product Planning</td>
<td>XXX</td>
<td>0.386**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market Segmentation</td>
<td>XXX</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.222</td>
</tr>
<tr>
<td>Cost Competitiveness</td>
<td>XXX</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>XXX</td>
</tr>
</tbody>
</table>

1 The Measure of Association used is the Phi Coefficient for Nominal Data.

*: Significant at .01.
**: Significant at .001.

TABLE VI
ASSOCIATION BETWEEN APPLICATION OF INFORMATION TECHNOLOGY vs. INFORMATION FOR EACH AREA

<table>
<thead>
<tr>
<th>Application</th>
<th>Customer Service</th>
<th>Supplier Relations</th>
<th>Product/Service Differentiation</th>
<th>New Product Planning</th>
<th>Market Segmentation</th>
<th>Cost Competitiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.181</td>
<td>0.356</td>
<td>0.342</td>
<td>0.355</td>
<td>0.218</td>
<td>0.277</td>
</tr>
</tbody>
</table>

* (p = .13) (p = .001)
** (p = .002) (p = .001) (p = .048) (p = .012)

Phi coefficient.

generation, funding, administration, and result measurement about two thirds or more of the respondents claimed that formal processes have not been developed. Clearly, much needs to be done for formally identifying and supporting the development of ideas for using information resources strategically.

To test propositions 2a and 2b, i.e., to observe the utility of any planning process the respondents may have had, cross-tabulations were done between the frequency and nature of the planning process and the claimed use of information or information technology for customer service. The results are shown in Table X. Customer service was analyzed because it is the most widely discussed and has the highest incidence of applications.

It can be seen from Table X that regular and continuous processes do affect the existence of both information and IT based applications in the area. For example, 95% of those who had continuous processes claimed information-based applications while only 42% claimed applications with no formal process. Similarly, on studying the nature of the process, the figures do suggest that analysis done as a part of IS planning or business planning do result in a greater incidence of applications (especially in the case of information).

Therefore, while the figures presented here are crude, at best, they do indicate that formal organizational processes facilitate the strategic utilization of information resources providing some support for the propositions.

IMPLICATIONS

This study represents a significant step in going beyond the anecdotal literature on strategic IS. It makes a serious attempt to capture empirical data from a large sample of senior IS executives. It conceptualizes a distinction between two types of information resources, and provides preliminary evidence to validate that distinction. It integrates literature from implementation and innovation to identify and report on major organizational inhibitors and facilitators for strategic use of information resources. And finally, it reports on organizational processes used to identify opportunities and the effectiveness of these processes.

However, it should be pointed out that the theoretical base of this line of research is limited. While some IS researchers are attempting to draw from marketing and innovation theory (e.g., [48]), the constructs and hypothesis related to competitive uses of information resources are still being defined. As such, this paper is reflective of the stage of evolution of research on strategic IS and in its use of a larger sample size,
Implications for Practice

The data suggest that the application profile for the strategic use of IT is different from that of information. While these results are primarily descriptive, the implications of recognizing this distinction for firms seeking strategic opportunities is significant. Most frameworks discussed in the area either highlight the more tangible IT-based applications or discuss the two types of resources interchangeably. Information that exists throughout the organization might be overlooked even though it may have strong strategic implications. Proprietary information might be a source of competitive advantage as can be evidenced by AT&T’s use of extensive databases of subscriber information to get a lead up on its competitors in signing long-distance subscribers. Or, the case of National Benefit Life reportedly merging with American Can, in part to gain access to data on the nine million customers of American Can’s direct retailing subsidiary [1]. The problem is to successfully “mine” existing databases to access potentially powerful information.

One method, proposed by King [19] to exploit strategic information is called SPIRA. Fig. 3 illustrates the SPIRA process, which consists of two steps, SPIS (Strategic Planning for Information Resources) and IRA (Information Resource Assessment). The SPIR component describes the process of translating the organization’s business strategy set into information resource terms. The IRA is an integrated ongoing process that focuses on identifying information that is crucial to identify strategic competitive advantage and to create and evaluate new strategies. This may be new information that has not been previously used to advantage, information that has been reevaluated, or an information product. The IRA processes involve the systematic assessment of the firm’s databases in a conscious attempt to find information that could influence the business strategy set. Typically these

<table>
<thead>
<tr>
<th>Rank</th>
<th>Manufacturing</th>
<th>Finance/Real Estate/Insurance</th>
<th>Utility/Communication Transportation</th>
<th>Mining/Construction/Petroleum</th>
<th>OVERALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>Other Priorities are more important (3.66)</td>
<td>Lack of Appropriate Planning (4.30)</td>
<td>Difficulty in Assessing Tangible Contribution (3.73)</td>
<td>Low Perceived Importance of Concept (4.08)</td>
<td>Other Priorities are more important (3.59)</td>
</tr>
<tr>
<td>#2</td>
<td>Difficulty in Assessing Tangible Contribution (3.44)</td>
<td>Other Priorities are more important (3.90)</td>
<td>Difficulty in Assessing Tangible Contribution (3.36)</td>
<td>Lack of Organizational/Top Management Support (4.00)</td>
<td>Difficulty in Assessing Tangible Contribution (3.43)</td>
</tr>
<tr>
<td>#3</td>
<td>Lack of Appropriate Management Objectives (3.70)</td>
<td>Ill-Defined Complexity of the Concept (3.70)</td>
<td>Lack of Appropriate Planning (3.83)</td>
<td>Lack of Appropriate Planning (3.31)</td>
<td></td>
</tr>
<tr>
<td>#4</td>
<td>Lack of Organizational/Top Management Support (3.19)</td>
<td>Difficulty in Assessing Tangible Contribution (3.70)</td>
<td>Difficulty in Assessing Tangible Contribution (3.75)</td>
<td>Lack of Organizational Support (3.25)</td>
<td></td>
</tr>
</tbody>
</table>

Inhibitors

Facilitators

Numbers in parenthesis represent mean scores on 5-point scales.
Inhibitors

Factor 1: IMPORTANCE
Lack of Appropriate Planning
Lack of Organizational/Top Management Support
Low Perceived Importance of Concept

Factor 2: ASSESSMENT
Difficulty in Assessing Tangible Contribution
Complexity of the Concept
High Potential Start-up Difficulties
Lack of Appropriate Technical Support
Nature of External Environment or Industry

Factor 3: POLITICS
Power and Politics in the Firm
Il-Defined Management Objectives

Factor 4: RESOURCES
Budgetary Constraints
Other Priorities (are more important)

Facilitators

Factor 1: POSITION
Existing Information Technology Leadership Position
Extensive Computer Facilities within the Firm
Strong Technical Support/Expertise within the Firm
Strong Market Position of the Firm
Strong Financial Position of the Firm

Factor 2: SUPPORT
Strong Planning Capability of the Firm
Strong Organizational/Top Management Support

Factor 3: PRESSURE
Pressure from Competition
Need for Uniqueness or Innovation

Factor Analysis (varimax rotation) done independently for inhibitors and facilitators. Only variables with factor loadings > 0.5 shown. All factors shown have eigenvalues > 1.0. Arbitrary names given.

Organizational Processes for Strategic Use of Information Resources

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Continuous</th>
<th>Regular</th>
<th>Irregular</th>
<th>No Formal</th>
</tr>
</thead>
<tbody>
<tr>
<td>22.62%</td>
<td>19.05%</td>
<td>34.52%</td>
<td>22.62%</td>
<td></td>
</tr>
<tr>
<td>Nature</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>As a Part of Normal Business Planning</td>
<td>As a Part of Normal IS Planning</td>
<td>No Formal Planning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.48%</td>
<td>28.57%</td>
<td>51.19%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formal Processes for Soliciting Ideas</td>
<td>Administrative Support</td>
<td>Funding Benefits</td>
<td>Measuring</td>
<td></td>
</tr>
<tr>
<td>28.57%</td>
<td>35.71%</td>
<td>26.19%</td>
<td>32.14%</td>
<td></td>
</tr>
</tbody>
</table>

The model of competitive advantage described could stimulate the independent thinking of strategic uses for both types of information resources.

Analysis of the inhibitors and facilitators reveal a number of interesting insights. First, on a descriptive note, it is clear that the strategic use of information resources has still not been integrated into the strategic milieu of the organization. Secondly, technological infrastructure and prowess are important enablers, despite greater emphasis on the business aspects in the literature. In other words, strategic systems may be conceived from a business perspective, but technical expertise, network infrastructures, and facilities are crucial to their success. It can also be seen that the inhibitors and facilitators are different for these systems than for traditional IS implementation. Organizational and senior management commitment, technological information and competitive pressure are more important facilitators for these externally oriented systems. And finally, the summative factor analysis model described provides critical success (and failure) areas where management should place emphasis for successful deployment of these systems.

The frequency and nature of organizational processes suggest that despite all the recommendations in the literature,
formal processes have not been developed for strategic systems. The most prevalent model seems to be the "garbage can" model [49] where issues and technology fortuitously meet to create competitive applications. However, there is some empirical evidence in the paper (despite numerous unvalidated prescriptions in the literature), that formal planning and frequent search for opportunities, may be related to greater incidence of strategic applications. This would suggest the need for top management and IS management to consistently work toward this end.

Implications for Research

Three basic notions have been discussed and empirically tested in this study, namely, the need to distinguish between information resources, factors that facilitate or inhibit the strategic use of these resources and the organizational processes leading up to their deployment. This study, while representing a major step over the existing anecdotal literature, still represents an exploratory approach to data collection and analysis. The important notions raised in the study, should be further tested and validated through more rigorous empirical work. For instance, in the quantitative analysis, the nature of strategic systems used by respondents was not captured. Taxonomies describing these systems on dimensions other than application areas should be used to validate the distinction between IT and information (e.g., Wiseman's [50] strategic thrusts or Porter and Millar's [1] value chain). Also, further testing of the seven generic classes of inhibitors and facilitators should be reevaluated. And finally, the effectiveness of various planning approaches must be assessed before any rigorous prescriptions can emerge for management in an area whose importance is only going to grow in the future.

REFERENCES

[1] M. E. Porter and V. E. Millar, "How information gives you competi-