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When Cost-Efficient Technologies Meet Politics: A Case Study of Radical Wireless Network Implementation

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Abstract

Cost efficiency has been a dominant perspective in the traditional IT literature. However, in complex technology and business environment, the widely recognized cost efficient assumption of information technology has been increasingly challenged. Drawing from a case study of wireless network implementation situated in a politically sensitive workplace, this paper provided practice insights for IT managers in today's networked economy. More specifically, stories experienced in the case study illustrated that despite well-calculated cost efficiency of wireless network infrastructure, the radical implementation process in the case organization encountered enormous challenges and opposition due to the fact that administrators failed to consider various stakeholders' positions and interests. Eventually, the implementation objectives and outcome were considerably undermined. Implications from this empirical case research reemphasized the significance of understanding political forces situated in any business environment where different stakeholders hold conflicting interests. Lessons learned from the case story further encouraged IT managers and policy makers to better strategize emerging information technology in general and wireless networks in particular as the whole global society and business environment are increasingly facing an emerging wireless world.

Keywords: Politics, wireless network, information technology (IT), case study

Research Background

The rapid development of information and communications technology (ICT) and relevant technologies has permeated society and transformed the business world in the 21st century (Hong and Tam, 2006). Research into ICT implementation could be readily found covering a variety of contexts such as Vietnam's economic development (Konstadakopulos, 2005), Australian remote construction projects (Weippert et al., 2003), Greek tourism promotion (Buhalis and Deimezi, 2004), the Swiss business sector (Hollenstein, 2004), and non-for profit organization settings elsewhere (Finn et al., 2006).

The emergence of wireless networks has further elevated the significance of ICT to our everyday work and life (Fiser, 2004, Liu et al., 2003, Shaffer, 2000). *The Economist's* report on a series of cover stories in April 2007, all related to wireless and mobile phenomena, provided a distinctive example. The topics of those stories included wireless chips and smart services, sensor networks and smart devices, various forms of emerging wireless communications, ubiquitous apartments where everything (i.e. home appliances, consumer electronics, and mobile communications) is controlled and connected online, growing communications chips that would soon vanish existing wireless tools, and a seemingly RFID

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(Radio Frequency Identification) tag injected into a club patron's arms for entry and purchasing records (Anonymous, 2007b). A variety of issues were also mentioned including wireless energy and invisible security and privacy issues (Anonymous, 2007a).

Similarly, the research community has also paid increasing attention to wireless networks and relevant technologies (Scornavacca et al., 2006). Topics investigated included the capabilities and applications of mobile technology (Casademont et al., 2004, Giaglis et al., 2004) or individual usage and adoption behavior (Campbell and Russo, 2003, Meso et al., 2005, Monk et al., 2004, Puuronen and Savolainen, 1997) such as consumer intentions in mobile commerce contexts (Zhang et al., 2006, Wang et al., 2006). However, these studies tended to simply evaluate technology impact on or relationship with various research contexts and, as expected, positive suggestions were predominantly made. Little attention is paid to social and political issues that might profoundly affect the effects of ICT in general and the deployment of wireless networks in particular.

Based on an in-depth case study, the purposes of this research are thus to draw attention to the significance of commonly overlooked social and political factors in the ICT research area and in turn to help IT managers to overcome those factors so that smoother ICT implementation and wireless network deployment process can be achieved. More specifically, we inquire, "How does wireless network implementation change an organization's business practice?" and "How the cost-efficiency of wireless networks is reshaped by the social context in which they are implemented?" The implications and conclusion of this study contribute to the existing understanding of ICT literature in the following ways. First, it expands our understanding of politics theory (Markus, 1983) to ICT management and wireless network implementation and thus calls for a more politically sensitive IT practice that is not commonly seen in the ICT or wireless network literature. Second, it provides specific suggestions as to how to manage contextual factors that might undermine the effects of cost-efficient technology. These contributions are significant to the ICT and wireless network research community because they provide alternative perspectives that are often overlooked in the main stream research areas (Smithson and Hirschheim, 1998).

IT Politics

Although Markus's classic study (1983) provided invaluable insights of politics in IT implementation, the mainstream research endeavor still predominantly focuses on cost-efficient assumption of information technology such as IT investment (Dehning et al., 2003), productivity (Thatcher and Oliver, 2001), business profitability (Hitt and Brynjolfsson, 1996), and consumer value (Mukhopadhyay et al., 1995). While there is no doubt that these research studies exert profound influence on ICT research and business practice, they tend to overlook or simplify some underlying issues that could significantly alter the implementation results (Markus, 1981, Myers, 1994). For instance, IT users might resist emerging systems for their self-interests and/or for inadequate technical deign; the interaction between systems users and the context in which the systems put into practice might be more influential than other factors involved (Markus, 1983). For poorly designed technology or inadequately customized systems that are not tailored to the users' needs, it is more understandable if the systems fail to achieve its intended results. For emerging technology or systems that could enhance users' productivity and efficiency, their implementation success or failure is often determined not by technical design but by social and organizational issues (Myers, 1994). In the contemporary ICT environment, popular technology such as wireless networks and enterprise-wide information systems such as ERP (Enterprise Resource Planning) might require multi-years of implementation process and/or multi-million dollars of investment (Gargeya and Brady, 2005). Any unintended consequences, particularly negative ones, derived from systems

implementation might be too complicated or costly to be overlooked.

Moreover, the cost-efficient assumption of IT literature often views IT impacts as merely the installation of a new technology. It neglects the fact that to fully understand the experiences and results of IT implementation, its social context, stakeholders, and organizational reactions that follow should be taken into serious consideration (Orlikowski, 1993). As Orlikowski [30] clearly points out, the changes that follow the implementation of new information systems could have a long-lasting impact, some incremental and some radical; each of which could significantly influence an organization's business practice over time. For organizational units that refuse to accept emerging changes associated with new technologies implemented, the potential of new systems would never be fully realized and the results of a cost-efficient system would thus be compromised. In the end, even with the same technology, different organizational structures, social contexts, and stakeholders involved could lead to contrasting implementation results.

In line with this view, a recent review of IT implementation literature by several senior IS researchers further suggests that three emerging factors have dramatically changed implementation practice and subsequently challenged the IT implementation research. These factors included (1) the substantial increase of IT investment on enterprise systems such as ERP (Enterprise Resource Planning), SCM (Supply Chain Management), and CRM (Customer Relationship Management), (2) the increasing demand in today's highly competitive market that required rapid development and implementation of IT, and (3) the emergence of multi-firm networks and virtual community platform (Lucas et al., 2007). These significant changes led them to conclude, "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" (31, p. 208).

In the particular domain of wireless networks chosen for our investigation, rich and complete stories would then need to incorporate alternative perspectives such as politics (Markus, 1983) and social context (Orlikowski, 1993). These alternative perspectives, as reviewed above, are particularly significant in the research investigation here because as widely recognized wireless networks have evolved rapidly and thus created many uncertain issues such as standards (Tan, 2002), security (Ghosh and Swaminatha, 2001), applications (Tarasewich, 2003), interface design (Lee and Benbasat, 2003), among others (Jarvenpaa and Lang, 2005, Palen, 2002). As these issues intermingle with social context and organizational structure, more complicated outcomes of wireless network implementation would thus be expected.

Research Methodology

To dismantle those complicated issues associated with wireless network implementation, we believe a case study research methodology is most appropriate. As widely recognized, case study research methodology has been the most commonly adopted qualitative methodology in the IT research community (Orlikowski and Baroudi, 1991, Chen and Hirschheim, 2004). It is particularly useful for research inquiry that seeks in-depth analysis of research context that resembles our research purpose (Yin, 1994). Despite no definite rule, conventional wisdom seemingly tended to disfavor single case study (Eisenhardt, 1989). On the contrary, some argue that one deep case study with good story telling might generate better theories than a number of surface case studies (Dyer and Wilkins, 1991). The research investigation that is based on a single case study is in line with such a perspective.

Study site

The organization under investigation was Alpha Law Center (ALC) at Alpha University (AU)[1] a large public research university in southwestern USA. The

[1] All names are pseudonyms

University's IT structure is mostly decentralized due to its large physical size and student population. Alpha Law Center's IT services, as in other academic colleges, are largely provided by its own IT department supervised by Assistant Dean, Gordon, and IT director, Roger.

The rationale for choosing ALC at Alpha University as our study site was mostly because it was one of only a few organizations, or even unique, in the metropolitan area to implement wireless networks across its entire campus. Most importantly, a mandatory laptop program which required admitted law students to be equipped with a laptop computer prior to entering the program created unique background that provided an ideal research context for our investigation not just for its wireless network environment but also for the social context (Orlikowski, 1993) and politics issues (Markus, 1983) interplayed between its newly implemented IT policy and the existing organizational structure and academic operations.

Data collection and analysis

The data collection process primarily took place in two academic semesters. During those periods we normally visited the site two to three times a week during our non-teaching days. Research findings reported here were primarily based on fourteen semi-structured interviews. While there was no definite rule regarding the number of interviews for a case study (Gummesson, 1991), the interviews presented served our research purpose because they included viewpoints of various stakeholders in the organizations that could help us gain a reasonable understanding of an organization's perspective as a whole. All interviews were digitally-recorded and followed the same guidelines. The average recording times of interviews were 54 minutes without students and 41 minutes with students. All interview records were transcribed and the transcription resulted in 106 single-spaced pages of data. Table 1 demonstrates the number of interviewees and their respective positions.

To achieve our research purpose that seeks an in-depth understanding of the process through which wireless networks interact with social and political context, narrative analysis was chosen as our analytical method. Narrative analysis is appropriate here because its rich story telling and in-depth description (Bruner, 2002) serves our research purpose well.

Table 1. Interviewee Chart

Interviewee Pseudonyms	Interviewee Job Title	Interview Duration (min)	Transcript Length (page)
Gordon	Assistant Dean	70	10
Roger	IT director (ALC)	62	15
Cameron	Networking Manager (Central IT	130	19
Dan	CIO/Vice President	45	10
Sean	Associate Dean	41	7
Vaughan	Associate Dean	31	6
Jarek	Professor	39	7
Janice	Professor	24	5
Glen	Professor	41	6
Aaron	Student	17	3
Molly	Student	20	5
Michelle	Student	27	6
JG	Student	13	3
Gabriel	Student	16	4

Case Story of Radical Implementation

The main stakeholders in this study included Assistant Dean, Gordon, who headed the IT department at ALC, current IT director, Roger, various faculty members, administrators, and students. The radical emergence of wireless networks at ALC began when a severe tropical storm swept across the metropolitan area and flooded a considerable section of the law center, in particular the networking facilities and the law library located in the basement. With a large proportion of the library collections unsalvageable and the primary function of networking infrastructure destroyed, the regular academic research and relevant activities could not be performed normally. The law center immediately fell into a dark facility with no electricity. However, the Dean at that time was determined to renovate the facility in time for the students to return in the subsequent semester, which appeared to be almost an impossible mission with urgent time constraint. Consequently, the options presented at the time would be either to re-wire the entire facility or to implement wireless networks. Gordon revealed that intuitively it appeared unwise to install two thousand network plugs throughout the facility. Roger, IT director, further suggested that the economic comparison between wired and wireless options quickly led the IT department to choose the wireless alternative.

In addition to the cost-efficient consideration of physical space and wiring costs, a mandatory laptop program was also implemented almost simultaneously. This mandatory laptop program required all freshman students to purchase one particular model of laptop prior to attending the school. On the one hand, it reinforced the notion of wireless campus and equipped students with necessary tool to best utilize wireless networks. On the other hand, the ownership of computing resources had completely shifted from the IT department to the students. The IT department no longer provided computers in the laboratory; neither did they equip networking infrastructure that traditionally existed in any physical facility. The IT function no longer needed to maintain or manage those computing and technological resources. The cost of technology ownership had been shifted to the students silently. Largely driven by resource allocation, such radical evolution highlighted an emerging era of ICT practice in general and network management in particular at ALC. Unfortunately, the inexperienced administration at that time failed to consider social and political context that involved other stakeholders at ALC. Consequently, many unexpected issues emerged and interplayed with the cost-efficient calculation of wireless network implementation.

Issue 1: Students vs. IT department

One immediate issue associated with the mandatory laptop program was that only certain models of laptop computers were recommended or no IT service would be provided. This situation created immediate nuisance between student users and the IT department, particularly those who have already equipped with their own laptop computers prior to entering the program.

> *I didn't like it at first because also the school recommends a certain computer and it's a very expensive computer. I think it's about $3,000 when I first got here. If I'm not mistaken, I'm pretty sure that's what it was and I had my own laptop which was $500 and it was fine… My laptop was a gift from my parents and was only 3 months old… At first I was questioning why did we need to have all that stuff, it didn't make sense… They [IT department] told me I could use my laptop, but said they couldn't guarantee it would work with everything and said I would get no IT assistance. [Molly, Student]*

Issue 2: Students vs. professors

Another issue occurred between professors and students in the classroom settings. The existence of wireless networks in the classroom has inevitably allowed students to distract themselves. Some faculty members have embarked on strict rules for forbidding laptop usages in the classroom and inevitably created unpleasant and confusing situation between professors and students.

It's just a reality that we are gonna use computer and that they are very fast and very useful. I was also a little surprised though and at first it was irritating me, some professors, the first year, professors, two of my professors would not allow laptops in the class. So it was like we had a requirement and then we were told not to bring them, which felt like an irony, which was like unfair. [Michelle, Student]

Issue 3: Professors vs. IT staff

Another problem caused by the implementation of wireless networks took a huge twist between professors and administrators. Due to urgent decision making, the administration failed to involve faculty members in implementing wireless networks and mandatory laptop policy. It provided the underlying cause for controversy between professors and administrations as illustrated by Sean's message below.

It's related to the controversy. One, it's an academic thing; the Dean shouldn't decide this on his own, he should have consulted more with the faculty. So there are some faculty who just think this was a bad process. [Sean, Associate Dean]

From a faculty member's perspective, it was bad enough to not be consulted with certain decision making that would affect his/her major academic activities, i.e. teaching in the classroom; it was worse not to be informed after the implementation of wireless networks has completed. When a professor discovered the existence of wireless networks and the distraction that it naturally created, his anger towards administration exploded as he perceived that his academic privacy and freedom was completely violated. He has since perceived the existence of wireless networks in the classroom a simple disaster and opposed to its development in any means possible including public speech to the central IT department and the entire law faculty email list.

No faculty was made aware of this during the first 6 weeks of class. When I found out, I published it and then the Dean admitted… I was mad as hell at the administration. The administration was determined to make me conform to what she viewed as a desirable classroom asset and she wasn't at all worried about the students' attention… I don't know what other people are doing actually in those classes but in my class the computer was simply a disaster. [Jarek, Professor]

Issue 4: Professors vs. professors

As the implementation evolved over time, conflicting viewpoints continued to battle at the law center. The first group of professors was fully aware of negative situations in the classroom but chose to neglect the problem. Their philosophy largely stemmed from the independence and freedom strongly rooted in the academic environment. This group of professors perceived that students should assume responsibility for their own actions and in turn that the professors should not engage in classroom control activities. Janice, for example, taught at the law center for over thirty years and observed much negative distraction recurring in the classroom. She, however, never made attempt to instruct how students should use (or not use) their laptops in the classrooms. As such, Janice's style was a completely independent, self-controlled approach. To her, the wireless networks might be literally nonexistent.

It's quite clear, unless they think they need to listen because there's something they don't understand, or they are going to get called on, or there is a problem set to work through, they are off doing their own thing. But I assume if they weren't doing that they'd be daydreaming. I don't think it's particularly a good thing. It hasn't stopped me from teaching the way I teach. I'm not going to go and patrol the classroom and go up and down the rows. The students who are interested are going to get good grades and pay attention and those who don't aren't. [Janice, Professor]

The other group of professors was so frustrated with student activities in the classroom that they adopted a radical approach to terminate the network access and laptop usage altogether. Jarek, for example, made several attempts to express his concerns and frustration to the administration in vain. Having received several teaching excellence awards over decades, Jarek considered the existence of wireless networks in the classroom a technology monster and be removed permanently at once. He even wrote an

article and presented it to the central IT department and other academic units on campus. After the first year of unsuccessful attempt to discourage students using the Internet in classroom, Jarek performed a legendary action that was widely known among ALC professors.

> *After that first year, it was a disastrous year in which I tried to get students to stay off the Internet. In desperation I got a ladder and unplugged the classroom system and was told by an unsympathetic administration I couldn't do that. I did it nevertheless after a week or two trying to make a point with the class and finally after I felt I'd made my point, I went on with the semester and the year and it was a disastrous teaching year. [Jarek]*

The radical approach adopted by one group of professors such as Jarek created two issues in the law center: one with students and the other with other faculty members. With the students, their approach contradicted with the mandatory laptop requirement practiced in the law center as described earlier. With faculty members, Jarek's persistent advocacy of removing wireless networks from classrooms continued to create conflicts between him and the administrators and the IT department. The attention was drawn to not just technology issues but also political issues among faculty members. Since faculty members at the law center exhibited various reactions toward wireless networks and Internet activities in the classrooms, not every faculty member embraced Jarek's radical approach. Eventually, Jarek's approach and persistent arguments with the administrations created incompatible attitude from some other faculty members who would simply consider Jarek a complete distraction on his own. Janice, for example, rolled her eyes when she revealed the message below.

> *In the beginning everyone accepted it and then some professors realised some students weren't paying attention. They were just doing all kinds of things so Jarek is famous for getting a ladder and unplugging things and making a huge fuss and then barraging the Dean with, "This is your fault. How could you have done such a stupid thing?" endlessly over the next 4, 5 years. He sent e-mails to all the faculty to barrage the Dean and making life difficult for everyone because he's unhappy… Don't talk to me about Jarek. [Janice]*

Analytical Reflections

In reflecting our first research question, "How does wireless network implementation change an organization's business practice," ALC's experiences clearly demonstrated the cost efficiency of wireless networks. First, it allowed an immediate replacement of previous wired network infrastructure within an urgent timeframe. ALC then quickly changed its network services from regular wired laboratories to a campus wide wireless network. The time saved for network implementation and the cost precluded for infrastructure ownership evidently achieved the cost efficiency of wireless networks planned. In addition, the implementation of wireless networks further enabled a mandatory laptop program that completely changed ALC's IT practice and business policy. It would become a common practice for students at ALC to bring laptops to classrooms and utilize wireless networks and Internet activities ubiquitously. Whether this radical change was positive, wireless network implementation has evidently revolutionized ALC's operations.

In reflecting our second research question, "How the cost-efficiency of wireless networks is reshaped by the social context in which they are implemented," ALC's story represented an interesting case where various stakeholders perceived and reacted toward this newly implemented technology differently. Many unexpected issues occurred in ALC's social and political context and in turn compromised the cost efficiency of wireless networks that was highly anticipated. Students immediately disagreed with ALC's new IT policy and predictably requested changes of the mandatory laptop requirement. Professors were not thrilled to observe constant distraction created by wireless networks in classrooms and subsequently conflicted with the administration and students. Intangible cost hidden behind these reactions naturally emerged and spoiled the cost-efficient benefit of wireless networks. As these reactions toward wireless networks continued to reshape its implementation results, frustration grew in other stakeholders such as different groups

of professors and IT department. Much hidden clash among different groups of stakeholders became apparent and ALC's academic routines and organizational culture were profoundly reshaped.

Implications

Cost efficiency vs. politics: ALC's story illustrated that the cost efficiency of emerging ICTs in general and wireless networks in particular was rather evident. The project duration of wireless network implementation was substantially shorter and less complicated than that of wired ones. In terms of disaster management as occurred to ALC, wireless network implementation thus appeared a more logical solution than a wired project. However, to achieve its full potential, a clear understanding of social and political contexts in organizations is as significant as the technology efficiency itself. As in the case of ALC, when students refused to support a newly implemented policy (i.e. the mandatory laptop program) or professors opposed to the existence of wireless networks in classrooms, the planned cost efficiency of wireless networks could be substantially compromised by these stakeholders' complicated, unexpected reactions.

Radical changes vs. knowledge domain: as illustrated in the case of ALC, radical changes in organizations often created revolutionary effects and fundamentally altered an organization's operations. By the same token, it might also require more careful project plan to gain user support, particularly when knowledge professionals were involved. Despite its logical solution to a natural disaster, the radical implementation of wireless networks at ALC could have been more successful if the administration have had first communicated with stakeholders, i.e. professors and students, involved. In doing so, the administration or IT department could smooth out undesirable resistance from stakeholders such as Jarek who was clearly shocked by sudden appearance of wireless networks in classrooms. In addition, top management should not neglect or underestimate knowledge workers' professional domains. At ALC, such domains were most apparent in professors' teaching integrity in classroom settings and academic autonomy else where. In the academic setting, these domains should even be taken more seriously because professors' intellectual freedom is commonly respected, informally sanctioned or even highly protected by higher educational systems. The hidden consequences caused by failing to acknowledge, if not appreciate, intellectual integrity and academic autonomy might significantly outweigh the cost efficiency of an emerging technology.

Wireless vs. wired solutions: another implication illustrated by ALC's story is derived from the radical disappearance of wired infrastructure that was completely replaced by wireless networks. Since all these events occurred over a summer break, organizational members, mainly students and professors, were left with no other alternative than wireless networks when a new semester resumed. The exiting members such as staff and professors were not made aware of the existence of wireless networks let alone trained to understand or appreciate its cost efficiency. From a technology standpoint, wireless networks might have been better as a supplement instead of a replacement of the existing wired infrastructure. In ALC's case, although wireless network was a cost efficient solution to a nature disaster, its technical capacity, for instance data transmission rate and bandwidth, was not parallel to that of a wired network. As such, it might not be a wise decision to completely remove the existing wired infrastructure. If an organization desires to do so as in the case of ALC, it is recommended that the project plan be carried out through incremental phases; the complete removal of existing wired infrastructure should wait until intended users have adjusted to technological changes and the technical capacity of wireless networks has been mature enough to serve a large number of organizational users.

Emerging wireless world: although the case of ALC was specifically situated in the academic setting, it reinforced the notion

that wireless networks have permeated contemporary higher education institutions in particular, and society and the business world in general. In other words, educators and business managers are increasingly facing a multitasking, social networking generation who grows up online and demands constant interaction and connection via the Internet as shown in the case of ALC. Professors whose classroom integrity was traditionally respected might no longer be able to enjoy conventional academic autonomy as they inevitably face technological challenges and cultural changes in the teaching and learning process. How this emerging generation's technological demands interact with traditionally well protected academic autonomy and how they shape and reshape the teaching and learning process and results might provide some interesting opportunities for future research endeavors.

Concluding Remarks

While qualitative research in general and a single case study in particular limits general understanding of issues investigated, the in-depth narrative analysis can help unveil subtle issues hidden behind the cost-efficient assumption of ICT and wireless networks. Although IT managers and researchers might gain different insights from the story narrated and the case analyzed, a common remark could be made that socially and politically sensitive ICT management and wireless network implementation appears necessary. A traditionally practiced top-down implementation approach might also need to be reconsidered since it often creates critical issues that undermine the objectives of IT projects. As ICT permeates society and wireless networks penetrates all knowledge domains, a new generation of college students and IT professionals who enjoy multitasking and social networking is rapidly emerging to change academic settings and the business world. More research endeavor to understand how to manage these technological and societal changes requires urgent attention.

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