An Investigation of the Effect of IT Occupational Subculture on the Relationship between Knowledge Sharing and IT Diffusion in Organizations

Research-in-Progress

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ABSTRACT

Based on existing conceptual work in culture and innovation diffusion theory, a framework is developed to investigate the moderating role of the occupational subculture of information technology personnel on the relationship between knowledge sharing and the IT diffusion process in organizations. We suggest that knowledge sharing between information technology (IT) and business personnel impacts the stage of the IT diffusion process in the organization, and this relationship is moderated by IT occupational subculture. In addition, insights from this study will shed light on how the IT diffusion process in organizations can be accelerated by managing IT occupational subculture.

Keywords

IT occupational subculture, professional culture, organizational culture, knowledge sharing, technology diffusion in organizations.

INTRODUCTION

Culture has been recognized as playing an important role in the adoption of new technologies (Leidner and Kayworth, 2006). Most cultural studies are conducted at the national level or through espoused national culture at the individual level (e.g. Hofstede, 1983; Srite and Karahanna, 2006). Notwithstanding the contribution of research up to now, our knowledge of how culture influences technology diffusion at the organizational level is limited. As organizations are becoming more and more reliant on IT, IT personnel who support the operations of business functions are essential to organizational technology diffusion (Kakabadse and Korac-Kakabadse, 2000). From a general perspective, IT personnel are regarded as those who make IT work; with respect to technology, business personnel are regarded as those who use IT to deal with everyday business at work (Nord, Nord, Cormack, and Cater-Steel 2006).

Guzman, Stam, and Stanton (2008) found that IT personnel have established a distinct occupational subculture within organizations. The concept of occupational subculture is different from both professional and organizational culture. Certain values, beliefs, and behaviors might be common across all IT workers regardless of their place of employment (professional culture). All employees of a certain company, including IT personnel, might also have similar values (organizational culture). However, within an organization IT personnel can have a distinct occupational subculture that is influenced by both the organizational culture of the company and the professional culture of the IT profession. Generally, occupational subcultures within organizations arise from those people who share similar educational, personal, and work experiences, and are pursuing the same occupation and have a similar understanding on occupational and organizational ideologies in speech and behavior. Please see Figure 1 below.
When organizations implement new IT, discrepancies often happen between IT personnel and non-IT employees. Differences in cultural perspectives, such as cultural beliefs, often cause conflicts between interacting groups (Rao and Ramachandran, 2011). Intergroup discrepancies affect the organization in technology diffusion process through three results: delayed peak adoption time, decreased peak adoption rate, and/or changed shape of diffusion curve (Cavusoglu, Hu, Li, and Ma, 2010). Previous studies have examined the factors which impact the rate of adoption of innovation; however, there is no research so far that considers the effect of sub-cultural conflict on the technology diffusion process at an organizational level. Although it is difficult to precisely measure culture (Weber and Camerer, 2003), it is important to open the black box and see how IT occupational subculture impacts organizational technology diffusion through cooperation with end users. This leads to the following research question: How does IT occupational subculture affect the organizational technology diffusion process through cooperation between IT personnel and business personnel?

Based on empirical research to date, classical IT diffusion variables by themselves are limited in their ability to predict the adoption of complex technologies at an organizational level. Based on meta-analysis, Hameed, Counsell, and Swift (2012) found that studies of IT diffusion in organizations have produced inconsistent and contradictory outcomes and organizational readiness is the most significant attribute of IT innovation adoption in organizations. Additional factors should be included to better explain IT adoption behavior at the organizational level, given that a high knowledge burden always exists among IT personnel and non-IT personnel (Fichman 1992). We propose that IT occupational subculture impacts the organizational IT diffusion process through cooperation between IT personnel and non-IT personnel.

We contribute to the technology diffusion literature by proposing a model that attempts to investigate the influence of IT occupational subculture on the organizational technology diffusion process. The proposed model is presented in Figure 2.
THEORY AND HYPOTHESES

IT Diffusion in Organizations

From the perspective of technology diffusion, IT implementation is defined as: “an organizational effort directed toward diffusing appropriate information technology within a user community”.

-- Cooper and Zmud, p. 124

To measure a technology adoption rate over time, research has found that it is influenced by two forces: a user’s intrinsic tendency to adopt technology and social interaction (Cavusoglu, Hu, Li, and Ma, 2010). This indicates that individual adoption is impacted by environmental factors.

Cooper and Zmud (1990) and Kwon and Zmud (1987) developed the IT implementation staged model, in which a new IT diffusion process goes through six stages: initiation, adoption, adaption, acceptance, routinization, and infusion. In the model, contextual factors, such as task characteristics, community characteristics, organizational characteristics, and environmental factors impact the six stages of new IT diffusion within a user community (Kwon and Zmud 1987).

While diffusion, in the above classical model, is still able to explain partial patterns of organizational technology diffusion, more factors should be considered in different contexts of IT diffusion in organizations (Fichman 1992). Classical diffusion is limited to the individual level, without sufficient capability to map clearly to the organizational level of research. Also, organizational IT adoption is not a binary event, but a process that unfolds in stages over time. More importantly, there is an implicit assumption in classical diffusion theory that adopters make the adoption decision based on their own usage, instead of being part of a larger community of interdependent users. It also does not take into account the fact that many technology decisions are mandatory and made by organizations.

Beyond classical diffusion theory, new variables come into play in the IT diffusion process at the organizational level. While the organization as a whole makes a decision to adopt new technology, how cooperative individual adopters are in embracing the innovation would highly impact the IT diffusion process (Fichman 1992). Further, it is acknowledged that the level of skills and knowledge gained to operate technology are important determinants of adopter innovativeness for organizations. In all, it implies that cooperation between IT personnel (who support IT diffusion) and non-IT personnel (who actually adopt IT) affect the entire organizational technology adoption process.

A dysfunctional relationship between business and IT personnel hinders the IT diffusion process in an organization. Previous research already recognized the frustrations regarding repeated project failures and project delays, which resulted from lack of cooperation between IT personnel and end users (Nord et al., 2006).

A considerable research effort has been applied in defining IT-business relationships. Among those studies, the Henderson (1990) model has often been cited to assess IT-business relationships in general. It was developed outlining two dimensions of partnership: partnership in context, which is necessary for a long term relationship; and partnership in action, which is necessary to create an effective day-to-day working relationship. For partnership in context, key factors include mutual benefits, commitment to the relationships, and predisposition. For partnership in action, key factors include shared knowledge, dependence on distinctive competencies and resources, and organizational linkages (Henderson, 1990). Among
these factors, knowledge sharing has been examined as a significant determinant of the IT-business relationship which is affected by IT professional culture (Nord et al., 2006).

Attewell (1992) argued that the complex IT diffusion process is driven by decreasing knowledge barriers, in addition to being a process driven by communication and social influence. IT personnel, who support business through IT implementation in various functions, are closely linked to end users. It has been proposed that IT group characteristics play a role in the modified IT diffusion framework (Fichman 1992). Effective cooperation among IT groups and business employees is proposed to quickly bridge end-users’ knowledge gap related to IT usage. Therefore, technology would be easier to implement in the whole organization. Thus:

Hypothesis1. Knowledge sharing among IT personnel and business end-users is positively related to IT diffusion process in organizations.

IT Occupational Subculture

“Culture matters because it is a powerful, latent, and often unconscious set of forces that determine both our individual and collective behavior, ways of perceiving, thought patterns, and values.”

-- Edgar H. Schein, 1999, p.14

The term culture is originally from anthropology, which is given to the rituals and customs that societies developed over time (Schein, 1992; Vecchio, Hearn, and Southey, 1996). Research has observed that not only do societies develop culture, but organizations, groups, communities, and occupations also do develop their own culture at these particular levels (e.g. Schein, 1992; Nord et al., 2006; Guzman et al., 2008). In general, culture is defined as a general shared understanding, which results from commonly held assumptions and views of the world among organizational, group, and occupational members (Weber and Camerer, 2003; Guzman et al., 2008).

Information systems research has already noted the essential role played by culture in organizations, and called for more attention to the social and cultural factors of employees’ workplace interactions with each other and with technology (Guzman et al., 2008). They found that IT personnel have established a distinct occupational subculture, such as the use of technical jargon, primary value of technical knowledge, feelings of superiority and a general lack of formal rules. When implementing new IT in an organization, the dynamic IT diffusion process at the organizational level is inevitably affected by the cultural contexts of those who work with IT and the organization itself.

Based on this multi-faceted perspective, Gallivan and Srite (2005) regarded culture as a richly layered set of forces that shape personal beliefs and behaviors. Within a multicultural team, members are given to multiple identities, such as national identity, organizational identity, group identity in team, and individual identity. Multiple level conflicts occur where different identity boundaries meet (Plessis 2012).

The model founded by Joshson and Scholes (1993) has been selected as the preferred model for assessing IT related occupational subculture in organizations (Nord et al., 2006). The model presents culture as a web, which is composed by central values and outer symbols. It is described as, “The center circle, the paradigm, represents a core set of values, beliefs, and assumptions common to the organization. These values, beliefs, and assumptions are reflected through the outer circles, which represent the cultural elements of stories, symbols, power structures, control systems, and rituals and routines” (Nord et al., 2006, p.6).

The Moderating Effect of IT Occupational Subculture on the Relationship between Knowledge Sharing and Organizational IT Diffusion

“An individual’s coworkers can be important sources of help in overcoming knowledge barriers constraining use of a complex system, and such interactions with others can determine an employee’s ability to influence eventual system configuration and features.”

--Sykes, Venkatesh, and Gosain, 2009, p. 371

IT occupational subculture is represented by six elements: organizational structure, stories and myths, symbols, rituals and routines, control systems, and power structures (Joshson and Scholes 1993), which are described in Appendix 1. Organizational structure guides the way in which an organization works. Stories and myths are tales told by organizational members. Symbols reflect the type of language used, logos, and office layout. Rituals and routines characterize the way work is done. Control systems highlight what is important in the organization. And power structures reveal the powerful managerial groupings in the organization.

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Based on previous literature, Nord et al., (2006) developed themes of IT culture for the six elements of IT culture. The first element, organizational structure, was specified in two themes: role of IT and positioning of IT. IT occupational subculture would contribute to a healthy IT-business relationship, if it reflected a structure where IT played a strategic role and the IT director was a senior executive of the organization. Furthermore, Nord et al., 2006 (2006) found that shared knowledge among IT and business professionals was positively affected by the strategic role played by IT personnel; and was negatively affected by the organizational structure where the IT director is not a senior executive.

Drawing from social network theory and previous individual-level technology adoption research, the model of acceptance with peer support (MAPS) proposes that an individual’s embeddedness in the social network of the organizational unit impacts new technology implementation in the organization (Sykes, Venkatesh, and Gosain, 2009). As key predictors of system use, valued network density and valued network centrality together influence pathways by which they impact the organizational technology diffusion process. Valued network density describe the connectedness of a focal employee to others, weighted by the perceived strength of the tie and the adjacent node’s control of system-related information, knowledge, and other tangible resources which are necessary for effective IT adoption. Valued network centrality refers to peers’ perception of the level of system-related resources controlled by a focal employee. This implies that the extent of how IT personnel influence other employees’ IT adoption in the organization is determined by their network density and centrality. If the IT director is a senior executive of the organization, the system resources would be more likely to be controlled by IT personnel. Therefore, IT personnel would be better able to facilitate the organizational IT diffusion process by overcoming knowledge barriers constraining the use of a complex system. Thus:

**Hypothesis2a.** The relationship between knowledge sharing among IT personnel and business end-users and stage of IT diffusion in organizations is moderated by IT occupational subculture, such that the relationship is stronger when IT occupational subculture reflects a structure where IT people play a strategic role in the organization.

As one of the “soft” issues of culture, stories and myths are told by organizational members. Nord et al., (2006) found that: IT professional culture had a positive effect on the IT-business relationship if success stories were told about the IT personnel. They further indicated that success stories and myths about IT are positively related to trust between IT personnel and other employees in organization. If good stories are told about IT personnel in the organization, business end-users are more likely to trust personnel’s capability, mutual benefits with them, and the integrity of what they are doing and what they will do. In that case, business end-users might be more cooperative to use IT in the organization.

According to trust theory, there are three kinds of trusting beliefs: competence, benevolence, and integrity (McKnight, Choudhury, and Kacmar 2002). Competence beliefs refer to the confident truster perception that the trustee has the ability to do what the truster needs. Benevolence beliefs refer to the confident truster perception that the trustee cares and is motivated to act in the truster’s interests. Finally, integrity beliefs refer to the confident truster perception that the trustee maintains honesty and keeps promises. A good reputation of IT personnel in the organization is positive to trusting beliefs formation process.

Gefen, Karahanna, and Straub (2003) integrate technology acceptance model (TAM) and trust theory, and link trust with intent to use technology. Obviously, trust will facilitate knowledge sharing among IT personnel and other employees in organization. Thus:

**Hypothesis2b.** The relationship between knowledge sharing among IT personnel and business end-users and stage of IT diffusion in organizations is moderated by IT occupational subculture, such that the relationship is stronger if organizational members are told about the success stories and myths of IT.

Symbols of IT occupational subculture include the type of language used, logos, and office layouts. Nord et al., (2006) found that a decentralized IT structure where IT professionals were physically located with their business colleagues had a positive effect on the IT-business relationship, while extensive use of IT jargon had a negative effect.

Media richness theory proposes that organizations process information to reduce uncertainty and equivocality (Daft and Lengel 1986). Uncertainty refers to the lack of information while equivocality refers to the ambiguity of information (Robert and Dennis, 2005). It is proposed that organizational structure and internal systems determine both the amount and richness of information provided to managers. In a decentralized IT structure, IT professionals are physically located with their business colleagues. Therefore, business and IT professionals would have more opportunity to communicate and integrate with each group’s subculture, which can reduce uncertainty and equivocality. Thus:

**Hypothesis2c.** The relationship between knowledge sharing among IT personnel and business end-users and stage of IT diffusion in organizations is moderated by IT occupational subculture, such that the relationship is stronger if IT occupational
subculture reflects symbols that a) IT professionals are physically located with their business colleagues and b) to avoid use of IT jargon.

Rituals and routines characterize the way work is done and normally manifest through the system development process. Nord et al., (2006) found that a system development process that was not adhered to by both business and IT had a negative effect on the IT-business relationship. Generally, the software development process is comprised of eight phases: determination of long-term organizational requirements; identification of projects and user requirements; system requirements; system analysis and design; programming; installation and training; system operation and maintenance; and system review and change (Carayannis and Sagi, 2001). It is implied that IT personnel should understand organizational and user requirements first, and then analyze how to employ IT to achieve business goals. The system development process should be adhered to by both business and IT. Therefore, the information processing would be facilitated. Thus:

**Hypothesis 2d.** The relationship between *knowledge sharing among IT personnel and business end-users and stage of IT diffusion in organizations* is moderated by IT occupational subculture, such that the relationship is stronger if IT occupational subculture reflects rituals/routines that system development process is adhered to by both business and IT.

Different from rituals and routines, the culture theme of a control system deals with the question: what is more important in an organization: IT or business? Guzman et al., (2008) found that IT personnel have a significant occupational culture which was characterized by the feeling of superiority and the primary value of technical knowledge. Nord et al., (2006) found that if IT controls the strategic direction in the organization and IT people manage projects, the IT-business relationship will be more interdependent. However, if there is a lack of involvement by business people in project management, and the responsibility of project management is left to IT people, the IT-business relationship will be harmed. It is reasonable to propose that when business people are more actively participating in the IT diffusion process and the greater dependence by business units on the IT group, the easier IT related knowledge can be shared with business units. Thus:

**Hypothesis 2e.** The relationship between *knowledge sharing among IT personnel and business end-users and stage of IT diffusion in organizations* is moderated by IT occupational subculture, such that the relationship is stronger if IT occupational subculture reflects a control system that both IT and business control the strategic direction within the organization and IT people co-manage projects with business people.

Similar to the cultural theme of a control system, power structures reflect the influence of the managerial group in an organization. There are various kinds of powers: interdependence power, expert power, position power, and information power (Nord et al., 2006). While a business highly dependent on IT is positively related to IT-business relationship, high levels of expert power and information power are negatively associated with it.

Furthermore, power structures shed light on how a powerful IT group can control business units. Nord et al., (2006) found that if the IT group uses their expert power and information power to their own advantage, and the business group has little control over this, the IT-business relationship would be harmed. Therefore, the power structures of IT group should be reasonably constrained. Thus:

**Hypothesis 2f.** The relationship between *knowledge sharing among IT personnel and business end-users and stage of IT diffusion in organizations* is moderated by IT occupational subculture, such that the relationship is weaker if IT occupational subculture reflects power structures that IT group has an extremely high level of expert power.

**RESEARCH METHODOLOGY**

The construct of occupational subculture is measured with items developed by the authors based on the literature, due to a lack of a previously validated scale. The instrument has been developed by authors. An online survey will be sent out to IT departments. The expected sample size is 400. Prior to sending the survey to participants, a pilot study has been used to establish the reliability (measured by Cronbach’s alpha) and validity (both convergent and discriminant validity) of the constructs. Partial least squares (PLS) analysis will be used to test the research model and the psychometric properties of the scales.

Data from the survey will be compared with secondary data collected in previous studies and existing Internet and organizational records. The participants’ gender, age, the IT groups’ work experience with business employees, organizational size, IT group size, IT diffusion project size, and organization’s previous IT diffusion experience will be collected. The research model will be run with all the control variables included. Thus, the threat of confounding variables which might affect the hypothesized relationships will be minimized.
POSSIBLE CONTRIBUTIONS TO THEORY AND PRACTICES

We will make academic contributions to IT diffusion theory by incorporating IT occupational subculture into the IT diffusion framework. Although researchers have already explored some cultural characteristics of IT personnel which are distinct from other employees, there is no prior study that has investigated the effect of IT occupational subculture in organizations. Also, knowledge sharing (among IT personnel who support IT implementation and business employees who use IT) as an important determinant of IT diffusion in organization has been taken into consideration, which allows us to better understand the process by which IT is diffused in organizations.

Classical IT diffusion theory is not adequate at the organizational level if all employees are required to adopt a complex IT (Nord et al., 2006). Knowledge sharing among IT personnel and business employees is able to bridge the knowledge gap between groups and will facilitate the diffusion process. Thus, the occupational subculture of IT personnel plays an important role when both groups cooperate in IT diffusion, particularly in mandated adoption decisions.

Drawing upon cultural and cross-subcultural psychology, the study presents one possible approach through which occupational subculture manifests at the organizational level of analysis and impacts the IT diffusion process. Additionally, the study makes a series of hypotheses as to how IT occupational subculture influences the relationship of knowledge sharing between business and IT personnel and the stage of IT diffusion in an organization. In doing so, behaviors related to IT diffusion at the organizational level will be better understood beyond the limitations of previous the classical IT diffusion framework.

This study also has direct managerial implications. While previous studies highlight the need for paying attention to cultural impacts, they do not go further to suggest how IT diffusion in organizations can be impacted by occupational subculture. This study proposes various factors that can be taken to facilitate the IT diffusion process in organizations. For example, given the prevalence for extensive use of IT jargon in an IT group, it may be important for management to develop jargon reduction mechanisms to facilitate knowledge sharing across different occupations. As such, the IT diffusion process in the organization may be accelerated.

LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

The data in this study won’t be as rich as it could have been if a longitudinal study been conducted. Additionally, the results of this study will be from data collected from organizations in one geographic area of the US, which may limit the generalizability of this study to a larger world population. Thus, a future study may test the model in other regions/countries and at multiple time points.

Another limitation might be derived from the information providers. In this study, only IT employees in each organization will be asked to take the survey and to measure knowledge sharing among IT personnel and business employees. Although data are not collected from a single source, it would have been preferable to ask the opinions from both IT personnel and business employees to assess the knowledge sharing process. Unfortunately the response rate is often very low in such situations and a trade-off between richness of data and response rate was deemed a necessity in this initial research.

Finally, there might be some contingencies and non-significant findings. The study may be replicated with a mix of different technologies and/or across various areas. Furthermore, a future study may examine the interplay between multiple levels of culture and develop hypotheses by linking the different levels together. For example, the interaction of national and occupational subculture might be a new interesting research area, given that IT outsourcing is a prevalent business model and international cooperation is very common in organizations.

PLAN

This study is in the process of data collection, we will present the analyzed data in the conference meeting.

REFERENCES


## Elements of Occupational Subcultural of IT Personnel

<table>
<thead>
<tr>
<th>Description</th>
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<tbody>
<tr>
<td><strong>Organizational Structure</strong></td>
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<tr>
<td>Refers to the way in which an organization works, and is specified in two themes: role of IT and position of IT.</td>
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<tr>
<td><strong>Stories and Myths</strong></td>
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<tr>
<td>Refers to reputation of the occupation, and related stories are told by members of an organization.</td>
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<tr>
<td><strong>Symbols</strong></td>
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<tr>
<td>Symbols of occupational subculture include the type of language used, logos, and office layouts.</td>
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<td><strong>Rituals and Routines</strong></td>
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<tr>
<td>Characters the way work is done, and manifests through systems development process.</td>
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<td><strong>Control systems</strong></td>
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<tr>
<td>It deals with the question: which one is more important in organization, IT or business? Both strategic control and project control are included.</td>
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<tr>
<td><strong>Power Structures</strong></td>
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<tr>
<td>Reflect the powerful managerial group in an organization, and is specified through how power IT can control business. There are four kinds of power: interdependence power, expert power, position power, and information power.</td>
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### Appendix 1. Occupational Subcultural Themes of IT Personnel within Organizations