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Implementation, Innovation, and Related Themes Over The Years In Information Systems Research.

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Abstract:

1. Introduction

Whither research on the adoption and acceptance of new information technology (IT)? At the recent 2006 meeting of DIGIT (Diffusion Interest Group in IT) held in conjunction with the International Conference on Information Systems (ICIS) in Milwaukee, we were asked as an invited panel to look back at our own research on IT implementation, innovation, and related themes, and to offer retrospective comments on it to provide a perspective for looking ahead to future research.[1] Following our participation on this panel, we were invited to develop our remarks into the present brief paper. We are pleased to offer this contribution, while cautioning the reader that our purpose is necessarily limited here to a mostly self-referential commentary. Chin and Marcolin (2001) and others in a relatively recent collection provide further background and a more comprehensive review of others' research on IT adoption and diffusion. Benbasat and Barki (2007) and others comment more extensively in this special issue of *JAIS* on the Technology Acceptance Model (TAM) that has dominated much recent research, while we just touch upon it ourselves. In the sections that follow, we first look back at certain pieces of our research over the years, we then comment on it with the benefit of hindsight and offer a look ahead.

2. A look back

Way back when, in the early 1970s, firms innovated with IT just as they do today (though with less grasp then of both the potential of IT to contribute to organizational objectives and the complexities associated with the IT-enablement of individual tasks and organizational processes). Many encountered difficulties and some failed in their efforts, just as they do today (though now less often and, generally, with fewer dysfunctional outcomes). These difficulties were characterized at the time as *implementation problems* and gave rise to an early research stream addressing the nature and sources of the problems and how they might be dealt with. The research had roots in the field of management science, where several scholars in the mid-1960s had similarly focused on implementation in the context of difficulties in having their formal models adopted for practical use in organizational settings (see, e.g., Churchman and Schainblatt 1965).

Our own efforts contributed to this emergent implementation research stream. Swanson (1974) explained managers' discretionary use of an MIS in terms of their understanding and "appreciation" of it, derived from their *user involvement* with its design and implementation. Lucas (1975) examined "why information systems fail" and, further, (Lucas 1978) presented empirical evidence for a model of implementation. Zmud and Cox (1979) articulated an approach to implementation where substantial change was expected once a system became operational.

This implementation research stream prospered well into the 1980s. Our own work gave it continued attention. Swanson (1988), drawing from his various work, positioned implementation as a "bridge" between design and utilization, and also identified the several pieces of what he termed the "implementation puzzle." Lucas, Ginzberg, and Schultz (1990) presented a structural model of implementation, which integrated and elaborated upon earlier work, bringing individual user and management models together. Zmud, in contrast, took a different tack. In a series of studies of software practices and their adoption (Zmud, 1982, 1983, 1984), he turned his attention specifically to the closely related theme of *innovation* and its *diffusion* in the IT context. Kwon and Zmud (1987) argued that the existing "fragmented models" of implementation could be unified with an innovation perspective.

As the 1980s came to a close, Davis (1989) and Davis, Bargozi, and Warshaw (1989) introduced the *Technology Acceptance Model (TAM)*, providing a sound and parsimonious theoretical base for explaining an individual's disposition to adopt and use new IT. Essentially, TAM reduced the predictors of an individual's intention to adopt a new IT innovation to a core set of two variables, perceived usefulness and perceived ease of use. Largely because it provided both a simplified frame for studying individuals' IT adoption/use behaviors and a set of sound measurement tools, TAM engendered an explosion of research. In the research that has followed, the model has been elaborated, and an attempt has been made to unify it (Venkatesh, Morris, Davis, and Davis 2003). TAM has in fact come to occupy a central position in research focused on individual adoption of IT innovations. In retrospect, we observe that the model provides relatively few implications for management for implementing new technology. It also seems to have discouraged further process studies

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[1] DIGIT has met regularly at ICIS since its founding in 1989 by Mary Prescott and Sue Conger. It is now sponsored by the Association for Information Systems (AIS) Special Interest Group on Adoption and Diffusion of IT (SIGADIT). See www.sigadit.org.

with the majority of work on implementation found to employ survey methods only. We ourselves did not follow the TAM route. Rather, our different interests gravitated toward other, organizational-level concerns.

The 1990s saw the development of a significant and diverse research stream focused on innovation in the IT context. We continued our participation. Cooper and Zmud (1989, 1990) repositioned implementation research in terms of innovation theory, employed an organizational level of analysis, and further introduced the notion of *infusion* (Apple and Zmud 1992, Saga and Zmud 1994) to complement that of diffusion. Lind and Zmud (1991) argued that an organization's *IT innovativeness* depended on a convergence in understanding between technology providers and users. Swanson (1994) offered a *tri-core model* of information systems innovations that differentiated between innovation types, with implications for organizational adoption and diffusion. Swanson and Ramiller (1997) introduced the concept of an *organizing vision* to explain the diffusion of certain popular applications of IT, such as ERP (Enterprise Resource Planning), across firms, giving new attention to the institutional context for IT innovation. Kambil, Kamis, Koufaris, and Lucas (2000) examined influences on the corporate adoption of Web technology, while Spitler and Lucas (2000) reexamined implementation challenges in the newer context of workstations and networks.

The 1990s also saw the establishment in 1994 of the International Federation of Information Processing (IFIP) Working Group (WG) 8.6 on Transfer and Diffusion of IT, which has furthered the development of a global community of scholars and practitioners interested in the subject with a series of working conferences.[2] This followed the earlier initiation of DIGIT in 1989, which provides an annual forum that brings IT adoption/diffusion researchers together at ICIS.

Turning to our recent work, Swanson has continued his research on organizing visions for innovating with IT. Ramiller and Swanson (2003) suggested that different organizing visions take different career paths, according to how they are received in the community as interpretable, plausible, discontinuous, and important, while Swanson and Ramiller (2004) examined organizational *mindfulness*, as opposed to mindlessness, in innovating with IT. They also considered why mindfulness apparently does not always prevail among firms. Wang and Swanson (2006), in a study of the failed diffusion of Professional Services Automation (PSA), proposed that organizing visions are launched through *institutional entrepreneurship* across a community. Key players include market researchers, consultancies, business and trade press, advertisers, writers, and conference organizers.

Among a variety of other work, including that on the business value of IT and IT governance, Zmud has focused recently on multi-level *post-adoptive behavior* associated with IT innovation. Purvis, Sambamurthy, and Zmud (2001) and Sherif, Zmud and Browne (2006) examined the *assimilation* of enabling technology platforms in organizations, while Jasperson, Carter, and Zmud (2005) presented a comprehensive conceptualization of post-adoptive behaviors that enriches the ideas initially introduced in Saga and Zmud (1994). The broad question addressed by Zmud's research portfolio is: What must an enterprise do right in order to introduce appropriate IT so as to fully leverage the functionality of this technology in creating business value? Over time, Zmud's research has moved toward working with and in real organizations, organizational and mixed-level analyses, working with archival data, and using context-rich and multiple methods.

Lucas has continued to move beyond individual- and firm-level studies, collaborating with others in examining IT and its impacts in specific industries, such as airlines (Duliba, Kauffman, and Lucas 2001) and retail brokerage (Bakos, Lucas, Oh, Simon, Viswanathan, and Weber 2005). Currently he is focusing on how IT enables the transformation of organizations, markets, and industries. Organizations that implement radical new business models successfully are creating dramatic changes in the economy. These changes force competitors to innovate with new business models and successfully implement new technologies to remain in business.

3. In hindsight

In retrospect, the early implementation research stream proved to be deficient in several respects. First, while it usefully accounted for various factors associated with implementation success, it failed to establish a unifying theory that brought the factors together.[3] Second, it also failed to yield the insights that began to emerge from process studies also being initiated (see especially Markus 1983). Third, the research addressed primarily the *individual* acceptance or rejection of systems in various (and often under-described) organizational contexts, leaving *organizational* use or rejection both within and among firms relatively unexplored. Fourth, the research typically ignored the innovation context--that is, the nature of the new technology being introduced into a specific organizational setting--while acknowledging the institutional influences of its prior introduction elsewhere among firms, and in the light of prior or concurrently adopted enabling and complementary

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[2] See www.ifip8-6.cbs.dk. Priscilla Fowler and Linda Levine played important roles in founding WG8.6 and putting on the first conference. Saga and Zmud (1994) were among the contributors to this event.
[3] See, however, Wixom and Todd (2005) for a more recent attempt at theoretical integration.

technologies. That is, the early implementation research lacked a sufficiently rich technological, institutional, and historical context.

On the positive side, this research has succeeded in identifying a large number of factors that are associated with implementation success in different situations. We now understand that many things have to go right for implementation to succeed, and that it only takes one or two mistakes to dramatically increase the chances of failure. This research has also provided insights on the process of implementation, focusing on how those designing the system, those who will ultimately use it, and those at multiple managerial levels (project, sponsor, IT, enterprise) must relate to one another during the planning, design, adoption and leveraging of a technological innovation. And, it is important to point out that IT adoption/diffusion research is somewhat unique in the IT discipline with regard to its cumulative research tradition. We and numerous others are aware of each others' research programs and have strived to incorporate prior-developed theories, constructs, methods, and measures where appropriate.

Today, the innovation perspective provides a broad umbrella that attracts research across a wide spectrum. This arguably corrects substantially for the earlier deficiencies in implementation research. Still, challenges remain. We still lack a unifying theory, or even a small assemblage of sub-theories that complement each other. This shows up most painfully when theory at one level is transposed, without much thinking, to another level, as when TAM at the individual level is naively appropriated for research at the group or organizational level. While using psychological constructs at higher levels has a long history in organizational research, it typically requires considerable care in the adaptation and translation. We note further that the concept of *diffusion* itself may be stretched when applied both to the spread of IT among individuals or groups within an enterprise and to the corresponding spread among firms within an industry or across industries, as the underlying communication, decision, and action mechanisms may be very different. Again, our theories of diffusion may need to be refined and differentiated across these different levels.

Broadly, as with TAM, much current research remains focused on individual adoption and acceptance of IT, where the original implementation research began. Is this in part because it has become rather natural for us to identify settings in which this is an issue and then move in to study the contemporary phenomena, following the lead of those who did the same before us? We see here something of an imbalance between micro and macro studies in the broad arena of innovating with IT, notwithstanding the contributions now being made by economics-oriented scholars to the latter (see, e.g., Mendelson and Pillai 1998, Zhu, Kraemer and Xu 2006). While we don't begrudge the former, it's by no means clear that we as researchers will ever be able to discern the workings of the larger IT innovation forests, even with the help of our economics-oriented colleagues, from our many close examinations of their individual trees. For instance, even a reworked TAM model that finds a way to go beyond individual perceptions to incorporate important antecedents and consequences (Benbasat and Barki 2007), may fail to bridge meaningfully to and from organizational-level theory.

4. Looking ahead

In the 1970s, our research was motivated in part by the remarkable failures occurring when firms sought to innovate with IT. Though remarkable failures continue to surface, e.g., the FBI case file system (Goldstein, 2005), the larger story over the decades has not been one of failure but rather one of substantial success as business across industries has been and continues to invest in and be substantially transformed through IT. Today, the overriding concern is that of enabling firms to more fully leverage these huge investments in IT.

Additionally, the nature of the IT implementation challenge has changed dramatically from what it was 30 years ago:

- The move to packaged solutions and enterprise-wide implementations - e.g., ERP, SCM, and CRM systems, has brought about increased costs and broader impacts along with tendencies to limit (unit or individual) customization..

- The increasing speed demanded in hyper-competitive markets for the development, deployment, and adaptation of implemented systems has put a premium on rapid implementation strategies and tactics.

- The emergence of inter-organizational (e.g., enabling multi-firm value nets) and community (e.g. the phenomenal growth of sites like YouTube) technology platforms has added additional levels of complexity to our adoption/diffusion models.

Looking ahead, we see the necessity for more fully accounting for technological, institutional, and historical contexts, leading us to suggest that our research should be more oriented toward telling rich and complete stories of innovation with information technology. Doing so may require that we recruit colleagues with a historical bent to assist us. We need to

look back in particular at the variety of IT innovations that have swept across the business landscape over the years, such as automated teller machines (ATMs), retail product bar-coding, and airline reservations systems (ARS). More recently, we need to look at new business models like portals and search engines, electronic marketplaces and auctions, and social networks, where the result has been obvious *business transformation*. In looking back at these innovations, we need to reconstruct the underlying diffusion stories and to theorize them in ways that help us understand how events came to happen.

At the organizational level, we should also pursue studies that help us understand how innovating with IT can lead to *organizational capabilities* that provide competitive advantage, however sustainable. Echoing an earlier call (Chin and Margolis 2001), we also need to study the *deep use* of systems, which must surely come from *individual and collective learning* and the *institutional restructuring* that takes place long after systems are first adopted and receive initial acceptance.

On the whole, we are optimistic about future research opportunities. We find that innovation and innovation-induced transformation provide powerful lenses through which to view the IS field. They can give one needed historical perspective and provide a stable theoretical frame with which to understand new technologies and changing practices. Future research will require multiple, complementary levels of analysis across individuals, organizations, and industries. Technology continues to change the world, although today the scope and rate of such change is greater then ever—and the need to understand technology and its adoption, implementation, and use has never been more important.

Acknowledgements

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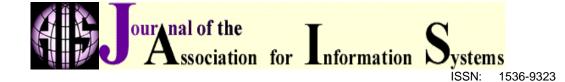
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Journal of the Association for Information Systems

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