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Structural, Normative, and Informational Influence on IT Standards Creation: A Focus on Online Knowledge Communities

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Abstract

As the Internet emerges as a new venue for many business activities, a new organizational form called virtual communities has emerged and rapidly spread out across the entire sector of industry to take advantage of the efficiency of communications technologies. In the knowledge era, such online communities are increasingly being regarded as a cyberspace in which individuals and organizations can meet and exchange the information of their interest that are dispersed both geographically and in time. In IT industry, online communities such as Web-based industry consortia, which heavily utilize computer mediated communication to exchange knowledge, have been playing instrumental roles in creating IT standards. Yet one barely understands how this form of organization works regarding group decision making. This research attempts to investigate structural, normative, and informational influence on IT standards creation process (as an instance of group decision-making) in the context of online knowledge communities. Using publicly open email archives from an industry consortium and the survey data from participants in standards creation process, this paper explores the factors associated with organizational, individual, task, and communication media, and investigates the extent to which they influence stakeholder perceptions and IT standards creation process. Then, using different datasets, this paper attempts to generalize the model based on different types of IT standards such as business process oriented standards and technology oriented standards.

Keywords: Online knowledge communities, group decision making, computer mediated communication, IT standards creation process

Introduction

Organizations have spawned many kinds of communities of practice (CoPs) that enable organizations to build, share, and apply the deep levels of competence required to compete in a knowledge-based global economy. Some CoPs are closely knit groups of experts who share knowledge for a specified task. As the emergence of the Internet and other communication technologies has opened new possibilities for organizations to develop new processes, organizations have increasingly participated in broader online communities of discourse (CoD) to rally contributions from people dispersed geographically and in time. Such CoPs are often referred as Electronic CoPs (Wasco and Faraj 2000) or Virtual CoPs (Neus 2001).

In information technology (IT) industry, examples of Electronic CoPs (ECoPs) include W3C (World Wide Web Consortium), IETF (Internet Engineering Task Force), and OASIS (Organization for the Advancement of Structured Information Standards), an industry consortium that heavily use the Internet by utilizing shared Web spaces and email lists as the communication media. We define online knowledge communities as ECoPs that specifically focus on knowledge creation and sharing. Although these online knowledge communities perform diverse tasks (e.g., creating guidelines such as standards, or developing official best practices), one barely understands how this form of communities works regarding group decision making. Among tasks, they are

increasingly playing important roles in creating IT standards, since the strategic importance of IT standards ever increases with the emergence of e-business.

This research attempts to investigate structural, normative, and informational influence on IT standards creation process (as an instance of group decision-making) in the context of online knowledge communities. This research presents two research questions. First, what are structural and cognitive factors influencing standards creation process with respect to organizational, individual, task, and communication media? Second, what are the impacts of the factors and their interaction on stakeholder perceptions and IT standards creation process?

The research consists of two phases. First, using publicly open email archives from an industry consortium and the survey data from participants in such an industry consortium, this paper investigates the factors and the extent to which they influence stakeholder perceptions and IT standards creation process in online knowledge communities. Second, using email archives from different online knowledge communities, this paper tests the model according to different types of IT standards such as business process oriented IT standards and technology oriented IT standards. The rest of this paper is organized as follows. In the next section, an overview of related work is briefly reviewed. In section 3, research setting is presented, followed by research methodology in section 4. Finally, in section 5, we conclude this dissertation proposal.

Related Work

Electronic Communities of Practice (ECoPs)

The groundbreaking work on CoPs was made by Wenger (1990), Lave and Wenger (1990), Brown and Duguid (1991) and others. CoPs are defined as people bound by informal relationships that share a common practice, or as a type of informal work-related social grouping (Lave and Wenger 1990; Brown and Duguid 1991; Wenger 1990,1991). These group of people share ideas, help solve problems and develop a common practice to the field. Through the emergence of the Internet, the potential for non face-to-face communication has been greatly facilitated. The concept of ECoPs well applies to describing an organizational form such as an industry consortium that operates based on the Internet. Although the concepts for electronic and non-electronic CoPs are similar, the context in which they are being formed differs. For instance, computer mediated communication is substantially different than face-to-face communication, and attempts to apply distributed problem solving to human organizations are still in their early stage.

Computer Mediated Communication (CMC)

CMC refers to a system designed to primarily to support text-based and generally asynchronous group discussions, such as an electronic mail system, a computer conferencing, and a bulletin board system (Fjermestad and Hiltz 2001). CMC has been a means of supporting group processes, facilitating the tasks of group decision making (Malone et al. 1987). In recent years, electronic mail systems have been the most common form of CMC systems, improving the effectiveness of communications in organizations and helping experts sustain relationship by supplementing face-to-face meeting. In spite of the argument that an electronic mail is lack of interactivity and that it eliminates interpersonal contact which is important in building relationships and morale, the competency of organizations can be enhanced by utilizing CMC to support ECoPs. For instance, a successful mailing list can help create a CoD by serving as knowledge filter (e.g., asking for help) and by sharing success stories and work-related knowledge. The success of a mailing list can be measured in terms of the activity and size and a successful mailing list tends to be active and grow fast in terms of subscription and message base, with many useful contributions made.

Group Processes

A group work includes problem solving, decision-making, allocation and coordination, and task structuring. Fulk, Schmitz, and Steinfield (1990) argue that the behavior and sense-making are subject to social influence. It is well proposed that investigating social processes is a necessary step towards an understanding of group behavior, that such understanding is crucial when attempting to support group processes using CMC, and that the social context should be considered as an integral part of this process, not as an external factor. It is claimed that social factors often influence the nature of the work process and the ways in which the technology is used (Giddens 1984; Orlikowski and Baroudi 1991). The central themes of group processes are

summarized as *influence* and *interaction*. Forsyth (1990) argues that group members influence one another through social interaction.

IT Standards and Standards Creation Process

IT Standards

As e-business begins to mature and requires even more interoperability in information systems, it is increasingly the case that IT standards become both a facilitator and in some cases the very focus of e-business as e-business practices and IT standards gain widespread acceptance. David and Shurmer (1996) analyzed the nature and economic significance of activities carried on by the formal standards sector to cope with modern needs for standards in the telecommunications and IT standards-setting environment. Metcalfe and Miles (1994) took an evolutionary perspective to account for the nature and function of standards. The impacts of IT standards are significant to both user organizations and technology suppliers. The benefits of IT standards to user organizations include the reduced cost of information systems integration and maintenance, and the increased business opportunities for the ever-growing e-business industry. For technology suppliers, the benefits include not only the economic payoff such as increased market share (Kobryn 1999), but also wide recognition as being a follower of IT standards. Not surprisingly, firms are proactively attempting to participate in standards bodies, and technology suppliers, for instance, spend a great amount of money to participate in standards creation process.[1]

IT Standards Creation Process

IT Standards creation process is characterized by dynamic interactions among standards bodies, technology suppliers and user organizations within a specific standards creation environment. It can be conceptualized as a sequential and iterative process consisting of distinct stages such as standards draft proposal, adaptation through feedback, and adoption of standards (Marpet 1998). Every stage of standards creation process is influenced by a number of contingent factors such as stakeholders' strategy, market situation, and types of technology dealt with. More current research efforts have emphasized such interaction among participants in standards creation process. For instance, Marpet (1998) proposes a solution to balance the interests of participants in standards creation process, emphasizing the importance of achieving the primary objective of standards which is to benefit commerce and society by producing the high quality standards.

Research Setting

This study focuses on ebXML (electronic business eXtensible Markup Language) industry consortium and its standards creation process. EbXML standards were sponsored by UN/CEFACT (United Nations Centre for Trade Facilitation and Electronic Business) and OASIS to develop a technical framework that enables XML to be utilized in a consistent manner for the exchange of all e-business data. By providing a set of common technical specifications, ebXML standards aimed to become the basis for enabling inter- and intra-industry trade (David and Shurmer 1996). EbXML standards have characteristics of both technology oriented standards and business process oriented standards. For instance, there are four basic XML-related components needed to conduct e-business within a single supply chain environment. At the foundation is the messaging service, which specifies how the information for an e-business transaction is physically packaged, transferred and routed securely between trading partners. Once a common messaging service is defined, trading partners must agree upon a common set of business and technical dictionary components and conventions for the content of the business message being sent. Last, the business and technical content exchanged between trading partners logically forms a complete business process, which in turn specifies the structure and format of the business content of a message.

The membership to this consortium was extended to all interested parties and the email communications were open to the public. In the ebXML consortium, project teams developed technical specifications and determined when the standard would be distributed to all participants and users for their input. Comments were taken back to the project team for consideration and the process iterated through a few cycles, eventually resulting in a final recommendation. If at any time in the development cycle,

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[1]Hawkins (1999) showed that costs directly attributable to standards-setting would appear to be in the average range of US$5-7 million per firm in the information and communications technology industry, per year and rising. The full costs are probably much higher.

consensus or significant agreement could not be reached, an executive committee would review the issue and put in a recommendation for a binding decision.

Research Methodology

Research Strategy

This study conducts exploratory and empirical research on IT standards creation process in ebXML industry consortium to gain an understanding of the dynamics of a group decision-making in online knowledge communities. To meet these objectives, this study triangulates research method using qualitative such as content analysis (Neuendorf 2002), quantitative, and model building. First, the research attempts to explore the factors related to organizational, individual, task, and communication media, to investigate the extent to which they influence stakeholder perceptions and IT standards creation process in online knowledge communities, and to test the model based on different types of IT standards such as business process oriented IT standards and technology oriented IT standards. The second phase of the study will use email archives from different online knowledge communities to test the model, based on business process oriented IT standards and technology oriented IT standards respectively. Currently, industry consortia such as W3C, IETF, and OASIS maintain publicly open email archives for standards initiatives such as WebCGM, security, and XML.

Research Design

This research investigates structural and cognitive factors at the individual level influencing IT standards creation in online knowledge communities.

Structural Influence

A distributed group decision-making environment in online knowledge communities involves diverse factors such as the characteristics of CMC, types of tasks, the characteristics of communities, profiles of participants, decision rules, group diversity and similarity, and so forth. For instance, tasks can be categorized into two categories in this study: business process oriented standards and technology oriented standards; profiles of participants can be categorized into experts, reflective users, and novices; and the characteristics of communities emphasizing shared objectives, etc. We hypothesize that these structural factors moderate the effect of normative and informational influence on group decision-making in online knowledge communities (see Figure 1).
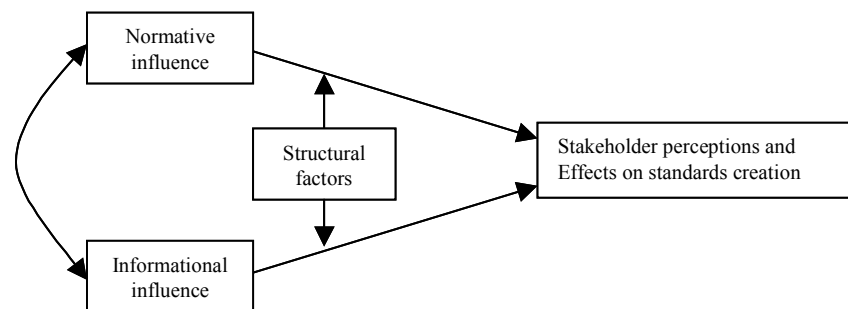

Figure 1. Conceptual Model

Cognitive Influence

Cognitive aspects deal with the perception of participants, focusing on the interaction and social influence during the process. Social influence is divided into two perspectives: normative- and informational-influence. Normative influence, or social comparison refers to the conformity that results from a person's desire to gain acceptance (Deutsch and Girard 1955). This occurs to enhance one's position in the group, to maximize social rewards such as acceptance and status (Sanders and Baron 1977). For

instance, in IT standards creation context, there is an emerging concern from user organizations on technology convergence that forces technology providers to conform to IT standards for the purpose of protecting user investments.

Informational influence or persuasive arguments refers to the conformity that results in a situation from accepting evidence about reality provided by others. It derives from the belief that others' views are valid and reliable (Deutsch and Girard 1955; El-Shinnawy and Vinze 1998). This occurs when one tries to persuade others through valid arguments with the use of logic or verifiable facts (Bishop and Myers 1974). This type of influence is greatest in IT standards creation when one is unsure of one's own ability to make an accurate judgment in a particular situation. We hypothesize that, in the context of IT creation in online knowledge communities, these normative and informational influence, interacting each other, have direct impact on group decision making in online knowledge communities (see Figure 1).

Dependent Variables

We measure the perceptions of stakeholders of technology providers and user organizations, such as the satisfaction and confidence, and the effect on standards creation process, such as the richness of the discussion and the level of participation.

Data Collection and Analysis

Two types of data are to be collected for this study: publicly open email archives and the survey data from participants in standards creation process. The publicly open email archives from ebXML industry consortium are supplemented with secondary data such as minutes of face-to-face meetings, teleconference meetings, and intermediate specification documents to highlight the process of synthesis and coordination efforts. As the ebXML initiative was a concerted approach of several project teams that worked for different areas of the standards, data were categorized based on business process oriented standards (e.g., BP and RR) and technology oriented standards (e.g., TRP and TA). Initial scan of data collected produced the following descriptive statistics (see Table 1).

Table 1. Descriptive Statistics of Collected Data

Project Team	No. of Emails	No. of Threads	Distribution of Emails per Thread				
			1	2	3~10	11~20	>21
Transport, Routing and Packaging (TRP)	3,415	983	528	153	236	49	17
Registry and Repository (RR)	1,356	981	280	187	495	12	7
Business Process (BP)	1,289	703	453	117	115	15	3
Technical Architecture (TA)	1,258	433	251	71	87	18	6

The data analysis will be conducted both for email archives, as well as secondary data, and for the survey data collected from participants in standards creation process. The data analysis task consists of several sub-tasks. For instance, the analysis of the email archives will proceed following the steps such as (1) Investigate major factors influencing standards creation process, focusing on organization, individual, task, and communication media, (2) Operationalize factors into detailed sub-factors and measurement items, and (3) Analyze the data based on the measurement items, with social network analysis as supplementary techniques available. To analyze the survey data, measured items will first be developed based on detailed research design, and then will be sent out to samples that are available in email lists. The dependability of the study is contingent on the reliability of the measuring instrument and the validity. The reliability measures the stability of the measuring instrument over a variety of conditions, and the validity determines whether a questionnaire measures what is intended. This study will test both reliability and validity.

Conclusion

It becomes increasingly important to understand the dynamics of online knowledge communities that play an /instrumental role in developing social capital. This study is expected to contribute to both researchers and practitioners in that it helps researchers better understand how online knowledge communities work with respect to group decision making and that it helps practitioners better understand how IT standards are created in rapidly emerging industry consortia. In other words, the topic of distributed

group decision making is still a hazy problem to many researchers across disciplines, and managers in today's organizations have to deal with a diverse set of IT standards associated with e-business implementations that are developed by a number of standards bodies.

Future study is twofold. First, from the standpoint of managerial policy, we need to study how to enhance the performance of online knowledge communities, once we understand the dynamics of group decision making in online knowledge communities. Second, from the standpoint of technology implementation, we need to explore how to enhance the efficiency of technology design and implementation in online knowledge communities.

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