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Abstract

This paper discusses the application of structuration theory in understanding the complex Internet innovation phenomenon in a developing country. It provides references to earlier studies on IS innovation and discusses two controversial perspectives on technological determinism and social constructivism. Through a review of existing IS literature on structuration theory a new direction is proposed to investigate one of the 20th century's major technological innovations, the Internet. A conceptual model and an analytical framework for studying the complex interactions between institutional structures and Internet innovation patterns in developing countries are presented. The most appropriate research methodology to study Internet innovation in Vietnam is articulated and discussed.

Keywords

Research, Frameworks, Structuration Theory, Diffusion of IS, Diffusion of Innovation, Internet, Vietnam

INTRODUCTION

The Internet is considered as one of the major technological innovations of the 20th century, affecting political and cultural relationships and socio-economic development (Castells, 1996). In innovation diffusion theory, an innovation is a practice, or object that is perceived as new by an individual or other unit of adoption (Rogers, 1995); and innovation diffusion is the spread of the capacity to produce or use innovation in practice (King *et al.*, 1994). Information systems (IS) innovation is broadly viewed as the application of digital, computer and communications technologies, commonly known as information communication technology (ICT) (Cooper and Zmud, 1990; Swanson, 1994). Internet commerce is the application of the Internet and its associated technologies in conducting trade in goods and services. In the context of this paper Internet commerce is considered as a technological innovation in society. According to Dutton (1996), at a societal level, technological innovation is a dynamic process underlying political, social, organizational and technological change. Such a process is complex to study because it occurs at different levels of society, starting at the micro level such as products and continuing up to the macro level such as infrastructures or large pervasive technological systems (Nakicenovic and Grubler, 1991).

Institutional factors are ubiquitous in developing countries and important to study in technological innovation study (King *et al.*, 1994; Montealegre, 1999; Peha, 1999). Technological innovation is a complex research field, and Dutton (1996) and Kubicek *et al.* (1997) suggest that sociological theories play an increasingly important role in the development of this discipline. Considering the uses and consequences of technology that emerge from complex social dynamics between institutional structures and social agents, this paper proposes structuration theory (Giddens, 1984) as a theoretical background to comprehend the complexity of the technological innovation phenomenon. The contribution of this paper is two-fold: theory and practice. From the theoretical perspective, it offers a conceptual model to study the mutual influences of institutional structures and technological innovation patterns in relation to Internet innovation in developing countries. From a practical

stance, with particular reference to a developing country like Vietnam where institutional forces are pervasive (Bezanson *et al.*, 1999; Dang, 1999; Petrazzini and Bui, 1995), the formulated analytical framework opens new ways for researchers to untangle the complexity of the phenomenon and capture new understandings.

LITERATURE REVIEW

The major focus of scholars in IS research is the complex interwoven relationships between information technology, people, organisational change and societal transformation. Markus and Robey (1988) explained that due to an inadequate theoretical construct, IS research does not support reliable generalisations and sometimes even generates conflicting results. These authors recommended adopting a new perspective that considers the adoption of information technology and its consequences as emerging unpredictably from complex social interactions. Similarly, regarding the nature of the phenomena under study, Orlikowski and Baroudi (1991) contend that a single research stance for studying innovation phenomena is limited and restrictive. These authors suggest a plurality of philosophical assumptions and research perspectives to explore the complex relationships between information technology, people, and organisations. Through studies and reviews of innovation literature across multiple disciplines, Wolfe (1994) reveals that innovation research has developed in a non-cumulative manner, and reaches inconsistent and inconclusive findings. Moreover, research on IS innovation remains both fragmented and limited (Swanson, 1994). The previous literature suggests that although the issues were pointed out in the early 1990s, opposing theoretical streams have still been developed in the IS research field over the last decade (Pozzebon and Pinsonneault, 2001).

On the one hand, researchers of the 'technological determinism' school opt for a deterministic stance and consider technology as an independent factor; and technological changes are seen to cause social transformation. According to this school of thought, to achieve the inherent benefits of technological innovation, society must adapt itself to the transformative forces of technology. This stream of research tends to focus on the 'effects' of technology or the 'impacts' of technological change on societies and aims to predict the rates and patterns of an innovation over time and space. IS researchers studied diffusion of computing networks (Gurbaxani, 1990), analysed the international Internet diffusion (Díez-Picazo, 1999), tracked the global diffusion of the Internet (Press, 1997), used innovation diffusion models to predict the Internet global diffusion growth rates (Rai *et al.*, 1998), or investigated the impacts of trade barriers on E-Commerce (EC) diffusion (Bhatnagar, 1999).

On the other hand, scholars and theorists of the 'social constructivism' school adopt a 'voluntaristic' position and tend to focus on social factors governing innovation and shaping technological change (MacKenzie and Wajcman, 1987). This research stream investigated the influence of individual, organisational, and social variables on the level of innovativeness. Numerous scholars (Dutton, 1996; Hirschheim, 1992; Hoffman, 1977; King *et al.*, 1994; Kling, 1978; Kling and Iacono, 1984; Kubicek *et al.*, 1997; Lee, 1977; Leiss, 1977; Markus and Robey, 1988; Pfeffer and Leblebici, 1977) have deemed that information technologies are basically social and human rather than merely technical.

The idea that technologies embed social characteristics is not new for social scientists. In the early 1970s, the social dimension of technology was reflected in the studies on the impacts of the technological innovations under socialism (Fleron, 1977). In investigating the dynamic interaction between technology and change engendered by the introduction of information technology and policy formation in centralised economies, Hoffman (1977) points out the importance of 'official ideology, secrecy, orthodoxy, arbitrariness, bureaucratic inertia, evasiveness, sanctions, confusion, mendacity' (*ibid*: 397). In relation to the introduction of a mass innovation in Eastern societies, Lee (1977) notes the effects of ideology upon the organisation of technological innovation at the firm level. Moreover, under specific ideologically legitimate conditions, economically rational principles and culturally acceptable norms, Leiss (1977) suggests that technology is always associated with the ideology, status, and role assignments that determine its use. Congruently, more recent studies on technological innovation suggest that government institutions (such as political parties, research institutes, regulators) play a major and multifaceted role in the development of ICT sectors (Bhatnagar, 1999; Bourreau and Dogan, 2001; King *et al.*, 1994)

and in Internet diffusion process (Al-Tawil, 2001; Dang, 1999; Hargittai, 1999; Khan, 1994; Montealegre, 1999; Peha, 1999; Rodan, 1998; Wiebe and Roy, 1995; Wu, 1996). As a result, one can posit that institutional structures (such as ideology, laws, infrastructures) can strongly influence the Internet innovation adoption patterns and diffusion rate.

Although the 'social constructivism' school acknowledges the role of the institutions in technological development, paradoxically few of these studies endeavour to explore how in specific circumstances of technological development, particular social agents' adoption patterns in turn place constraints on and reshape the institutional structures. This constitutes a deficiency in the existing technological innovation research.

To overcome such a deficiency in technological innovation research, the major challenge of this paper is to go beyond the simplistic view of either technological determinism or social constructivism, and propose a cohesive and integrative approach to extend the knowledge of Internet innovation study, especially in developing countries where the institutional forces are omnipresent. In relation to Internet innovation, the focus of this paper is in exploring how institutional structures (such as laws, infrastructures, and ideology) influence the social agents' adoption patterns; and in turn how the social agents' adoption patterns reshape such institutional structures. To develop such an integrative approach, a general theory in social sciences is needed.

AN INTEGRATIVE APPROACH TO STUDY TECHNOGICAL INNOVATION

Increasingly, IS researchers borrow more dynamic theories from sociology (Johnston, 2001; Orlikowski and Robey 1991; Rose and Scheepers, 2001) to enrich their theorising. Using structuration theory, Pavlou and Majchrzak, (2002) explored the complexity of electronic commerce market intermediaries; Flynn and Hussain (2001) explained information system development and its use in organisations; and Orlikowski (1992; 1993), Walsham and Han (1993) analysed how technologies interact with organisations.

Internet innovation dynamics can be seen as a playing field in which interactions occur between the institutional structures and a number of social agents with diverse beliefs, agendas, intentions and interests (Bekkers, 1997). According to Sinha (1996), institutional structures consist of dominant ideology, formal laws and regulations and informal rules (such as conventions, habits, codes of conduct) that shape economic activities, capital and technological infrastructures. Moreover, they also determine organisational choices that influence industry performance.

This paper attempts to propose an integrative conceptual model to explore the complex and dynamic process involved in technological innovation. It investigates the influences of institutional structures on the Internet innovation adoption patterns; and in turn the impacts of adoption patterns on institutional structures and policy formation. As discussed earlier, Internet innovation has societal level implications and technologies are basically social and human rather than merely technical.

The central theorem of "duality of structure" is of primary importance in structuration theory. It refers to institutional properties of social systems as the results of human actions, which in turn reshape human actions. In structuration theory, both social agents and institutional structural properties constitute social reality. Fundamental to the theory of structuration is the idea that: "*The constitution of agents and structure are not two independently given sets of phenomena, a dualism, but represent a duality*" (Giddens, 1984:25). Hence, structuration theory (Giddens, 1984) in sociology lays the theoretical foundation for the study of the dynamic interaction process between social agents adoption patterns and institutional structures in technological innovation studies.

The structuration process involves reciprocal influences between social agents and institutional structures and implies the mutual dependence of institutional structures and social interactions. This two-way character of dependence between social agents and institutional structure is referred to as "*the dialectic of control in social systems*" (Giddens, 1984:16). Applying this principle to the Internet innovation process, the above concepts led to the development of a conceptual model (depicted in Figure 1) discussed in more detail in the next section.
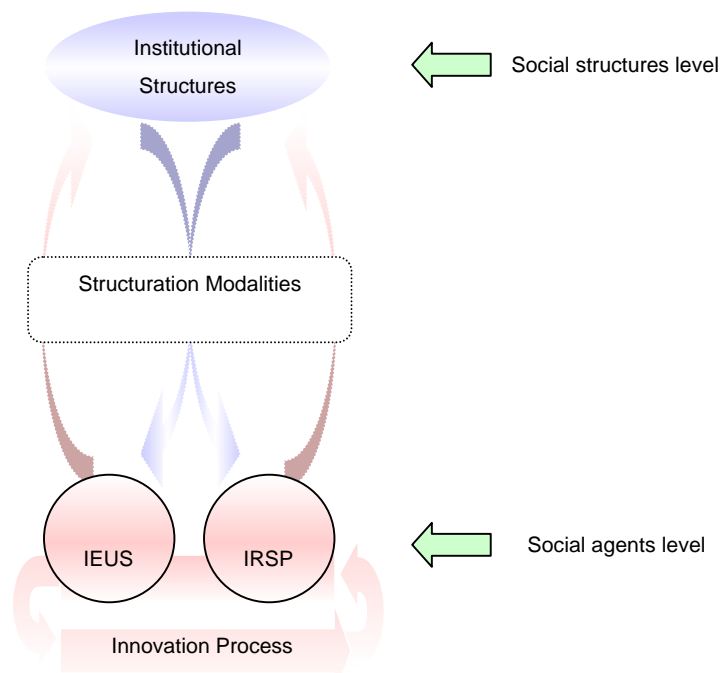
Figure 1: Process of Structuration of Internet Innovation

A CONCEPTUAL MODEL FOR EXPLORING INTERNET INNOVATION

In various studies on the development of the Internet and its infrastructures, three groups of players can be identified: regulators, providers, and users (Bekkers, 1997; King *et al.*, 1994). The first group (regulators) is composed of government organisations, which play political, regulatory or law enforcement roles constituting the institutional structures. For the second group (providers) of players, there are three types: Internet commerce services and product providers: telecom operators and IT hardware and software manufacturers. In the dynamic and uncertain Internet innovation context, they compete aggressively by mobilising specific rules (such as regulations, practice, or self-regulation principle) and resources (infrastructures, technologies or capital) that they have in their possession. Each provider tries to shape the technological development and the resulting outcomes according to their own market, socio-political positions as well as economic interests. These two groups of players form the Internet regulators and services providers (IRSP).

The last group (users) comprises heterogeneous Internet end-users (IEUS) such as businesses, individuals, or households with a diversity of needs and usually divergent interests. According to the IEUS' own objectives, interests and the subjective meaning assigned to the technology, they are capable of transforming the technological design or unintentionally changing their habits to appropriate the technology. As a consequence, the changes that occur during the IEUS adoption processes can in turn alter or reinforce the ideology, regulations, norms or infrastructures reflecting the institutional structures.

In the context of Internet diffusion study, the process of structuration occurs as a result of the mutual interactions between the realm of social agents' actions and the institutional structures via the three modalities; ideology, techno-economic resources and socio-legal norms. In structuration theory, these three modalities are respectively the meaning, resources and rules of the structured properties of social systems; as Giddens (1984) contends, they cannot be conceptualised separately.

The conceptual model presented in this paper focuses on Internet innovation. It provides a novel approach to investigate how institutional structures (ideology, infrastructure, laws) influence the social agents adoption patterns; and in turn how the social agents' adoption patterns have the capability to reshape the institutional structures. The proposed model challenges perspectives on technological innovation based on a view that it is linear and that change are determined simplistically by either technological or social forces. It is rather a

combination of both social and technological innovation processes, which mutually influences the course of change in a dynamic and unpredictable way.

According to the above model, Internet innovation is conceptually seen as uncertain and driven by social agents' conflicting meanings and motivations. Its success depends on the dynamic political, economic and social processes involved in the diffusion and adoption patterns. The model operationalises structuration theory for studying Internet diffusion and integrates the institutional perspectives by exploring how social agents' actions are conditioned by and in turn reshape the wider institutional structures in society. With particular reference to the Vietnamese case study, the above conceptual model has been developed to address the following central questions: how do the institutional structures such as the official ideology, technological infrastructures, and socio-legal rules shape social agents' adoption patterns; What are the social agents' adoption patterns; and how do these adoption patterns in turn reshape the institutional structures?

APPLICATION OF THE MODEL TO STUDY INTERNET DIFFUSION IN VIETNAM

After more than ten years of economic reform and renovation under the slogan battle of "Doi Moi", on March 5th 1997 the Vietnamese government promulgated the Degree 21/CP that officially and legally authorised Internet connection in Vietnam. On November 19th 1997, the sole Internet access provider Vietnam Data Communications Corporation announced the official launch of public access to the Internet in Vietnam. However, general public Internet subscriptions were only available in late December 1997 (Dang, 1999). Vietnam was one of the latest countries in the world to join the global network (Zakon, 1999). At the end of November 2001, four years after the legalization of the Internet, Vietnam Post and Telecommunications officially announced that only about 160,000 users (around 0.2% of the population) had subscribed to the Internet (Tran, 2001). For a country with a population of approximately 80 million, and an adult literacy rate of 94 per cent (UNDP, 2001), the results constitute a profound opportunity for reflection for policy-makers, who always consider and promote IT as a lever for the country's economic development. The above conceptual model can be used to explore new understandings of questions such as: Are the Vietnamese' attitudes towards technological innovations different from other countries? Do the socio-cultural or economic factors determine such outcomes? Are the institutional structures, the legal system, and technological policies influential shaping forces of such a diffusion rate?

In developing countries, institutional factors are ubiquitous and important to study in any effort to understand or explain IT diffusion crossing organizations' boundaries (King *et al.*, 1994; Montealegre, 1999; Peha, 1999). Indeed, according to several authors (Goodman *et al.*, 1994; Blanning *et al.*, 1997), governments play a major role in building the national information infrastructures (NII) (ITAA, 1993) because most them would have been impossible without governmental support and financing. Regarding technological innovation, government policy may range from simply acknowledging its importance to formally mandating its use through rules and regulations (King *et al.*, 1994).

From a conceptual perspective, ideology is the enduring dominant shared beliefs and thoughts reflected in the institutional policies. It is also the shared meanings, which social agents draw upon during the interactions and whereby they justify their actions. According to Mackay and Gillespie (1992), intentionally or not on the part of the producers or providers, technologies are 'encoded' with functions or symbols, which embody particular ideology leading to specific forms of use.

Although a particular ideology leads to specific forms of use, the adoption of a technology cannot be entirely separated from its techno-economic factors (Mackay and Gillespies, 1992) or without taking into account the constraint imposed by the limitations of the material dimension (Schneider, 1997). In fact, excessive telecommunication charges and Internet access fees set by regulators and network operators can seriously hamper Internet diffusion (Bezanson *et al.*, 1999). Additionally, other important impediments to Internet diffusion are the poor telecommunications infrastructures (Goodman *et al.*, 1994; Wu, 1996) and the difficulty and time taken to gain access to them (Palmer, 2000). These techno-economic factors are the resources, which can enable or constrain social agents' adoption patterns.

Alongside the resources, numerous authors (Goodman *et al.*, 1994; Schneider, 1997; Wu, 1996) argue that socio-legal norms also play an important role. In developing countries, bureaucratic hurdles, inefficiency, jurisdictional conflicts among institutional agencies and the lack of coordination can also impede Internet development (Wu, 1996). The fear of sharing information locally and cultural factors such as the preference for personal face-to-face communications constitute obstacles to Internet diffusion (Goodman *et al.*, 1994). High illiteracy rate, limited computer skills and the lack of technical expertise (Goodman *et al.*, 1994; Wu, 1996) are other inhibitors to its diffusion. These socio-legal norms are habits, practices, or regulations that govern social agents' appropriate and legitimate social conducts and hence can potentially influence the social agents adoption patterns.

In sum, technology is not merely technical development; it is always a result of complex political, economic and social interactions (Hong, 1995). As a consequence, socio-economic and political forces are inextricably linked to nations' technological policies, and no technology however autonomous can be developed out of the economic, socio-political context (Bekkers, 1997). Therefore, in studying technological innovations, researchers should take into account all the previously discussed dimensions.

FRAMEWORK FOR PRACTICE

At the end of the last century, the Internet and its associated technologies created a paradigm shift in the conduct of commerce in goods and services. Nations, regional and supranational organisations around the world launched initiatives and proposed frameworks to promote Electronic Commerce (APEC, 1999; European Union, 1997; OECD, 1998; 1999; United States, 1997).

Internet diffusion is a contemporary phenomenon in societies. To understand the institutional role in Internet diffusion in Vietnam, it is useful to compare the Vietnamese Internet development policy with the E-commerce development strategy of other nations. Among the most advanced countries, the United States has the largest number of Internet users in the world (APEC, 1999; OECD, 1998; 1999). Its 'Framework for Global Electronic Commerce' (United States, 1997) suggests a set of principles, and guidelines to facilitate the growth of E-Commerce and used as a basic reference frame. This framework also endorsed by developed nations such as Australia (AU-US, 1998) or Japan (JP-US, 1998), as well as developing countries like Colombia (CO-US, 2000) or the Philippines (PH-US, 2000) as guidelines and principles to promote and foster the global diffusion of Electronic commerce.

As discussed earlier, structuration theory provides a useful guide in grasping the ideological, technological and socio-legal dimensions and interprets them in the conceptual language of structural shared meanings, rules and resources. Although it is not clearly noticeable, in promoting the global diffusion of the Internet, the United States (1997) 'Framework for Global Electronic Commerce' exhibits specific ideological belief, technological assumption and socio-legal conviction. From a structurational perspective, the meanings, resources and rules are articulated respectively from the ideological, technological and socio-legal dimensions of the United States (1997) framework. The application scope of the analytical framework is confined to the key elements suggested in the 'Framework for Global Electronic Commerce' (United States, 1997) as presented in Table 1.

The ideological dimension of the framework reflects the dominant beliefs of the institutional structures, which recommends a non-interventionist doctrine with decentralised governance and industry self-regulation principle. As Bekkers (1997) points out, this main ideological thought was emphasised in the United States' National Information Infrastructure (NII) (ITAA, 1993) initiative launched in 1993. According to the normative perspective of the framework, the role of governments should be rather limited, and E-Commerce development should be primarily market- driven and a '*laissez-faire*' policy is seen as a necessary condition for its speedy diffusion.

The techno-economic resources dimension of the framework addresses the technological infrastructure perspective to support the broadest possible free flow of information nationwide and across nations. It encourages interoperability in ensuring competition to improve information technology and communication infrastructures, electronic payment and

security systems, offering a diversity of customer choice at lower prices and higher services quality (United States, 1997).

The socio-legal rules dimension of the framework prescribes the regulations and practice perspectives to encourage genuine market opening and competition. It urges industry self-regulation principles and promotes private enterprises in the market place to define and articulate most of the regulations that govern E-commerce development. It also advocates an adequate legal framework to deter fraud and theft of intellectual property (United States, 1997).

Structural properties	Domination	Signification	Legitimation	Level of Analysis
	Structuration Process	**Structuration Principles**	**Structuration Principles**	
	Coping with the Internet innovation, through the installation of resources in the techno-economic dimension, the structural properties recast the domination	Coping with the Internet innovation, through the communication of meaning in the ideological dimension, the structural properties reshape the signification	Coping with the Internet innovation, through the implementation of rules in the socio-legal dimension, the structural properties reinforce the legitimation	Social Structures level
Modalities	**Techno-economic dimension**	**Ideological dimension**	**Socio-Legal dimension**	
	ICT Infrastructures to support free flow of information	*Decentralisation Governance*	*Genuine Market opening, Competition*	
	Power	**Communication**	**Sanction**	
	Innovation adoption patterns	Innovation adoption patterns	Innovation adoption patterns	
Social agents Interactions (IEUS, IRSP)	Interacting with the resources in the techno-economic dimension insinuates the following patterns: appropriation, rejection, or adaptation of the resources in the adoption process.	Interacting with the meaning in the ideological dimension insinuates the following patterns: conviction, justification, or acceptation of the spirit in the adoption process.	Interacting with the rules in the socio-legal dimension insinuates the following patterns: competition, cooperation, or integration of the rules in the adoption process.	Social agents level

Table 1: Internet innovation analytical framework

Using a comparative basis, the previous normative aspects of the framework can be referred to examine Internet innovation pattern in different countries. They are relevant to the study of Internet diffusion and gain acceptance from many developed nations and developing countries around the world (AU-US, 1998; JP-US, 1998; CO-US, 2000; PH-US, 2000). Thus, by comparing research findings to the previous normative perspectives of the framework, potential similar patterns or contrasting evidences can be identified for the study of Internet

innovation in other countries. Consequently, more coherent and conclusive explanations can be provided and reliable generalisations can be formulated.

RESEARCH METHOD

Vietnam is a developing country in transition to a market economy and the Internet as a technological innovation was introduced less than 5 years ago. At the time of writing, there is still a paucity of studies on this research topic. A review of the literature in 1999-2000 located no studies related to the Internet or Electronic commerce in Vietnam. Only one conference paper on the telecom issues in Vietnam (Petrazzini and Bui, 1995) and few general articles that discussed about Internet in Vietnam (Dang, 1999) have been published.

Since the Internet is new in Vietnam with no or little previous research, an exploratory study is relevant to understand the Internet diffusion. As Benbasat *et al.*, (1987) suggest, case study is the most suitable approach to accomplish exploratory research projects. Similarly, according to Yin (1994), case study research is considered as the most appropriate method for conducting empirical inquiry that investigates a contemporary phenomenon within its real-life context. This method is not new for IS researchers and has received an increasing acceptance in IS research community (Benbasat *et al.*, 1987; Lee, 1989).

The study aims to explore a new approach to investigate the institutional aspects of IT innovation in developing countries; it should also provide an interesting testing ground for the robustness of structuration theory in technological innovation studies, thus offering potential theoretical and methodological reflections. In the light of the findings, it will provide an initial erudition on the diffusion of Internet in Vietnam.

Following Walsham and Han (1993), the previously exposed conceptual model is used to guide and explore the complex dynamics of Internet innovation in Vietnam. The data analytical strategy is qualitative and research findings from data analysis are related to the conceptual model and are guided by the analytical framework.

The field study for this research project was carried out during a period of three months from mid-November 2000 to the end of February 2001. Data collection undertakings, interviews and discussions have been conducted with organisations, institutions and professionals in Ho Chi Minh City.

The principal data collection technique during the field study with regards to the case study was in–depth interviews with individuals of the organisations/ institutions directly involved in activities related to the Internet services. This was complemented with documentation analysis and observations. Using an open-ended questionnaire, arrangements were made to have formal semi-structured interviews with 3 state-owned enterprises, 2 academic institutions, 8 private enterprises, and 2 professional associations. Follow-on meetings were arranged to seek supplementary information, data sources, which were unanticipated in the initial plan. When allowed, reports, as well as institutional unpublished documentation were solicited and consulted during field study visits and interviews. Other interviews were also conducted as informal discussions on an *ad hoc* basis with IT professionals, lawyers, public servants and Internet users. Additionally, to gauge the influence of the institutional structures, longitudinal data (such as GDP, telephone density, Internet connectivity, access pricing, legal environment, etc.) with respect to the economic situation, the existing technological infrastructure and the related institutional environment were taken into account in the structural analysis.

It should be noted that, in the specific social and political context of the Vietnamese case, gathering materials and statistical data for this project was indeed a very hard and time-consuming task due to the 'secrecy' culture and the scarcity of reliable statistical data and documentation on the topics. Most of the information was collated from numerous reports or articles disclosed in specific local trade or professional journals and the daily press.

This research project is in progress and the data collected from the field study in Vietnam is being analysed based on the previous conceptual model and analytical framework. It expected that when the conference convenes in December 2002, an initial result from the analysis of the data would be available for presentation.

CONCLUSION

In summary, this paper aims to reconcile two traditional opposing perspectives: the technological determinism and the social constructivism. In addition, it presents an integrative and cohesive approach to study Internet innovation research. It incorporates multiple perspectives to capture the rich context and analyse the dynamic process of the innovation phenomena under study. The proposed conceptual model and the analytical framework attempt to provide what has so far been lacking in the literature: an innovative model and perspective for investigating the relationships between institutional structures and technological innovation. It is also a frame to guide the design of the data collection and it will also be employed as a method of data analysis to explore the influences of the institutional structures and the social agents' interactions in relation to the Internet adoption patterns.

The emphasis of this paper is on the formulation of the conceptual model and the analytical framework. The contribution of this paper is two-fold – theory and practice. Using structuration theory as a theoretical research background, this paper has offered a conceptual framework that is useful for understanding the complex phenomenon of Internet innovation in developing countries. In terms of practice, from the research findings, scholars in the field could benefit from new understandings on how institutional structures influence innovation diffusion in developing countries. This will assist policy-makers to formulate consistent and effective strategy to promote technological diffusion.

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