PUBLIC IT POLICIES IN LESS DEVELOPED COUNTRIES: A CRITICAL ASSESSMENT OF THE LITERATURE AND A REFERENCE FRAMEWORK FOR FUTURE WORK

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ABSTRACT

How well do extant diffusion models originating in developed countries explain adoption of information technologies in less developed countries? What is the current status of the literature with respect to public IT policies? The authors explore the literature on public IT policies to answer these questions. Findings indicate that, due to differences in environmental factors, existing models may not be readily applicable to less developed countries without careful consideration of the structural differences between developed countries –where most models originated– and less developed countries. Within extant studies of public IT policies, this article identifies typical research characteristics – e.g., case study methodologies, single country selection, single project scope, and little theory development. Finally, an integrative framework for the rationalization of existing models is proposed.

Keywords: Public IT policy; less developed countries; least developed countries, diffusion models; IT policy framework; IT policy impact

INTRODUCTION

Public IT policy has emerged as an important arena for studying global IT, especially subsequent to the rapid and irresistible trend toward globalization. The imbalance of study efforts between developed countries and less developed countries has resulted in our having relatively little understanding about the phenomenon of national IT policy in less developed countries (Palvia, 1998a: 1998b). The relatively few extant studies about public IT policies in less developed countries contribute little to theoretical development and the results from these studies are not cohesive.

Given (1) the increasing interdependencies between international communities, (2) urgent needs to balance the economic development between developed and less developed countries, and (3) growing levels of multinational investment in less developed countries, more attention should be directed toward the domain of public IT policies in less developed countries. Continuous research efforts are necessary to push the envelope of the theoretical development and investigate and resolve inconsistent results.

In this paper, we conduct an assessment of existing literature in a delimited set of journals to shed light on the work to date to advance theory, and direct future research. Believing that it is also crucial to identify the important factors in the context and the relationships between public IT policies and these factors, we also conduct a meta-analysis of prior relevant research in the IS literature and propose an integrated and generalizable framework for future studies of public IT policies in less developed countries.

The Emerging Fields In Global IT Studies

There is ample evidence that global IT has been accepted as a critical arena for academic study (Kumar & Basu, 2002). This evidence is in journals, birds-of-a-feather research communities, conferences, and educational programs. First, there are established journals specializing in global information technology — journals such as the *Journal of Global Information Technology Management (JGITM), Journal of Global Information Management (JGIM),* and the *Electronic Journal of IT in Developing Countries (EJITDC*). Moreover, there is the occasional publication of work on global issues in mainstream IS journals. Second, educational programs on global IT management are well established throughout all tiers of colleges and universities worldwide. Finally, research groups such as CCRIS (Cross-Cultural Research in Information Systems) and GITMA (Global Information Technology Management Association), and conferences such as the Conference on Global IT Management (GITM) plus specialized conferences on global topics — all indicate high levels of interest on the part of a group of IS scholars.

Two important subfields have emerged as a consequence of globalization of both the academic discipline itself (i.e., the international integration of the academic community) and research within global IT studies (i.e., the study of IT in global contexts). They are: (1) the study of IT in less developed countries and (2) the study of the impacts of public IT policies. The increasing importance of these subfields is reflected in the appearance of

dedicated conferences as well as special tracks in mainstream conferences (e.g., ITCD[1] 2001, 2002, and 2004, ICIS 2002, AMCIS 2003).

IT In Less Developed Countries

In his survey of research of emerging issues in the field of global information technology, Palvia (1998a; 1998b) points out the imbalance in the numbers of scholarly studies on advanced and less developed countries. He argues that research focusing on less developed regions is critical to identify the key IS issues in these area. Trends toward globalization, escalating interaction between countries, and increasing international expansion of multinational companies (MNC) also reinforce the desirability of conducting more (and better) research in this emerging area. The present study, therefore, focuses on less developed countries, including those that are the least developed.

There is no clear definitional line of demarcation between developed and less developed countries since international agencies use different classification schemes with which to categorize countries. To define a practical scope for the current study, our research excludes most European and North American countries, Australia, and Japan. Some countries included might also be somewhat controversial. For example, even though Singapore and Ireland may now be thought of as developed countries, they were included because prior research studying these countries tended to treat their experiences with public IT policies as valuable lessons of transitioning from a less developed to a developed class. In this paper, "less developed countries" refers to classes of countries that includes those in the developing, emerging markets, and least developed status as well as older and politically incorrect terms such as second and third world and underdeveloped/undeveloped.

Governmental IT Policies

The critical dimensions for global IT issues identified by Palvia (1998a; 1998b) encompass country environmental characteristics such as national developmental priorities, labor markets, and the political environment. Two different and separate streams of work show the relevance of IT policies for the business community.

It is clear that, on the one hand, there is a group of researchers who focus on environmental factors of a country and its government actions. These researchers have shown that IT policies are not only an important catalyst of social and economic development (Trauth, 1999), but may also be swayed by institutional leaders, amongst whom are leaders of the business sector. The appropriate role of institutions and particularly government and quasi-governmental institutions in facilitating successful IT innovation has yet to be determined in spite of King et al.'s early work (1994). Nevertheless, governmental policy is probably one of the most important factors that still needs careful study (Dasgupta, Agarwal, Ioannidis, & Gopalakrishnan, 1999; King et al., 1994).

[1] The Conference on Information Technologies, Communications and Development (ITCD) has been held annually in Kathmandu.

On the other hand, it can be noted that another stream of IT adoption (and particularly that of IT transfer) focuses on the influence that these environmental factors have on the efficacy of businesses. For example, some researchers have found that more liberal environments (defined as less restrictive import policies) lead to higher IT adoption and planning efficacy.

METHODOLOGY

Critical Analysis Of The Literature

Due to the rapid emergence of global IT research and its consequent variety, Fagan (2001) has argued for the need to consolidate and provide direction for future research. One of the suggested approaches is through a meta-analysis of empirical evidence to identify the knowledge gap and the opportunity for future research.

For the research reported here, we engaged in an assessment of relevant works from selected journals over the last 10 years. For the selection, we looked at mainstream publications and at those that specifically focused on international issues (see Table 1).

Table 1. List of publications

Selection of Mainstream Journals
Management Information Systems Quarterly (MISQ)
Information Systems Research (ISR)
Journal of Management Information Systems (JMIS)
Information and Management (I&M)
Management Science
Selection of Internationally-Oriented Journals
Journal of Global Information Technology Management (JGITM)
Journal of Global Information Management (JGIM)
Electronic Journal on Information Systems in Developing Countries (EJITDC)

Research Scope

From these publication venues, we examined those articles that discussed public IT policies. We not only selected studies that focused on IT policies as the main unit of analysis, but also reviewed those that considered IT policies as independent or context variables (i.e., those that posited or found any relation between IT policies and business performance, regardless of the main focus of the paper). The purpose of our study is not to report on all the activity in the field no matter where in the literature on policy it may have appeared, but instead to provide an overview and an integrative framework for future reference and use. In this sense, we narrowed our selection to those papers that were representative of the dominant paradigms in the domain (see Table 2).

Table 2. Studies Examined in the Analysis

Study	*Methodology*	*Geographic setting*	*Study focus*
King et al., 1994, ISR	Conceptual	World	Institutional perspective
Nidumolu et al., 1996, MISQ	Case Study	Arab (Egypt)	Interpretive approach
Dologite et al., 1997, JGIM	Multi-case study	Asia (China)	Descriptive. State owned companies.
R. Jain, 1997, JGIM	Case study	Africa	Large system implementations in developing countries
Lai et al., 1997, JGIM	Survey	Asia (Singapore)	Organizational oriented. Public policy is a context variable
Wan and Lu, 1997, JGIM	Case Study	Asia (China)	Legal issues
Hassan, 1998, JGITM	Case Study	Arab (Pakistan)	SW industry development. Skill sets available in the government for the design of policies.
R.Gibson, 1998, JGIM	Multi-case Study	Latin America	
Wong, 1998, ISR	Case Study	Asia (Singapore)	Country specifics are significant.
Loh et al., 1998, JGIM	Conceptual	World	
Mennecke and West, 1998, JGIM	Conceptual	World	GIS for DSS
Siowck-Lee, 1998, JGIM	Case study	Africa (Malaysia)	Descriptive
Davis, 1999, JGITM	Case Study	Latin America (Regional)	Assessment of national ICT capability building
Enns, Huff, 1999, JGTIM	Case Study	Asia (Mongolia)	Challenges for IT implementation
La Rovere	Case Study	Latin America (Brazil)	Reform of the telecom sector
Mockler, Dologite, Chen, Fang, 1999	Field Study, Multi-Phased	Asia (China)	Factors that the diffusion of IT: Political and economic factors, ownership, and competitive environment
Dasgupta et al., 1999, JGIM	Survey.Multivariate regression analysis	Asia (India)	Organizational oriented. Examine the determinants of process-based information technolgoy adoption. Liberal-Restrictiveness of public policies are a variable
Montealegre, 1999, JMIS	Multi-case study	Latin America	Process oriented.
Niederman, 1999, JGIM	Meta Research. Conceptual	World	"*National and Regional policies to support technical and human resource infrastructures" as* an area of exploration
Trauth, 1999, JGIM	Ethnography	Ireland	IT labor force development
Watad, 1999, JGIM	Case Study	Latin America (Colombia)	Exploratory. Municipal (city/county) level
Tallon, Kraemer, 2000, JGITM	Longitudinal case study	(Europe) Ireland	IT policy, industrial development, IT diffusion, and economic payoffs.
Malhotra, 2000, JGIM	Conceptual	Asia (Israel) as illustration	Measure of national intellectual capital
Meso and Duncan, 2000, JGIM	Longitudinal quantitative analysis.	Least developed countries (LDCs) only	Macroeconomic

Table 2. Studies Examined in the Analysis

Study	*Methodology*	*Geographic setting*	*Study focus*
Scheepers and Mathiassen, 2000, JGIM	Proposal for Action Research	Africa (South Africa)	Transfer of a model for Scandinavia to South Africa.
Hunt, 2001, EJISDC	Case Study	Latin America + Carribean (LAC)	Telecentre development in LAC
Braa et al., 2001, EJISDC	Survey	Africa (Mozambique)	Integrated effort for ICT development.
Dedrick, Kraemer, 2001, EJISDC	Case Study	Asia (China)	Assessment of China's environment with respect to ICT.
Darley, 2001, JGITM	Use secondary data for analysis	Africa, Sub-Saharan Area (Regional)	Organizationally oriented. Public policy is a context variable, controllable through lobbying.
Aladwani, 2001, JGITM	Survey	Arab (Kuwait)	Organizational oriented. Public policy is a context variable; "liberal" IT policy explored
Jennex and Amoroso, 2002	Case Study	Ex Soviet Union (Ukraine)	E-Business and technology issues for developing economies
Fleming, 2002, EJISDC	Case Study	Africa (South Africa)	Technology influence on democracy development
Mbarika, 2002, EJISDC	Conceptual	Africa (LDCs), Regional study	Teledensity as the precursor for diffusion for IT in Africa's LDC
Davis, McMaster, Nowak, 2002, EJISDC	Case Study	Asis (Fiji)	Supply of IT-enabled services by a developing country
Idowu, Alu, Adagunodo, 2002, EJISDC	Survey	Africa (Nigeria)	Effect of IT on the development of banking industry
Nair, Prasad, 2002, EJISDC	Case Study	India (Just a state)	Emphasize the need to mobile additional resources for IT policies
Shakya, Rauniar, 2002, EJISDC	Case Study	Asia (Nepal)	Consideration of cultural issues.
Mujahid, 2002, EJISDC	Case Study	Arab (Pakistan)	Various digital opportunities for development when applying ICT
Joia, Zamout, 2002, EJISDC	Case Study	Latin America (Brazil)	Obstacles & constraints for E-Government initiative
Mbarika, Musa, Byrd, McMullen, 2002, JGITM	Survey	Africa (LDCs), Regional study	Teledensity
Travica, 2002, JGITM	Case Study	Latin America (Costa Rica)	E-Commerce diffusion in Costa Rica
Iyer, Taube, Raquet, 2002, JGITM	Conceptual	World	E-Commerce strategy

STUDIES OF PUBLIC IT POLICIES IN DEVELOPING COUNTRIES

Existing Frameworks

Most researchers agree that circumstances in less developed countries are different than those in developed countries to the extent that some models –if not most– cease to hold in varying contexts. Nevertheless, few models have been created to frame the role of public IT policies in these countries, even under contingent circumstances. Following are short discussions of those few models or theories that do undertake an effort at explanation.

IT Diffusion And Adoption

Mockler et al. (1999) applied Cooper and Zmud's diffusion model (1990) to explain the IT diffusion in China. Mockler et al. presents an evolutionary process model in six stages: initiation, adoption, adaptation, acceptance, routinization, and infusion. Based on McKenney's IT adoption process model (1994), Montealegre (1999) conceived a temporal model to institutional influence on the adoption of Internet in less-developed countries. Carrying these concepts forward, Wong's case study about Singapore (1998) reveals the evolutionary nature of their governmental IT policies. *In toto*, these studies all point to the assumption that governmental IT policies represent an evolution of nations toward a developed status via stages. Thus, if correct, the formulation of governmental IT policies should be based on the progress of IT adoption and diffusion in a given country and the level of maturity of the IT development. In short, a policy that might be effective during one evolutionary stage might not be appropriate or might not work in another stage.

Institutional Framework

King et al. (1994) utilize an institutional perspective as a lens to explain innovation at the industry, national or regional levels. They introduce two basic frameworks. The first is a taxonomy of those institutions with influence over IT policies. Second is a classification framework of policies based on two dimensions: the normative character of the policy (i.e., regulatory or "influential") and the market mechanism (i.e., demand pull or supply push).[2] Further they present a taxonomy of policies.

Intellectual Capital

For explaining the level of intellectual capital and its effects on public IT policy, Malhotra (2000) applies Edvinsson and Malone's model of intellectual capital (1997) to national environments. Malhotra's intellectual capital approach to understanding a nation's human resource and knowledge assets asserts that knowledge is a key lever for economic growth and performance. The article, however, presents only one illustration as evidence.

[2] This represents an interpretation, but not an unreasonable one, we think, of King et al.

Specialized Models

Besides these generic modeling approaches, other researchers have developed specialized and unique models of institutional influences and applied these to developing or lesser developed countries. Meso and Duncan (2000), for example, utilize an information infrastructure index to measure national information infrastructure, which is then used to predict social development (measured by a national development index).

Nidumolu et al. (1996) apply an interpretive approach to frame the deployment of IT policies in Egypt. They use three different perspectives (functional, political/symbolic, and social information processing) to explain the adoption of IT by local governance. These perspectives have varying explanatory power across the development stages of the system (implementation, evaluation, transformation).

Dasgupta et al. (1999) examine the adoption literature and extract constructs from sundry existing frameworks. They classify these into environmental and organizational factors, concluding that factors that influence information technology adoption are similar in developed and less developed countries, although the magnitudes of the relationships – and in some cases the directionality– differ (e.g., management information systems personnel has a negative rather than a positive impact on adoption).

Jain (1997) concludes that existing diffusion models may not be applicable to diffusion of large public information systems in the least developed countries. She develops a process model that includes environment building, matching organization and technological elements, and widespread use of technology. The model is then applied to the analysis of a public IS in India.

Research Practices In IT Policy Studies

In our review of the literature, we found only a handful of studies published in mainstream IT journals. This argues quite convincingly that the study of public IT policies is still a niche area within the IS field.[3] This may be due to the following reasons: (1) public IT policies are outside the scope of the publication,[4] (2) there is little theory development, and (3) most studies are case-based with low generalizability of results.

Nevertheless, one of the few IT policy studies published in the mainstream, King et al. (1994), makes a strong case for why public IT policies are so central to understanding the organizational environment. We endorse this premise via a framework for assessing the literature, presented later in this paper. This framework suggests that organizations

[3] It may well be that this domain will always be a niche area in IT studies. This is not a judgment, since the field as a whole has, rightly so, such a wide range of concerns. Nevertheless, the difficulties of carrying out global IT research may, *per force*, limit the involvement of IT researchers, and find this a select study domain for a select group of researchers well into the future.

[4] This reason seems less likely, but may have a more subtle effect on submissions and acceptances.

should be concerned with public IT policies, both because the policies are a critical part of their environment and because organizations can have a strong say in the creation and deployment of these policies.

As remarked earlier, frameworks originating in and applied to developed countries do not necessarily work well in less developed countries, primarily due to contextual differences, e.g., teledensity, literacy, role of/dependence on international institutions, etc. These differences motivate studies in less developed countries that aim to validate or falsify existing models. However, given that differences occur not only within and among developed countries – where such theories originated – but also within and among less developed countries, the degree of generalizability of any theory is bound to be limited.

In order to cope with this limitation, researchers opt for case study approaches, in many cases lacking even the aspiration to develop theory from the cases (Yin, 1994). The purpose of such studies seems mainly to enhance knowledge of existing possibilities and hazards. As a result, most studies are single-country and even single-project (e.g., a particular GIS implementation). Few findings are the result of quantitative analysis and only a handful present any sort of working framework (either applied or emergent).

Government Interventions In IT Development

The role of institutions in the development of IT capabilities varies from country to country, depending on, among other factors, the economic development of the country under scrutiny (i.e., on whether it is developed, developing or lesser developed). In most less developed countries, domestic for-profit organizations and individuals are typically less involved in the process (intended or emergent) of development of IT capabilities; the government is usually the most active agent. The proactive stance of the government of Singapore, for example, was the most critical factor in shaping economic development through IT related policies (Wong, 1998). Similarly, the Irish government's IT policy beget a healthy IT industry (Tallon & Kraemer, 2000; Trauth, 1999).

In other countries, however, governmental IT policies exert much less influence. In most of the least developed countries, regional agencies –usually industrial or professional associations– or international agencies, e.g., United States Agency for International Development (USAID), United Nations Development Programme (UNDP), have played the most significant role in shaping IT infrastructure and capabilities, to the point that they often become the central architects of national information infrastructures. In his research into e-Commerce development in Spanish-speaking Latin America, Davis (1999) asserts that the development of electronic commerce was initiated by regional or international agencies. Similarly, international agencies, rather than the domestic government, initiated the Pan African Telecommunication Network (PANAFTEL) (Mbarika, Musa, Byrd, & McMullen, 2002).

Governmental limitations in less developed countries are due to several factors. First, unlike most developed or industrialized countries, less developed countries usually have limited resources, preventing them from taking on initiatives that require large-scale

investments. Therefore, a collaboration among regional and international partners is needed to achieve political economies of scale, for instance, by sharing resources for joint development projects. Furthermore, governments often lack the technical expertise required to formulate appropriate and effective governmental IT policy. This fundamental issue has not been extensively addressed in the literature although, in a study of the software industry in Pakistan, Hassan (1998) did raise and briefly discuss the issue.

But the differences between developed and less developed countries are not limited only to the development of information capabilities (see Table 3). Governments in industrialized countries not only participate actively in the development of IT capabilities, but also invest heavily in IT-related research. Given the limitations mentioned before, less developed countries are much less capable of such investments.

Table 3. Differences with Respect to IT Policy Setting

Policy Intervention Component	***Developed Countries***	***Less Developed Countries***
Initiator for policy making (mostly)	Domestic Government	Regional or International Agencies
Attitude of the government	Proactive	Passive or reactive
Investment purpose	Invest in both research knowledge and IT infrastructure	Invest mostly in IT infrastructure
Typical capabilities of the government	Has both technical and financial capabilities	Lack of technical skills, financial limitations
Position with respect to standards	Standard Setting	Standard Following

Reviewing the role of governments formulating public IT policies, we found that governments in advanced technology nations took more proactive positions in creating environments or platforms in which economic development could take place efficiently. Governments in under-developed countries usually played a rather passive or reactive role and tended to rely on regional or international agencies.

Characteristics Of Successful And Unsuccessful IT Policies

Some characteristics emerge from the literature as leading to the success or lack of success of IT policies (see Table 4). These traits appear in the *most successful* countries, such as Ireland or Singapore, whereas few *unsuccessful* countries are associated with any one of those traits.

First, case studies of the most successful examples of economic development in less developed countries show that these countries committed to long term capability-building perspectives in the development of their IT policies. Ireland has depended heavily on foreign investment to transfer funds, knowledge, and skills (Tallon & Kraemer, 2000; Trauth, 1999) and so has China (Dologite, Fang, Chen, Mockler, & Chao, 1997; Mockler et al., 1999). It was their strategy to transfer the IT capability from advanced countries

through infusions of such foreign resources. Their IT policies all emphasized the building of human resources development, an infrastructure, and coordination between policies. As a consequence, these countries were able to reduce their reliance on foreign expertise and build their own capability and strength for the long term.

Second, short-term IT policies led to future reliance on foreign resources and assistance in development, as was the case of the telecom network in Africa (Mbarika et al., 2002). By focusing on consumption rather than production of IT (Gibson, 1998), this over reliance on foreign assistance, in turn, contributed to the formulation of policies that do not adequately address the real needs of these countries,

Third, studies also show that governments must be flexible in adapting their IT policies to the shifting environment in order to accommodate the rapid rate of technological international competition. In the multi-case study conducted by Montealegre (1999), empirical evidence showed that adaptive institutional, including governmental interventions, led to successful IT adoption in four Latin American countries. Case studies in Singapore (Wong, 1998) and Ireland (Tallon & Kraemer, 2000; Trauth, 1999) also highlight policies that changed over time in response to new environmental contexts and needs.

Finally, the intermeshing of IT policies and other concurrent policies is another critical formula for national success. The tight intertwining of IT policies, infrastructure construction programs, education programs, economic development projects, and funding mechanisms — working together as a cohesive building force — helped countries like Ireland, Singapore, Korea, Costa Rica, and Taiwan achieve successful economic development. On the other hand, unsuccessful cases of IT policy implementation in the Ukraine (Jennex & Amoroso, 2002), Pakistan (Hassan, 1998), and Africa (Mbarika et al., 2002) show distinct symptoms of a disconnect between IT policies and other concurrent activities.

Table 4. Success Factors in IT Policies

Successful IT Policies	***Unsuccessful IT Policies***
Long-term oriented	Short-term oriented
Capability-Building	Resource-Consumption
Adaptive	Less-responsive
Collaborative	Non-collaborative

An Integrative Framework

IT policies are intended to boost diffusion and/or adoption of IT as a means of achieving social and economic development. Therefore, it is reasonable to apply extant models to explain their outcomes. It must be kept in mind, though, that extant diffusion models have been developed with individual and organizational levels in mind, but not the public level (Rogers, 1995). Watad (1999) points out, for example, that factors such as top management support are not as influential in highly bureaucratic environments (e.g., governmental) as they are in more flexible environments (e.g., organizational), hindering the generalization of the those models to public settings.

More so, since most existing diffusion and adoption models were invented in developed countries, the application of these models to less developed countries is dependent on a careful use of the model and the potential impact of the new conditions on it. Following, we present an integrated framework that would help perform such an analysis.

An Integrative Framework for Setting Public IT Policies

One conclusion that can be drawn from the work reviewed thus far is that the IT research efforts in exploring the origin and effects of public IT policies has led to an incohesive set of implicit propositions and elements. To remedy this conundrum, we propose the integrative framework in Figure 1. This framework allows future studies to position themselves with respect to explanations of IT policies. The framework considers the interactive nature of the process, the actors engaged, and pertinent constructs. The direction of the arrows is indicative of the interaction between sundry stakeholders and actors and the public environment.

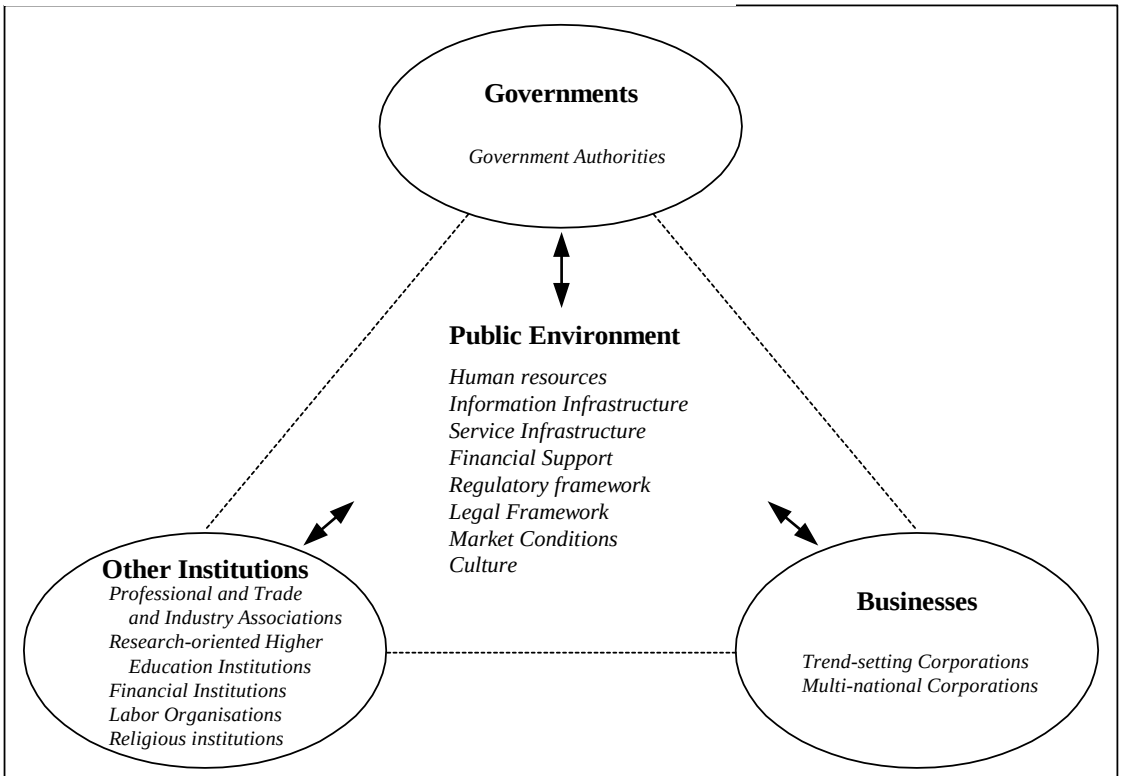
Actors

First of all, it should be noted that all institutions included in King et al.'s taxonomy (1994) are represented in the model. Business and governments are the main actors in the model (and therefore explicitly identified), while other institutions play stakeholder roles that differ in importance across contexts. It is clear, for example, that religious institutions play a more critical role in Arab countries than they do in Latin American countries. So the framework allows for this influence, but does not insist on its presence in every case. Similarly, international agencies have stronger presence in the least developed countries, and their influence will be felt more so even than in less developed countries.

Public Environment

Human resources, information infrastructure, services infrastructure, financial support, regulatory framework, legal framework, market conditions and culture are implied in most IT adoption models. This section describes these environmental characteristics and how they vary across countries.

Figure 1: Meta-Framework of IT Policies



Symbol	Factors	Explanation
⟷	**Processes**	Bi-directional interactive processes represent that institutions affects and are affected by the environment.
----------	**Networks**	Relationships between institutions form relational social networks.
⬭	**Actors**	All institutions included in King et al's (1994) taxonomy are represented.

(1) Human resources

The supply of knowledge workers tends to be lower for less developed countries due to education constraints; i.e., they display lower education indices (UNDP, 2003). On the other hand, demand also tends to be lower due to lower economic activity.

(2) Information infrastructure

Less developed countries exhibit low teledensity [in (UNESCO, 1999)], poor connection quality, and insufficient power supply, all of which lead to low economies of scale in the national adoption of IT.

(3) Services infrastructure

Less developed countries have inferior services infrastructures –e.g., lower credit card usage, unreliable or not-ready e-logistic services (El-Nawawy & Ismail, 1999). This variable is seldom included in IT adoption studies (specifically in e-commerce studies).

(4) Financial support

Developed countries often include technology research programs in their ecommerce strategies (UNCTAD, 2002). Technologies developed under governmental sponsorship spill into the private sector. IT diffusion in less developed countries, on the other hand, is mostly subsidized by international agencies, with fewer investments in research (UNCTAD, 2002).

(5) Regulatory framework

Less developed countries typically exhibit highly regulated contexts, such as state-owned monopolized communication services and high import costs that result from high custom duties or relative low purchasing power. Less developed countries also devote less attention to regulatory issues in the establishment of ecommerce-related policies (UNCTAD, 2002).

(6) Legal framework

Incomplete laws protecting intellectual property and unwillingness to enforce the existing laws are characteristic of less developed countries; levels of software piracy are higher for less developed countries than for developed countries (UNCTAD, 2002).

(7) Market conditions

Less developed countries have lower purchasing power (reflected in the country's GDP per capita) and lower customer readiness (e.g., lower PC literacy) to adopt IT innovation than developed countries (UNDP, 2003).

(8) Culture

Most less developed countries are characterized by non-western cultures, which creates conflicts when the western features embedded in the technologies are introduced into the culture (Straub et al., 2001).

Processes

The interactive nature of the model is represented by the bi-directional arrows that extend into and out of the institutions in Figure 1. Decisions and actions available to institutions are conditioned by the factors mentioned above. On the other hand, as institutions take action, these conditions consequentially change (Trauth, 1999). In the case of governmental interventions (i.e., policies), the delayed impact of the effect might range from rather immediate –as in the case of regulations– to considerably lagged, as in the case of national human resource building.

The framework also suggests the collaborative or synergistic aspects of governmental and other institutional interventions. Empirical studies show that the coordination of IT policies and other interventions, both governmental and non-governmental, highly influences the outcome of these initiatives (Davis, 1999; Montealegre, 1999; Mujahid, 2002; Nair & Prasad, 2002; Tallon & Kraemer, 2000).

Networks

The institutional perspective presented by King et al. (1994) not only introduces the different actors intervening in the design of policies but also implies the mechanisms by which these occur. Institutions interact, forming relational social networks. The topology of these networks varies from country to country, shaped by the factors mentioned above.

CONCLUSIONS

For the research reported here, we assessed relevant works on public IT policies in developing countries from selected journals over the last 10 years (Tables 1 and 2). Public IT policies are not only an important catalyst of social and economic development (Trauth, 1999), but may also be swayed by institutional leaders, amongst whom are leaders in the private sector (King et al., 1994). These policies, in turn, affect the actions and outcomes of businesses, e.g., more liberating environments lead to higher IT adoption and planning efficacy.

Yet, as a research domain, public IT polices is a relative new stream within the information systems discipline, and even more so is the domain of public IT policies in less developed countries. Despite its novelty, there is ample evidence of its growth as a stream in its own right. The stream merges the literatures in national (or public) IT policies, adoption of IT and IT in developing countries. There is some theory development in each of these streams, but little in the combination, i.e., IT policies *in* less developed countries. Most of the studies that do address the specific context of public IT policies in these countries are descriptive cases of IT initiatives. Only a handful of these studies attempt to put together any sort of theoretical or stakeholder framework.

Theory originating in organizational contexts or in developed countries may not be applicable to the explanation of public policy in developing countries without careful consideration of the structural differences between contexts. The contexts present in developed countries differ from those of developing countries in terms of: (1) human resources, (2) information infrastructure, (3) services infrastructure, (4) financial support, (5) regulation framework, (6) legal framework, (7) market conditions, and (8) culture.

But not only do contexts differ between developed, developing, and lesser developed countries, so too do tactical characteristics of the interventions (see Table 3). These include: (1) sponsorship of the policy (local government or some other institution), (2) attitude of the government (proactive or passive/reactive), (3) purpose of the investment (development of both research knowledge and infrastructure or infrastructure only), (4) typical governmental capabilities (wherewithal) and (5) positioning with respect to standards (standard setting or follower).

The studies analyzed suggest that there may be some characteristics common to successful initiatives, i.e., countries that succeeded in achieving economic growth through IT show that the policies they implemented were (1) long-term, (2) aimed at building capabilities, (3) adaptive to changing contexts, and (4) synergistic with other ongoing national programs (Table 4). Finally, the new and increasing interest of the research community in public IT policies has created an incohesive set of studies and models. To direct future research, we propose an integrative framework (Figure 1) to allow studies to position themselves with respect to public IT policies. The framework considers the interactive nature of the process, the actors involved, the relationships between the actors (network) and the environmental factors that affect the development, implementation and outcomes of public IT policies. The framework proposes that all of

these elements should be considered, whenever possible, in studying the influence of IT policy on economic and social development and diffusion of IT.

LIMITATIONS AND FUTURE RESEARCH

This assessment has focused on only the last ten years and on research published in a selective group of mainstream and global IT niche journals. It is possible, even likely, that work outside the field of IT would inform our understanding of where we should take future research in IT policy and its antecedents and effects. That limitation aside, this assessment is a reasonable first approximation of where we stand within the IT field in this emerging stream of work.

Also, most studies focus on IT policies at the national level, e.g., deregulation and privatization policies in the telecom industry. But there is evidence that collaboration between actors and stakeholders at a regional or international level, on the other hand, is also of tantamount importance. Furthermore, the interaction between national, regional, and international IT policies may be quite intricate. These relationships might have strong implications for the economic and technological development in these countries. However, the studies that addressed interventions by these regional or international agencies focused mainly on the localized rather than the regional impact. There is a need, therefore, for a systematic study of regional efforts with regard to IT policies and for the exact nature of the interaction between these three levels of policy.

Finally, the framework developed in this study should be subject to empirical testing and potential revision to provide deeper theoretical understanding about the IT policies in the less developed countries. This empirical research should lead to more insights for policy makers to formulate IT policies in a more effective and efficient manner.

While it is difficult to carry out global research of any sort, the arena of public IT policies can have a huge payoff in terms of growing the knowledge base for how governments bring about national change through IT. It is an arena where senior IS researchers could be instrumental in influencing government leaders worldwide on the value of IT in transforming national agendas for the better.

REFERENCES

Cooper, R. B., & Zmud, R. W. (1990). Information Technology Implementation Research: A Technological Diffusion Approach. Management Science, 36(2), 123-139.

Dasgupta, S., Agarwal, D., Ioannidis, A., & Gopalakrishnan, S. (1999). Determinants of information technology adoption: An extension of existing models to firms in a developing country. Journal of Global Information Management, 7(3), 30.

Davis, C. H. (1999). The Rapid Emergence of Electronic Commerce in a Developing Region: The Case of Spanish-Speaking Latin America. Journal of Global Information Technology Management, 2(3), 25-40.

Dologite, D. G., Fang, M. Q., Chen, Y., Mockler, R. J., & Chao, C. (1997). Information Systems in Chinese State-Owned Enterprises: An Evolving Strategic Perspective. Journal of Global Information Management, 5(4), 10-21.

Edvinsson, L., & Malone, M. S. (1997). Intellectual Capital: Realizing Your Company's True Value by Finding Its Hidden Brainpower. New York: HarperCollins Publishers, Inc.

El-Nawawy, M. A., & Ismail, M. M. (1999). Overcoming Deterrents and Impediments to Electronic Commerce in Light of Globalization: The Case of Egypt. Paper presented at the 9th Annual Conference of the Internet Society, INET'99, San Jose.

Fagan, M. H. (2001). Global Information Technology Transfer: A framework for Analysis. Journal of Global Information Technology Management, 4(3), 5-26.

Gibson, R. (1998). Informatics Diffusion in South American Developing Economies. Journal of Global Information Management, 6(2), 35-42.

Hassan, S. Z. (1998). A Framework for IT Industry Development: A Case Study of Pakistan. Journal of Global Information Technology Management, 1(4), 38-55.

ITU. (1998). World Telecommunication Indicators, 1998. Geneva, Switzerland, International Telecommunication Union (ITU).

Jain, R. (1997). A Diffusion Model for Public Information Systems in Developing Countries. Journal of Global Information Management, 5(1), 4-16.

Janssens, M., & Brett, J. M. (1994). Coordinating Global Companies: The Effects of Electronic Communication, Organizational Commitment, and a Multi-cultural Managerial Workforce. Journal of Organizational Behavior, 1, 31-46.

Jennex, M. E., & Amoroso, D. L. (2002). E-Business and Technology Issues for Developing Economies: A Ukraine Case Study. Electronic Journal on Information Systems in Developing Countries, 10(5), 1-14.

King, J. L., Gurbaxani, V., Kraemer, K. L., McFarlan, F. W., & Raman, K. S. Y., C.S. (1994). Institutional Factors in Information Technology Innovation. Information Systems Research, 5(2), 139-169.

Kumar, A., & Basu, C. (2002). Toward a Deeper Examination of Global IT Theory. Journal of Global Information Technology Management, 5(4), 4-17.

Malhotra, Y. (2000). Knowledge assets in the global economy: Assessment of national intellectual capital. Journal of Global Information Management.

Mbarika, V. W., Musa, P. F., Byrd, T. A., & McMullen, P. (2002). Teledensity growth constraints and strategies for Africa's LDCs: "Viagra" prescriptions or sustainable development strategy? Journal of Global Information Technology Management, 5(1), 25-42.

Meso, P., & Duncan, N. (2000). Can National Information Infrastructures Enhance Social Development in the Least Developed. Journal of Global Information Management.

Mockler, R. J., Dologite, D. G., Chen, Y., & Fang, M. Q. (1999). Information Technology Diffusion in Developing Countries: A Study of China. Journal of Global Information Technology Management, 2(4), 23-40.

Montealegre, R. (1999). A Temporal Model of Institutional Interventions for Information Technology Adoption in Less-Developed Countries. Journal of Management Information Systems, 16(1, Summer), 207-232.

Mujahid, Y. H. (2002). Digital Opportunity Initiative for Pakistan. Electronic Journal on Information Systems in Developing Countries, 8(6), 1-14.

Nair, K. G. K., & Prasad, P. N. (2002). Development through Information Technology in Developing Countries: Experiences from an Indian State. Electronic Journal on Information Systems in Developing Countries, 8(2), 1-13.

Nidumolu, S. R., Goodman, S. E., Vogel, D. R., & Danowitz, A. K. (1996). Information Technology for Local Administration Support: The Governorates Project in Egypt. MIS Quarterly, 20(2), 197-224.

Palvia, P. C. (1998). Global information technology research: Past, present and future. Journal of Global Information Technology Management, 1(2), 3-14.

Palvia, P. C. (1998). Research Issues in Global Information Technology Management. Information Resource Management Journal, 11(2), 27-36.

Rogers, E. M. (1995). Diffusion of Innovations. New York: The Free Press.

Tallon, P. P., & Kraemer, K. L. (2000). Information Technology and Economic Development: Ireland's Coming of Age with Lessons for Developing Countries. Journal of Global Information Technology Management, 3(2), 4-23.

Trauth, E. M. (1999). Leapfrogging an IT Labor Force: Multinational and Indigenous Perspectives. Journal of Global Information Management, 7(2), 22-32.

UNCTAD. (2002, July 2002). Electronic Commerce Strategies for Development: The Basic Elements of an Enabling Environment for E-Commerce. Paper presented at the United Nations Conference on Trade and Development: Expert Meeting on Electronic Commerce Strategies for Development, Geneva.

UNDP. (2003). Human Development Report 2003: Millennium Development Goals: A compact among nations to end human poverty. New York-Oxford: United Nations Development Programme (UNDP) - Oxford University Press.

UNESCO. (1999). World communication and in formation report 1999-2000. Paris: United Nations Educational, Scientific and Cultural Organization (UNESCO) Publishing.

Watad, M. M. (1999). The context of introducing IT/IS-based innovation into local government in Colombia. Journal of Global Information Management, 7(1), 39-45.

Wong, P.-K. (1998). Leveraging the Global Information Revolution for Economic Development: Singapore's Evolving Information Industry Strategy. Information Systems Research, 9(4), 323-341.

Yin, R. K. (1994) Case Study Research: Design and Methods. Beverly Hills, CA: Sage Publication.