TAKING INDUSTRY SERIOUSLY IN INFORMATION SYSTEMS RESEARCH

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Abstract

In this essay, we argue that industry receives little attention in information systems research and theory, despite its increasingly important influence on IS activities. This is evident both in the narrow range of industries examined in IS research and the infrequent consideration of industry in theory. We base these observations on an analysis of IS publications in two top-tier journals (MIS Quarterly and Information Systems Research) over eight years. Drawing from institutional theory, we consider various ways industry can be addressed and assess how industry influences IS activities. We conclude that industry provides an important contextual "space" to build new IS theory and to evaluate the boundaries of existing IS theory. We outline a range of strategies for incorporating industry into IS research.

Keywords: Information systems theory, institutional theory, industry context

Introduction

For many organizations and individuals, industry is an important concept. Governments maintain industry statistics, develop regulations for some industries, and formulate legislation to protect others. Firms form industry associations to promote common interests, to develop shared infrastructure, and to exchange information. Common marketing and technology strategies often emerge within particular industries (Mauri and Michaels 2003). Managers identify with their firm's industry and apply industry knowledge within their organizations (Spender 1989). Their career paths often reflect deepening functional knowledge within an industry. Consulting firms develop specializations in their practices to bring industry knowledge to...
clients, and information technology vendors provide an array of industry-specific products and services.  

Given that industry is important to key constituents involved with information systems and technologies, we might expect that IS researchers would consider industry seriously when developing and testing theory. Our analysis of IS research publications in two top-tier IS journals, *MIS Quarterly* (MISQ) and *Information Systems Research* (ISR), over the period 1997-2004 suggests this is not the case. We found that authors seldom considered the influence of industry in individual-, group-, or organization-level studies. We also found that empirical studies were concentrated in a subset of industries. Appendix A provides details of our publication analysis. Here we highlight key findings to motivate our discussion of industry and IS theory.

Of the research articles examined, most (58 percent) did not identify an industry in which the study was conducted (Appendix A, Table A-1). Of the 42 percent that identified one or more industries, 71 percent focused on five industry sectors (manufacturing, high-technology, banking/finance, retailing, and insurance). In these same 42 percent of articles, nearly three quarters (74 percent) simply mentioned the industry or cited it as a study limitation. Only 11 percent of the articles discussed any influence of industry on the study findings or analyzed industry issues. These results are consistent with Crowston and Myers (2004), who found just 4 percent of IS publications from a broad range of IS journals were industry-level studies.

Various factors may explain why industry has not played an important role in IS theory. First, much IS research has focused on general IS management and technology topics (Markus 1999; Orlikowski and Iacono 2001). The associated phenomena may not vary in theoretically interesting ways among the subset of industries commonly studied in IS research. Second, the IS field has long been interested in firm-level strategy and IT use. Organization-level studies, particularly those involving leading-edge firms, may subsume industry influences within organization-level sense-making and action. Third, the IS field’s genesis in faculties of business, commerce, and management has led to a focus on for-profit industries with little attention being given to not-for-profit industries. Fourth, financial services, manufacturing, and retailing were among the first industries to use information technologies, providing the most advanced settings for empirical research at the time. Fifth, sectors such as health care, government, law, education, and mass media are aligned with other university faculties (i.e., medicine, public administration, law, education, and communication). As IT has permeated these industries, IT-related research developed within these disciplines (such as medical informatics in medical schools), but less so within the IS field.

Today, the diffusion of information technologies to diverse industries offers important opportunities for the IS field to develop its knowledge and broaden its relevance. Venturing beyond the subset of industries commonly studied, IS researchers may encounter IT applications that challenge existing theories or constructs. New (to IS) industries are likely to reveal novel phenomena, which were unnoticed or missing in industries previously examined. Accounting for industry will help researchers determine the technical and social boundaries of IT artifacts and IS theories. Investigating industry transformation within and across industries will inform theory and social policy (Crowston and Myers 2004). Grounding current IS theory in the language and concerns of specific industries could also improve its practical relevance.

In this essay, we argue it is time to consider explicitly the role of industry in IS theory. Drawing from institutional theory, we suggest how industry could be addressed and illustrate how industry

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3The apparent naturalness of disciplinary boundaries masks the largely historical accidents that created these divisions (Midgely 1991, p. 9).
may influence IT artifacts and associated research topics. We then consider how accounting for industry in theory development could contribute to IS knowledge. We conclude with strategies for integrating industry into IS research.

An Institutional Perspective on Industry

Webster’s Dictionary defines industry as “any particular branch of productive, especially manufacturing, enterprise.” As systems of expert knowledge developed in the modern era (Giddens 1991), industrial concepts extended beyond manufacturing to a broad range of social and economic activities. The term industry is now applied to many socio-economic sectors, each with distinctive market structures, technologies, and knowledge domains. We use the term industry in this broad, colloquial sense but also draw on institutional theory to consider how industry could be addressed in IS research.

Institutional theory highlights two broad dimensions of an organization’s environment that influence organizational forms and actions. Factors in the material resource environment influence organizations as production systems, which transform inputs into outputs (Scott 1987, 2001). The institutional environment refers to the normative, cultural, and regulatory structures that are shared widely among actors within an industry. Scott (1987) argues that organizations adapt to their environment. Moreover, their environment influences organizational actions. Table 1 is derived from an in-depth analysis of the health care industry (Scott et al. 2000). It outlines material-resource and institutional dimensions that have been studied extensively.

Institutional theory also suggests levels of analysis for examining industry context and its influences on IS research topics. Figure 1 depicts the relationship between these levels.

Industry can be addressed as an organizational population, or set of organizations, that produce similar products and services, operate in similar technical and institutional environments, share systems of meaning, and take actions that are influenced by shared normative, cognitive, and regulatory structures (Scott 2001). Hannan and Freeman (1977) posited that organizations in an organizational population face similar environmental vulnerabilities, which foster similarities in structural forms and adaptive capabilities. While Hannan and Freeman focused on competitive pressures toward homogeneity of organizational form, DiMaggio and Powell (1991, p. 66) noted that “organizations compete not just for resources and customers, but for political power and institutional legitimacy, for social as well as economic fitness.” They defined institutional isomorphism as the process of homogenization among members of an organizational population arising from regulatory and normative pressures and from professional governance.

6An organization and a firm are not necessarily the same analytic unit. A conglomerate firm encompasses many organizations and may cross industry boundaries.

7In the next section, we use these dimensions to consider industry influences on IT artifacts and related topics.

8In Hannan and Freeman’s population ecology theory, structural similarities arise through the birth and death of organizational forms; a full discussion of this theory is beyond the scope of this paper.
Table 1. Material-Resource and Institutional Dimensions of Industry

**Material-resource environment**

Demand-side factors: complexity, stability, variation in demand for product/services  
Supply-side factors: scarcity, concentration of key inputs to product/service  
Technologies: material technologies, skills, and knowledge used to produce outputs  
Market structure: alignment of suppliers, customers, competitors that influence flow of resources

**Institutional environment**

Institutional logics: organizing principles underlying practices and belief systems  
Institutional actors: individuals and organizations that create and enact institutional logics  
Governance systems: systems of regulatory and normative control

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Figure 1. Industry Environment: Organizations, Populations, and Fields
When other organizational populations and institutional actors are included in the research scope, industry can be examined as an organizational field (Scott et al. 2000). Similar to an industry system (Hirsch 1985) or societal sector (Scott and Meyer 1983), the organizational field includes "those organizations that, in the aggregate, constitute a recognized area of institutional life: key suppliers, resources and product consumers, regulatory agencies, and other organizations that produce similar services or products" (DiMaggio and Powell 1991, pp. 64-65). The boundaries of an organizational field typically coincide with geographic or national boundaries (Scott 2001). Organizational fields evolve over time, as populations develop or disappear, boundaries between organizations in the field change, or the field's boundary expands or contracts. A field may exhibit strong patterns of interaction, information sharing, and governance arrangements among actors; it may also undergo changes that undermine common belief systems and behaviors (Scott 2001; Scott et al. 2000).

Institutional theory thus provides several approaches to conceptualize industry influences on IS activities (i.e., organizational environment, population, and field). Identifying individuals, groups, and organizations that are members of an industry is an empirical, as well as a conceptual, issue. High-level characterizations such as "service-sector" and "manufacturing" are sometimes useful, but these super-categories are more appropriate for meta-analysis. Government classification schemes can be used to identify key organizational actors and to define boundaries of an organizational population or field. However, industries change through government regulation or deregulation, corporate mergers, changes in technologies, and so on. These changes, when related to IT phenomena, are themselves of great interest. We thus urge caution in approaching industry with a biologist's interest in species classification. Documentation of selection criteria and precise definitions will help other researchers understand how industry was defined in a given study and will facilitate cross-study comparisons or meta-analysis of industry effects.

**Industry, IT Artifacts, and IS Research Topics**

IS researchers have drawn attention to the IT artifact in IS research (Benbasat and Zmud 2003; Orlikowski and Iacono 2001). The term IT artifact encompasses "those bundles of material and cultural properties packaged in some socially recognizable form such as hardware and software" (Orlikowski and Iacono 2001, p. 121) and "encapsulates the structures, routines, norms, and values implicit in the rich contexts within which the artifact is embedded" (Benbasat and Zmud 2003, p. 186). If we adopt these embedded views, industry context is important to the meaning, design, use, and structure of IT artifacts. Table 1 outlines a set of analytic categories that highlight possible industry influences.

First, the design and functionality of most IT applications reflect an industry's core technologies (e.g., factory production, classroom instruction, loan processing, food service). Congruence in IT design and artifacts across organizations may develop in an industry as IS applications and software markets mature. The industry specificity of an IT artifact will also increase when information system technologies are enmeshed with technologies in the core production system. For example, digital X-rays (an IT-enabled production technology) can be incorporated in an electronic patient record (an IS application) and automatically billed to an insurance company (an IS application). This configuration of enmeshed IT artifacts is highly specific to an industry (health care).

Other industry dimensions are also evident in IT artifacts. Market structure influences the features and structure of IT artifacts, for example, when dominant suppliers or customers drive industry standards for electronic data interchange (EDI) and interorganizational infrastructure. Institutional logics and actors are encoded in data structures, software, and interfaces. In our medical example, different clinical roles and privileges for various health care professionals are coded into computerized roles. Governance systems, such as managerial controls, are reflected in IT features. In industries where organizations exert strict
managerial control, IT-enabled monitoring of employees is integrated into the IT artifacts (Garson 1988). In industries with strong professional governance, the building of monitoring features into software applications is more problematic. For example, medical professions have a strong role in governance (Friedson 2001), and IT-enabled monitoring of physicians must be negotiated with them (Davidson and Chismar 1999; Kohli and Kettinger 2004).

Beyond the IT artifact, industry can influence other phenomena of interest to the IS field, what Benbasat and Zmud (2003) termed a nomological net of core IS research topics. These include (1) IT impacts, or consequences of use for individuals, collectives, structures, and contexts; (2) IT uses associated with implementing and applying IT artifacts; (3) IT capabilities for developing or applying information technology; and (4) IT practices such as methods and techniques used to develop IT artifacts and manage the IS function (Benbasat and Zmud 2003, p. 186).

Consider first the relationship between industry and IT impacts. The impact of IT on organizational performance depends in part on industry characteristics and trading partners in an organizational population or field (Melville et al. 2004). Economic studies of IT impacts on productivity have also yielded mixed results, with industry contributing to this variation (Devaraj and Kohli 2003). This is not surprising. Outputs vary significantly by industry—a quality automobile, a healed patient, an educated child, and a satisfied moviegoer are different outputs. The tangible and intangible benefits of IT in diverse industries affect the meaning and measurement of productivity and performance, particularly in not-for-profit industries where outputs are often complex.

The variation in IT impacts across industries is not merely an issue of measurement. Industries vary in how information technologies are used. The Nortel case study (Massey et al. 2002) begins with a discussion of deregulation in the telecommunications industry (governance structures) and heightened competition for customers (demand-side factors, market structure). Nortel's development of a knowledge management system to facilitate new product development can be understood as an organizational response to changes in the material-resource and institutional environments of the telecommunications industry. The same environmental influences are not present in all industries. Moreover, the same type of IT application might be applied differently across industries. For example, knowledge management initiatives in U.S. hospitals, such as those described by Davenport and Glaser (2002), are aimed at standardizing clinical practices (supply-side factors, production technologies), complying with increased regulation (governance structures), and adopting legitimized quality care practices (institutional logics) (Bodenheimer 1999).

The fact that some industries have lagged in their adoption and use of information technologies suggests two possible explanations. First, IT capabilities may exist in industries, as well as in organizations. A mature software market for industry-specific applications can facilitate the uptake of IT among organizations in that industry. Maturity of the software market depends on well-defined production technologies that serve as models for software functionality, a pervasive institutional logic among industry members, and persuasive organizing visions (Swanson and Ramiller 1997) for how information technologies could be applied in the industry. For instance, manufacturing resource planning (MRP) software evolved as an organizing vision among production and inventory control managers, their professional associations, industry consultants, and software firms, and not within any one organization or IT vendor. Few manufacturing firms have the IT capabilities to develop an MRP system in-house. Many also rely on assistance from vendors with industry expertise to help with implementation of such enterprise-wide systems (Robey et al. 2002).

A second possibility is that the industry environment influences firm-level IT capabilities. Chris- tiaanse and Venkatraman’s (2002) analysis of American Airlines’ use of information technology for knowledge management illustrated how IT resources within the industry provided a foundation for building IT capabilities within the organization.
The authors focus on American Airlines’ use of their SMART knowledge management system to evaluate and promote the airline among travel agents. Industry environment and IT resources in the organizational field were critical to the organization’s use of IT to exploit knowledge of electronic channels in the airline industry: the common electronic market infrastructure in the airline industry, the high concentration of airline bookings in this electronic infrastructure, and government regulation that required reservation systems to share electronic booking information with all airlines (Christiaanse and Venkantraman 2002, p. 20). In industries without similar field-level IT resources and governance structures, an individual organization would likely have difficulty exploiting knowledge of electronic channels in similar ways.

IT practices are usually associated with the IT industry or with IS as a professional group within organizations. Typical research assumptions are that variation in IT practices occurs at the organization level (see Fichman and Kemerer 1997) and that generic IT methods are unaffected by industry context (see Sumit et al. 2001). In their proposal of a method for analyzing IT and organizational dependency, Tillquist et al. (2002) suggest something more industry-specific: that the method might be most valuable in highly institutionalized settings (an aspect of organizational environment). Similarly, Lamb and Davidson’s (2000) examination of intranet practices suggests that end-user developers in industries with strong professional cultures (such as law) may face career path choices (e.g., to forego firm partnership), which end-user developers in other industries may not face.

Industry and IS Knowledge

We have argued that industry has a significant role in IS activities, even though industry has not yet received much attention in IS research. If IS theory is to diffuse more broadly (Myers and Baskerville 2002), more attention to industry in theory development is needed. IS research has concentrated on a small subset of industries. Research findings from these industries cannot be generalized to other settings unless we assume that “nature is uniform” (Lee and Baskerville 2003)—that is, unless we assume that differences among industries do not affect the applicability of IT knowledge and theory. All management disciplines are faced with the need to adjust general theories to the environments of specific industries and to build general theory through empirical testing in different industries. That is, all are challenged by the uniformity of industry assumption. In this respect, the IS field is not unique. However, the rapid diffusion of IT across a broad range of industries, a number of them rarely studied in IS research, increases the relevance and urgency of this challenge for the IS field. Our earlier discussion of organizational environment, population, and field levels of analysis provides a basis to reflect on how consideration of industry could contribute to IS knowledge.

Over half of IS research publications focus on organizations (Crowston and Myers 2004). In field studies, researchers often account for some contextual influences within organizations, but their consideration of context typically halts at the organizational boundary (Avgerou 2001). How organizational actors interpret environmental factors provides a proximate explanation of their actions (Daft and Weick 1994), but institutional logics play a powerful role in shaping their interpretations and legitimizing their actions (Scott 2001). By focusing only on the organizational context, researchers may overlook elements in the industry that facilitate or constrain actors’ IT-related actions. This approach risks under-specifying theory and producing general explanations that break down when context varies significantly. On the other hand, explicit consideration of industry dimensions (Table 1) and their possible role in an IS theory could help delineate the social and technical boundaries of a theory.

Consider, for example, the finding by Bassellier et al. (2003) that managers’ IT competence helps predict their willingness to champion IT efforts. The researchers surveyed managers in two insurance companies. They commented, “these
firms are also representative of highly information-intensive organizations in any industry because both the product and the process of distribution can be digitized" (p. 325). Information-intensiveness of the organization is derived from the material-resource environment of the insurance industry; the authors' generalization is to organizations in industries with similar information-intensive material-resource technologies. Managers' IT competence and their willingness to champion IT efforts could be examined in other information-intensive industries that differ in dimensions such as professional governance. Law firms are information intensive and their knowledge-based products are subject to digitization, but institutional logics and professional governance emphasize legal expertise and the ability to attract clientele (Friedson 2001). Investigating whether IT-competent lawyers champion IT efforts, given the potential consequences for their careers (see Lamb and Davidson 2000), would further define the social boundaries of this theoretical relationship.

Industry not only provides a context which may bound IS theories, it also represents a contextual space in which a theory might apply generally. That is, organization-level studies may overestimate the uniqueness of findings and underestimate the potential to generalize theoretically to an organizational population. Although managerial action is not determined by environment, similarities in organization structure and strategies, in interpretations of key actors, and in environmental responses, arise from industry influences (Scott 1994, 2001; Spender 1989) and isomorphic processes (DiMaggio and Powell 1991). Institutional theory thus provides a basis for considering whether theory developed within an organization might apply generally to other organizations in the population.

Lamb et al. (2002) illustrated how organization-level and industry-level analysis together can provide a more predictive explanation of IT usage. They found organizations in a highly regulated industry (pharmaceuticals) produce much documentation and thus use online services more intensively than organizations in less-regulated industries (p. 214)—a population-level influence. Pharmaceutical firms also vary in their uses of online services due in part to their network of inter-firm relationships—an organization-centric influence. By examining how the industry shapes IT uses in general and how specific organizations vary in their adaptation to industry influences, the authors produced a bounded yet predictive explanation of organizational IT use.

Industry studies at the organizational field level are increasingly important in the era of the Internet, business-to-business electronic interchange, and supply chain management. Despite widely cited predictions that IT would have a transformative effect on market structures (see Malone et al. 1987), little empirical IS research has been published that examines industry-wide IT impacts. Crowston and Myers (2004) found that industry-level research has also been limited to economic or strategic systems approaches. They outline a broader research agenda for studying industry transformation at the organizational field level. Their framework is consistent with our arguments for increased attention to industry in IS theory development.

Organizational field studies provide an important bridge between organizational and societal analysis (Scott 2001). IS researchers often use grand social theories (e.g., structuration) or middle-range theories (e.g., diffusion) to explain organizational actions and outcomes. If industry influences are ignored, theory development relies on the uniformity of industry assumption. In contrast to this approach, Barrett and Walsham's (1999) study of electronic trading in the London Insurance Market integrated social theory with industry analysis. The researchers' examination of threats to self-identity posed by an electronic trading system was founded on Giddens' general social theories of modernity. Nonetheless, their application of this general social theory was grounded in their examination of long-held institutional logics in the London Insurance Market, such as the importance of face-to-face interactions for the infusion of expertise into business transactions. In industries in which face-to-face interaction is less important to perceived expertise,
Giddens's general social theories may apply, but IT mediation may not have the same consequences for self-identity.

Although we believe industry could have a significant role in IS theory, we are not arguing that industry should be considered in every IS research project. Dennis and Garfield's (2003) study of a group support system (GSS) used by teams of nurses makes almost no mention of the hospital industry. By studying a generic organizational task and information system, the researchers appropriately disregarded the industry setting, beyond characterizing the hospital's social structure as hierarchical and a limitation to generalizing their findings to "flatter" organizations. On the other hand, when the IT artifact is specific to an industry or when IT development, implementation, and use are associated with changes in the industry environment, taking industry into account could enhance interpretation of theory and findings. Kohli and Kettinger's (2004) report of an action research project to implement a physician profiling system (generically termed a decision support system) necessarily took into account hospital/physician relationships and professional governance in the design and implementation of the IT artifact.

Benbasat and Zmud's (1999) recommendations for increasing the practical relevance of IS research highlight how industry-focused research could contribute to this goal. They exhort IS researchers to "speak the language" of practitioners in theories, constructs, and frameworks. Much IS research has grown up around socio-technical topics such as enterprise resource planning, customer relationship management, data warehousing, or group support systems. Socio-technical topics can have limited meaning outside an industry context. General assumptions about these IT artifacts may need to be contextualized to reflect the material-resource and institutional environment of different industries (see Kohli and Kettinger 2004). When looking to practice for relevant research topics, differences in the issues, concerns, and desired outcomes of IS activities are likely to arise in different industries. In these ways, an industry-specific theory would provide a finer-grained lens with which to examine IT issues. The results could be findings and recommendations that are more realistic and applicable to practice.

There are counterarguments to our recommendations for considering industry in IS theory. One is that producing general theory is the job of academic researchers, and industry-specific knowledge is best left to practitioners, IT vendors, and consultants. Another is that industry-specific publications would fall at the outer edges of what Whinston and Geng (2004) characterized as "the gray area" of relevant IS research topics. They noted, however, that innovative research can arise from gray areas. We believe this would be the case with industry-specific research. Moreover, general IS knowledge will grow by testing and refining IS theories in different industries and through meta-analysis (quantitative and qualitative) of industry-specific findings. Through replication, extension, and generation of theory (Berthon et al. 2002) with respect to industry, the IS research space will develop.

**Practical Steps to Take Industry Seriously**

If considering industry in theory would contribute to IS knowledge as we have argued, how could researchers begin to take industry more seriously? As a first step, researchers planning a study routinely could ask themselves, is it possible that industry matters in the IS activity being studied? Sometimes, the answer will clearly be "no"—for example, in studies of generic processes and IT artifacts (see Dennis and Garfield 2003). Sometimes the answer will clearly be "yes"—for instance, in the type of organizational field studies advocated by Crowston and Myers (2004). In field research, the answer will often be "possibly." As a thought experiment, Becker's (1998) "null hypothesis trick" could help researchers imagine this
possibility. If industry does not have a substantive role in the phenomena of interest (the null hypothesis), no observed differences should arise due to industry. If differences arise (e.g., high concentration of an IT-related practice in particular industries), the null hypothesis should be questioned. If no apparent variation arises due to industry, particularly if a theoretical basis exists to rule out industry influence, researchers could simply explain their rationale for excluding industry from consideration.

Detecting industry influences will depend on how researchers sample phenomena from the empirical world—the organizations they choose to study, the IT phenomena they choose to examine, and the data they choose to collect. Examining industry-specific IT artifacts and venturing beyond the subset of industries commonly studied will heighten IS researchers’ sensitivity to the industry boundaries implicit in current IS concepts and theories. Sampling for industry influences does not mean every research project would include multiple industries in an empirical study. We recommend only that researchers explicitly consider (and possibly dismiss) industry in their choice of empirical settings, phenomena, and data. When the IT phenomenon of interest directs researchers’ selection of cases, they could consider whether the phenomenon is happening in some industries but not others and, if so, what this nonrandom occurrence suggests about industry influence. Our discussion of Christian and Venkatraman’s (2002) study of American Airlines illustrates that answering such questions can highlight industry dimensions relevant to theory and findings, even in single industry studies.

Different research designs and data collection methods provide opportunities for examining industry influence on IS activities. In meta-analysis of surveys from different industries (see Devaraj and Kohli 2003; Melville et al. 2004), industry effect can be analyzed quantitatively. In cross-industry surveys, researchers can collect basic data about industry classification, each organization’s position within the industry, and management responses to industry environment, in addition to data on other constructs of interest (see Lee et al. 2004). Industry influences may be noticeable, however, only with large sample sizes. We are not advocating that researchers increase sample size only to look for industry effects. They should do so only if they have a theoretical or empirical basis to expect that industry effects exist. In their survey of outsourcing practices in Korea, Lee et al. (2004) theorized that industry type (a contingency variable) would mediate the effects of outsourcing strategy on success (p. 114). This hypothesis was supported for one category of industry type ("long-linked technologies") but not for other types ("mediating" and "intensive" technologies) (p. 124).

Surveys and field case studies conducted within a single organization (or single industry) provide opportunities to explore in detail the interaction of organization and industry in IS activities. Using archival materials, field researchers can become informed about and sensitized to industry dimensions. They may also partner with researchers already familiar with the industry, a wise strategy when venturing into fields like health care, law, or education. The analytic task in case studies will be challenging, given the volume and range of contextual data that confronts field researchers. Through sampling and data collection, researchers can increase the likelihood of uncovering data to support suspected industry influences while actively looking for data to disconfirm the existence of such relationships. In these ways, industry influences can be "teased out" from organization-level influences.

Although we believe that taking industry into consideration in IS research will have substantive benefits for the IS field, doing so may increase the effort and risk involved in a research project. With limited time and budgets, researchers may chose to hold industry constant by working within one industry. In this case, they could still consider possible influences from that industry context on findings (see Barrett and Walsh 1999). As studies are replicated in different contexts and as industry research grows within the IS field, industry analysis will be possible through cross-case study and meta-analysis.
Conclusions

In this essay, we have argued that industry represents an increasingly important influence on the patterns and meaning of IS activities and that more attention to industry in IS theory and research is warranted. We considered how industry influences IT artifacts and related phenomena and suggested that industry provides a contextual space, grounded in institutional theory, to evaluate the boundaries of IS theories. We posited that increased attention to industry will extend and refine IS knowledge, moving the field toward what many IS researchers recommend: diffusing IS theory into other disciplines (Myers and Baskerville 2002), attending to the IT artifact embedded in its social and technical context (Benbasat and Zmud 2003; Orlikowski and Iacono 2001), fostering new customers for IS knowledge (Markus 1999), and increasing the practical relevance of IS research (Benbasat and Zmud 1999).

Our commentary is based primarily on our assessment of publications in two top-tier IS journals. This selection of publications is not representative of all IS research or publications. Notably, our in-depth analysis of health care IS research publications (Chiasson and Davidson 2004) indicated that some IS journals publish a higher percentage of studies related to health care than ISR and MISQ. We suspect this is true for other industries rarely studied in IS research and for industry-focused research generally. The number of conference mini-tracks focused on IT uses in industries like health care, government, and education is also growing. Specialized IS journals, professional journals, and the journals of other academic disciplines provide additional outlets for industry-related IS research. Thus, our conclusion that industry is seldom considered in IS theory must be viewed with some caution. However, our intent in this essay was not to produce a representative profile of IS research. Our objective was to highlight a critical, yet unappreciated, approach to IS research and theory development. For this purpose, top-tier journals provide a normative gauge of the types of research that are valued highly in an academic field. These journals also provide unique, important insights on the practices and forms of knowledge created in a field. We hope our essay will stimulate awareness about the IS field's implicit and collective choices in developing theory, encourage debate about the importance of industry in IS research, and provide ideas to researchers interested in undertaking industry-focused studies.

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Appendix A

Methods Used in Analysis of MISQ and ISR Publications

We examined research publications in two top-tier IS journals (MISQ and ISR) over an eight-year period (1997-2004) to determine whether an industry is mentioned, which industries are mentioned, and the degree to which industry was considered in theory and analysis. We examined 272 empirical articles, omitting conceptual and opinion pieces. We found that 58 percent of these articles (157) did not identify an industry or mentioned multiple but unspecified industries. A minority, 42 percent (115 of articles) identified one or more industries from which empirical data were drawn. We tallied the number of articles in which empirical data were drawn from a particular industry, using the industry labels (e.g., manufacturing) used by the article authors. Table A-1 summarizes our analysis. Because some articles reported collecting data from more than one industry, the total count of 144 exceeds 115.

Five industry categories (manufacturing, high-tech, banking/finance, retail, and insurance) accounted for 71 percent of the industries examined. Health care accounted for 5.6 percent of publications—an upward trend due to three articles related to health care in the MISQ special issue on action research in 2004. The remaining articles were spread over a variety of industries, including services (4.9 percent), government (3.5 percent), distribution (3.5 percent), education (3.5 percent), and airlines (2.8 percent). The education category primarily related to studies of university or business education, and health care articles included medical suppliers and pharmaceutical companies. Oil and gas (2.1 percent), military (1.4 percent), utility (0.7 percent), law (0.7 percent), and real estate (0.7 percent) were the subject of one to three articles each. No studies were published that examined IT issues in industries such as agriculture, mining, entertainment, or construction.

To characterize the degree to which industry is considered in data analysis or theory, we further characterized the 42 percent of the articles that mention an industry in the following way: (A) no discussion of industry characteristics or influences on research; (B) some industry description included but minimal discussion of industry influences on study findings and theory; industry primarily mentioned as a limitation to generalizing study findings; (C) industry description included, with consideration of industry influences on findings or theory at the organization population or organizational field level of analysis. Our categoriza-
Table A-1. Industries Examined in 115 Articles Reporting a Specific Industry

<table>
<thead>
<tr>
<th>Industry</th>
<th>Count</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
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<tbody>
<tr>
<td>Manufacturing</td>
<td>30</td>
<td>20.8%</td>
<td>20.8%</td>
</tr>
<tr>
<td>High-Tech/IT Consulting/Telecomm</td>
<td>28</td>
<td>19.4%</td>
<td>40.3%</td>
</tr>
<tr>
<td>Banking/Financial</td>
<td>22</td>
<td>15.3%</td>
<td>55.6%</td>
</tr>
<tr>
<td>Retail</td>
<td>13</td>
<td>9.0%</td>
<td>64.6%</td>
</tr>
<tr>
<td>Insurance</td>
<td>9</td>
<td>6.3%</td>
<td>70.8%</td>
</tr>
<tr>
<td>Health care</td>
<td>8</td>
<td>5.6%</td>
<td>76.4%</td>
</tr>
<tr>
<td>Various services</td>
<td>7</td>
<td>4.9%</td>
<td>81.3%</td>
</tr>
<tr>
<td>Government</td>
<td>5</td>
<td>3.5%</td>
<td>84.7%</td>
</tr>
<tr>
<td>Distribution</td>
<td>5</td>
<td>3.5%</td>
<td>88.2%</td>
</tr>
<tr>
<td>Education</td>
<td>5</td>
<td>3.5%</td>
<td>91.7%</td>
</tr>
<tr>
<td>Airline</td>
<td>4</td>
<td>2.8%</td>
<td>94.4%</td>
</tr>
<tr>
<td>Oil &amp; gas</td>
<td>3</td>
<td>2.1%</td>
<td>96.5%</td>
</tr>
<tr>
<td>Military</td>
<td>2</td>
<td>1.4%</td>
<td>97.9%</td>
</tr>
<tr>
<td>Utility</td>
<td>1</td>
<td>0.7%</td>
<td>98.6%</td>
</tr>
<tr>
<td>Law</td>
<td>1</td>
<td>0.7%</td>
<td>99.3%</td>
</tr>
<tr>
<td>Real Estate</td>
<td>1</td>
<td>0.7%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Total</td>
<td>144</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

...tion focused only on the publication’s attention to industry. Some studies in the A and B categories devoted significant analytic attention to organizational context.

Of the 115 articles mentioning an industry, 74 percent (85 articles in categories A and B) only mentioned the industries in which empirical work was conducted or simply described the industry as background for the study and a cause for limited generalization. The remaining 26 percent of publications (30 articles) that identified industry (category C)—a total of 11 percent of the 272 articles examined—considered industry influence theoretically or in the analysis of data. Although there was variation year-to-year, we did not detect sustained trends toward more or less attention to industry in these journal outlets.