

Association for Information Systems AIS Electronic Library (AISeL)

AMCIS 2005 Proceedings

Americas Conference on Information Systems
(AMCIS)

2005

The Institution ICT Economic Development Nexus: Two Cases

Nir Kshetri

University of North Carolina at Greensboro, nbkshetr@uncg.edu

Follow this and additional works at: <http://aisel.aisnet.org/amcis2005>

Recommended Citation

Kshetri, Nir, "The Institution ICT Economic Development Nexus: Two Cases" (2005). *AMCIS 2005 Proceedings*. 258.
<http://aisel.aisnet.org/amcis2005/258>

This material is brought to you by the Americas Conference on Information Systems (AMCIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in AMCIS 2005 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

The Institution-ICT-Economic Development Nexus: Two Cases

Nir Kshetri

The Univ. of North Carolina—Greensboro

nbkshetr@uncg.edu

ABSTRACT

ICT projects and institutions in developing countries superimpose in a complex interaction. The acceptance of an ICT project by various stakeholders and the contribution to economic development are functions of such interaction. In general, a successful implementation of an ICT project undertaken in a developing country requires significant institutional adjustments. Drawing upon institutional theories, this paper investigates how regulative, normative and cognitive institutions in developing countries influence the ICT-economic development nexus. We use a multiple case study research design. The findings of this paper suggests that the root causes of success or failure of ICT projects are nature of institutional components such as sanctioning and monitoring power, social norms and cognitive programs of stakeholders. We have examined interrelationships among orientation of an ICT project (economic elite centered vs. socially disadvantaged group centered); the nature of institutions and institutional adjustments associated with the project; diffusion pattern of the technology and resulting contribution to development.

Keywords

Institutions, ICT, economic development, developing countries

INTRODUCTION

Societies differ widely in terms of flexibility and acceptance of technological changes. Success rates as well as contribution to economic development of ICT projects undertaken in developing countries thus vary widely. Technological changes have occurred more rapidly in some developing countries than others (Phillips 2000). The sources of such widely disparate paths of technological change in societies have been very important but highly underresearched subject (North 1990, 6).

Obstacles facing and sources of success of an ICT project in a developing country go far beyond economics. In addition to the *costs, benefits and performance* (Franz and Robey 1984), political criteria (Franz and Robey 1984; Markus 1983) and social factors (Rice and Aydin 1991) influence ICT adoption and implementation as well as outcomes. Put differently, success of an ICT project is tightly linked to the monitoring and sanctioning powers, social norms and cognitive programs of various stakeholders.

In this paper, we seek to address the following research questions:

1. What is the nature of institutional factors that interact with an ICT project in a developing country? What are the mechanisms by which these factors influence the success of the project?
2. How can ICT projects be introduced in developing countries so as to enhance the contribution to economic development?

We draw upon institutional theories and two case studies to address the above questions. The remainder of the paper is structured as follows: The next section provides a brief overview of the methodology employed. Then, we review definitions of the term “economic development”. It is followed by a review of the literatures on institutional theory. Next, we analyze two cases of ICT projects undertaken in developing countries. Then, we discuss lessons learned from the two cases. Finally, we provide some discussions.

METHODOLOGY

There is a serious lack of well-defined concepts and theories on ICTs’ interaction with institutions in developing countries. Qualitative studies are arguably appropriate when phenomena as well as relationship among them are not well understood (Eisenhardt 1989; Parkhe 1993).

Since the objectives of the study are oriented toward theory development (Glaser and Strauss 1973) rather than theory testing, we employed a case study methodology—a qualitative approach (Eisenhardt 1989; Parkhe 1993; Yin 1994). By using analytical rather than statistical logic, case studies help understand complex phenomena (Yin 1994).

More specifically, the approach of this paper can be described as interpretive epistemology and multiple case studies to construct theory (Montealegre 1999; Orlikowski and Baroudi 1991; Yin 1989). A multiple case study design investigates two or more cases to provide insights into a condition, phenomenon, or population that can be generalized (Stake 1994).

The cases selected in this paper are ICT projects in the Andhra Pradesh State of India and OSS projects in China. These projects vary widely in terms of institutional setting such as laws, beliefs, norms, rules and conventions as well as economic factors (Table 1 and 2).

Since diverse institutional factors are embedded in the unit of analysis, primary data collection is time consuming at best and impossible at worst. Moreover, primary data cannot capture the comprehensive picture of the whole context of ICT implementation process and impacts on economic development. We thus mainly relied on data from secondary sources. For one of the projects, however, we conducted semi-structured interviews with policy makers and consumers.

Table 1 and 2 here

ICTS AND ECONOMIC DEVELOPMENT

The term “economic development” is interpreted differently depending upon the perspectives. The American Economic Development Council (AEDC) defines economic development as: “The process of creating wealth through the mobilization of human, financial, capital, physical, and natural resources to generate marketable goods and services” (Swager 1991, 3).

It is widely recognized that any definition of "economic development" must include "reduction of poverty" (Richards 2003). Development economists and international institutions such as the World Bank define “Economic Development” as “improvement in the quality of life” (e.g., Todaro 1994, pp. 14–19; World Bank 1991, p. 4; Sen 1981). It may thus be achieved by transforming increased production into augmented quality-of-life variables, such as health and literacy, as well as command over other utility-enhancing goods and services (Fosu 2004). Economic Development used in this paper is similar “human development” defined by the United Nations (1990, 9–16). Following these definitions, ICT projects that attack poverty or enhance women’s command over resources contribute more to economic development than projects that have opposite characteristics.

RELEVANT THEORIES: INSTITUTIONAL FACTORS

All economic phenomena are arguably also institutional phenomena (Parto 2005). A corollary of this statement is that ICT projects exhibit important institutional characteristics. For this reason, institutionalists have recognized that the success of an innovation is tightly linked to the context provided by institutions in an economy (Storper and Walker 1989, Sabel and Zeitlin 1997). Viewing from a rational perspective, institutions are mechanisms that provide efficient solutions to predefined problems (Olson 1965; Williamson 1975). Institutions do so by helping align individual and collective interests.

North (1990) defines institutions as the macro-level rules of the game and thus distinguishes the players (organizations) from the rules (institutions) (p. 27). Institutions can be better understood in the context of the tasks for which they were created (Holm 1995). For ICT projects, institutions guide behaviors of by mediating the relationships among various stakeholders and technologies (Russo 2001)¹.

In this article, we follow definitions of institutions suggested by Scott (1995, 2001)². Scott has conceptualized institutions as composed of three broad categories: regulatory, cognitive, and normative.

Regulative institutions

Regulative institutions consist of "explicit regulative processes: rule setting, monitoring, and sanctioning activities" (Scott 1995:35). They include regulatory bodies (such as the government of Andhra Pradesh) and the existing laws and rules (such as local procurement and anti-monopoly laws in China) that influence the success of an ICT project. These institutions focus on the pragmatic legitimacy concerns in managing the demands of regulators and governments (Kelman 1987).

Normative institutions

Normative components introduce "a prescriptive, evaluative, and obligatory dimension into social life" (Scott 1995, 37). Practices that are consistent with and take into account the different assumptions and value systems of the national cultures are likely to be successful (Schneider 1999). While regulative rules are parts of regulative institutions, social rules are components of normative institutions. Normative institutions are concerned with procedural legitimacy and require users and implementers of an ICT project to embrace socially accepted norms and behaviors (Selznick 1984).

Cognitive Institutions

Although all components of institutions are intertwined with culture (Neale 1994:404), cognitive institutions are arguably most closely associated with culture (Jepperson 1991). These components represent culturally supported habits that influence the success of an ICT projects. In most cases, they are associated with cognitive legitimacy concerns that are based on subconsciously accepted rules and customs as well as some taken-for-granted cultural account of technology use (Berger and Luckmann 1967). Cognitive programs affect the way people notice, categorize, and interpret stimuli.

Scott (1995, 40) suggests that "cognitive elements constitute the nature of reality and the frames through which meaning is made". At this point, it must be emphasized that although carried by individual members, cognitive programs are elements of the social environment and are thus social in nature (Berger and Luckman 1967). Various stakeholders of a project (e.g., people at different social classes, donor agencies, national and international policy makers, and media), however, have varied cognitive programs that influence the lens through which they view an ICT project.

TWO CASES ILLUSTRATING ICT-INSTITUTIONS-DEVELOPMENT NEXUS

Table 3 presents regulative, normative and cognitive institutions that influenced the two projects selected in this paper.

Table 3 here

Case 1: IT development in the AP

Chandrababu Naidu, the chief minister of the Andhra Pradesh (AP) state of India during 1995-2004, played an instrumental role in the development of the high-tech industries in the state. During Naidu's tenure as the AP chief minister, the state attracted \$12 billion foreign investment³. He attacked impediments to the growth of the IT industry measures and computerized government machinery. AP emerged as Asia's major IT hub as well as a significant producer and consumer of IT in a very short period of time. The Hi-tech city at Hyderabad, the capital of AP, has Asia's largest software technology complex which houses Microsoft's development facility and the operations of industry giants like Infosys, Oracle, Dell, GE Capital, IBM, Motorola, Ericsson, Citicorp, Baan/Invensys and HSBC.

Many technology services firms in Hyderabad serve customers in the U.S. and Europe. Many high skilled computer programmers and software developers live and work in the rapidly modernizing city. Like the rest of India, however, farmers living in villages account for 70% of the AP population (globalenvision.org 2004). The IT revolution in Hyderabad has a very little impact on these farmers' lives. On the contrary, consider the neighboring state, Maharashtra's government-funded Kisaan Call Center. The center provides rural farmers advice from operators speaking their own language treating every farmer as a customer (globalenvision.org 2004). Many farmers in AP villages unable to cope with drought commit suicide. Estimates suggest that AP accounts for 75% of suicide deaths in India⁴.

Regulative institutions

There are different levels of sanctioning and monitoring powers associated with various stakeholders. International agencies' have rules affecting the behavior of individual economies. For instance, the World Bank offers loans only to economies that undertake economic reforms. In the AP case, Naidu's economic reforms drastically improved credit rating of the state. The World Bank in 1998 provided \$557 million for the AP Economic Restructuring Project even though assistance to India was blocked after its nuclear tests.

Next, national/state level laws determine who benefits from an ICT project. Naidu's government in AP, for instance, revised laws against special privileges to the backward population. To take one example, in February 1999, AP government decided that Indian Institute of Information Technology (IIIT) would not provide reservations for the Backward and Scheduled classes and would strictly adhere to the admissions based on merit⁵.

The balance of sanctioning power associated with an ICT project may shift from one source to another over time. Thanks to the democratic system, ordinary citizens also have monitoring and sanctioning power in India. In the May 2004 election, unhappy farmers exercised their sanctioning power and voted Naidu out of office.

Normative institutions

Governments in developing countries, however, have moral obligation to reduce poverty. Naidu's opponents capitalized on the fact that the ICT projects had virtually no impact on poverty reduction. They attacked Naidu's decision to raise rice and electricity prices by cutting subsidies as "anti-people" and branded as elitist his cultivation of technology and foreign capital (Chanda 2000). The state's low per capita income, dependence on agriculture, and an illiteracy rate in excess of 53% reinforced the effects⁶.

Cognitive institutions

In the early days Naidu's plans gained very little cognitive legitimacy from stakeholders. There was a serious *lack of belief* that his projects would lead to the economic development. One of Naidu's interviews provides a glimpse of such disbelief:

I used to talk about Singapore, South Korea, even Japan. At that time people used to laugh at me. Even when I spoke about Information Technology, people used to react very pessimistically (Lanka.net 2001).

Cognitive programs change over time but not at the same rate across different groups of stakeholders. The lens through which government employees, farmers, development agencies, national and international policy saw the AP ICT changed at different rates over time.

Initially, government bureaucrats perceived the ICT projects as threats to their jobs and incompatible with their daily routines. The projects arguably jeopardized their jobs as well as the ability to extract bribes (The Economist 1999, September 11). They vigorously opposed Naidu's IT plans and protested against computerization by threatening an indefinite strike in 1999. Naidu, however, motivated bureaucrats to champion IT usage. Many bureaucrats were labeled as ex-officio IT secretaries. The resistive force from the bureaucrats disappeared. They shared common platforms of views on IT issues, made effective presentations and spoke the same language in public forums (Bhatnagar 1999).

Development agencies, international media and international policymakers had a positive cognitive evaluation of Naidu's plans. The President of the World Bank, while addressing the Governors of the bank mentioned AP's initiatives. During his India visit in 2000, U.S. President Bill Clinton visited Hyderabad, as the exemplar IT city of India, rather than the more famous "software plateau" of Bangalore (Field 2000).

AP government responded to suggestions from investors at a pace that is startling by established standards of India (The Pioneer 1998) and other developing countries. Such *responsiveness* influenced Bill Gates' commitment of \$80 million over three years for a development center in Hyderabad in his Asia tour in 2000 (Business Asia 2000). It is reported that the AP Government responded to some of the Microsoft's demands within a single day, even though it was a holiday.

Economic elites that benefited from the ICT projects also provided cognitive legitimacy to his projects. A college lecturer said:

We can see a big change in our lives since Naidu took over. Most politicians are corrupt, but at least this one works (Quoted in Sidhva 1998).

A majority of the population depending upon agriculture, on the other hand, had persistent negative cognitive programs. Naidu's neglect of agriculture development and focus on the computer industry cost him the election in May 2004. Y S Rajashekha Reddy, who replaced Naidu, said:

'We stand committed to their (the peoples') development, to mitigate their sufferings. Mr. Naidu only made five percent of the population richer. We raised the farmers' issue in the assembly, and Naidu ignored it'.⁷

Contribution to economic development

While software exports from India registered 56% annual average growth rate in the period 1996 to 2000⁸, AP was the only state in India to register consistently triple digit growth rates during this period – a Compound Annual Growth Rate (CAGR) of 121% (IT People 2001 August 27). Software exports from AP increased from US \$1 million in 1992 to US \$265 million in 1999.

The Naidu government, however, failed to transform increased production into improving the quality-of-life of rural people. ICT projects in AP employed highly capital intensive technology which is incompatible with the relative abundance of labor (Hawrylyshyn 1978). Developments in technology and industrialization thus failed to bridge the urban-rural divide or attack poverty and social and gender inequalities (Sen et al. 2002).

Case 2: OSS in China

No other developing countries are even close to the level of achievement China has achieved in the OSS arena. The Chinese government started Linux development in 1998 and has thrown its weight behind the project since then.

Red Flag Linux was established in August 1999. Beijing Software Industry Production Center was similarly a group established by the government to organize Linux development. Red Flag, working with TurboLinux, first introduced Chinese-language versions of Linux (Smith 2000). Building on RedFlag and Cosix Linux, and coordinating the efforts of a hundred software engineers across 18 organizations, Yangfan Linux was launched by the center in the early 2002. It was installed in 2,800 government computers in Beijing during the first six months.

Regulative institutions

Rule setting, sanctioning and monitoring activities by Chinese government have provided regulative legitimacy to OSS.

Local procurement and anti-monopoly laws: The Government Procurement Law enacted in January 2003, requires government departments to procure domestic goods and services where possible⁹ (Ebusinessforum.com 2004). The local procurement requirement is thus giving a major boost to the growth of the Chinese OSS industry. Moreover, a report of the Chinese State Administration for Industry and Commerce in the mid-2004 argued the urgency of the need of anti-monopoly and anti-trust laws¹⁰. The report cited Microsoft's dominance on the Chinese software market.

Stricter piracy laws: Estimates suggest that over 92% of software used in China is pirated (Kessler 2004). As a WTO member, China is compelled to adhere to the trade-related aspects of intellectual property rights (TRIPS) agreement. The TRIPS agreement requires China to provide adequate legal and enforcement tools to prevent piracy. Rapid growth in the domestically developed IP has also provided impetus to China's fight against anti-piracy (Roth 2005). Under new laws, buyers of pirated goods can be fined 5-10 times the value of the goods and manufacturers face jail time and equipment confiscation (Kanellos 2002).

Government's technology priority: Linux development was the only software project on a list of government's top technology priorities in 1999. Similarly, Linux Internet server software and Linux mobile phone software were among the 19 projects identified by The Ministry of Information Industry (MII) in 2004 for IT fund, which was founded by the State Council in 1986 to encourage R&D in IT¹¹.

Normative institutions

The OSS projects have gained normative legitimacy from various constituencies in China.

National security concerns: For the PLA and the government maintaining national security falls on the obligatory dimension. In an editorial on "information colonialism" in February 2000, the *People's Liberation Army Daily* wrote:

Without information security, there is no national security in politics, economics and military affairs. While learning from others, China should not be under their control (Goad and Holland 2000).

An article published in *China Economic Times* on June 12, 2000 discussed military security as one of the three mechanisms Xu Guanhua, then Chinese vice minister of the science and technology, thought high technology affects national security. Guanhua said that developed countries have put many hi-tech arms into actual battles and discussed the likelihood that technology-exporting countries might have installed software for "coercing, attacking or sabotage". In particular, Chinese government thinks that Microsoft and the U.S. government spy on Chinese computer users through secret "back doors" in Microsoft products (Mahlow 2003).

Principal of self reliance and national pride: Fear about dependence on foreign country combined with a sense of national pride¹² resulted in the principle of *national self-reliance under the Mao Tse Tung era* (Terrill 1977). Since then, this principle has been guiding the Chinese economic system. Though attitude toward technology import and foreign investment has changed drastically, due to a lack of significant alteration in its political structure (Solinger 1995, p.127), a high level of advocacy for national self-reliance and domestic development of technology still exists among Chinese policy makers, researchers and scientists (Simon 2001) and more so among military leaders.

The foreign software used in China's computers has thus long been a focus of concerns. Over the past 20 years, China made several attempts to develop a Chinese operating system, but failed because of the fast development of the global software industry (Goad and Holland 2000). Chinese scientists and engineers are working to create Chinese standards in computer operating systems and audio-video compression to 3G data standards (CNETAsia 2003). They want to achieve self reliance and reverse the flow of fees¹³ by exporting Chinese standards. There is also the matter of national pride in having a custom-made operating system.

Cognitive institutions

Culturally supported habits and subconsciously accepted rules and customs in China are compatible with OSS.

Perception of exploitation by foreign MNCs: Although a large proportion of Chinese users do not pay for software, thanks mainly to widespread piracy, those who pay feel that license fees of Microsoft and other multinational corporations (MNCs) are expensive. For instance, Microsoft Windows 98's price of US\$241 translates to four months' salary for an average Chinese worker. An Internet entrepreneur even sued Microsoft for unfair pricing (Smith 2000).

Attitude toward sharing: A distinguishing feature of OSS is that unlike proprietary software, it can be “legally” shared. China and the Western world differ in terms of attitude toward software sharing.

Gallaway and Kinnear (2004) argue that the contemporary cognitive institutions in Western countries do not encourage sharing. Confucianism, which has had a strong influence on the Chinese politics and culture, on the other hand, emphasizes the importance of the family and society over the rights of the individual person (Hofstede and Bond 1988).

Second, in terms of the perception of how innovations originate, Chinese differ drastically from Westerners. Intellectual property (IP) protection in Europe and the U.S. is based on the premises that an individual can create and own ideas (Mittelstaedt and Mittelstaedt 1997). Alford (1995, p. 25) argues that the disagreement of Confucianism with the Western concepts explains the difference in the systems of copyrights and attitudes towards piracy.

Contribution to economic development

OSS is rapidly diffusing in China. The number of companies involved in developing Linux in China as well as providing software and services for Chinese Linux users is increasing rapidly. In the second half of 2003 alone, Linux sales in the Chinese PC market crossed 800,000 copies¹⁴, a big saving in IP royalty. In June 2004, a Chinese-made super computer "Dawning 4000A", which is based on a Linux operating system, ranked Number 10 in the top 500 list of the world's fastest supercomputers¹⁵.

LESSONS LEARNED FROM THE TWO CASES

In this section, we explain the “whys” of the ICTs-Institutions-Economic development nexus discussed in the above two cases. The following are some of the important lessons we have learned from the two cases:

1. ICT diffusion pattern is a function of the cohesiveness of institutional components.

The success of an ICT project depends on the extent to which all components of institutions work cohesively together toward a common mission. OSS projects in China, for instance, have gained regulative, normative and cognitive legitimacy over competing products (e.g., Microsoft). There are thus no difficulties related to institutional adjustment for OSS in China. Chinese policy makers created institutional structure or rules of game (such as MII's allocation of IT funds for OSS projects and local procurement laws) to facilitate OSS projects. These structures were consistent with Chinese cultural institutions (or in Scott's terms: normative and cognitive institutions) such as principle of self-reliance and habits of sharing. Put differently, rather than “slavishly imitating Western institutions” (North 2005), Chinese attempted to create institutions that are compatible with OSS and are derived from their cultural institutions.

2. An ICT project that ignores socially disadvantaged groups is like a house constructed on a sand foundation.

In a developing country with widespread poverty, when people have direct sanctioning power, the projects that are elite centered are likely to fail. The AP case discussed in this paper reinforces the observation made by the World Bank's Charles Kenny: "Poor people don't seem to think that the Internet is the answer to all their problems" (Rich 2003, p. 93). Institutions help individuals understand what may and may not be done (Neale 1994, 403). In countries that have widespread poverty, policy makers may not launch ICT projects that are economic elite centered. In the AP case, for instance, national and international media and policy makers provided legitimacy to Naidu's ICT projects. Without support from grass-root people, however, they became like a house constructed on a sand foundation.

3. Institution-ICT linkage also depends upon the current level of economic development and market size

An inter-case comparison indicates that level of economic development and market size moderate the institution-ICT-economic development nexus. For instance, since the Chinese market is bigger and more developed than that of AP (or India), foreign investors are more likely to be attracted even without any institutional adjustments. Whereas AP was required to carry out reforms and undergo significant institutional adjustments in line with the ICT projects to attract foreign investors in the state, many foreign investors continue to be gravitated to China even without significant institutional changes. Moreover, China's stage of IT development allows it to develop its own technology (such as OSS), but AP is at more primitive stages. Furthermore, habit of software sharing, one of the major sources of success of OSS, is related to the level of IT industry development. The development level of IT industry is negatively related to propensity to share.

DISCUSSION, IMPLICATIONS AND CONCLUSION

The cases analyzed in this paper make it clear that institutions are the real root causes of success or failure of ICT projects. Sanctioning and monitoring power, social norms and cognitive programs of various stakeholders play instrumental roles to determine the contribution of an ICT project to economic development.

OSS experience in China indicates that ICT projects that gain regulative, normative and cognitive legitimacy over competing products (e.g., Microsoft) diffuse rapidly. The AP case, on the other hand, indicates that ICT projects that are incompatible with social norms (normative institutions) and perceived to be top-down (cognitive institutions) face an array of barriers, at least in the long run. In developing countries, when people have direct sanctioning power, the projects that focus on the elites are likely to fail.

In some cases, different stakeholder groups have contradictory preferences. In the AP case, for instance, increased rice and electricity prices fostered positive cognitive effects to lending agencies such as the World Bank but was against the implicit obligation of reducing poverty.

The discussions in this paper are, however, tempered by some limitations. These include exploratory nature of the research and a lack of inferential statistics. These limitations indicate the need for further research in this area. Particularly fruitful avenues include developing and testing quantitative model that combines the effect of the regulative, normative, and cognitive factors.

SELECTED REFERENCES:

1. Berger, P.L. and Luckmann T. (1967) *The Social Construction of Reality: A Treatise in the Sociology of Knowledge*, Doubleday, New York.
2. Eisenhardt, K.M. (1989) Building Theories from Case Study Research, *Academy of Management Review* 14, 4, 532-550.
3. Franz, C. R. and Robey, D. (1984) An investigation of user-led system design: Rational and political perspectives, *Communications of the ACM*, 27,12, 1202-1209.
4. Fosu, A. K. (2004) Mapping Growth into Economic Development, *American Journal of Economics & Sociology*, 63, 5, 1173-92.
5. Glaser, B. and Strauss, A. (1973) *The Discovery of Grounded Theory: Strategies for Qualitative Research*, Wiedenfeld & Nicholson, London.
6. Hawrylyshyn, O. (1978) Capital intensity biases in developing countries technology choice, *Journal of Development Economics*, 5, 3, 215-232.
7. Henley, J. S. (2004) Chasing the dragon: accounting for the under-performance of India by comparison with China in attracting foreign direct investment, *Journal of International Development*, 16, 7, 1039-1052.
8. Holm, P. (1995) The dynamics of institutionalization: Transformation processes in Norwegian fisheries, *Administrative Sci. Quart*, 40, 3, 398-422.
9. Montealegre, R. (1999) A Temporal Model of Institutional Intervention for Information Technology Adoption in Less-Developed Countries, *Journal of Management Information Systems*, 16, 1, 207-232.
10. NAR (1996) *Technology and Development*. The Hague: Nationale Adviesraad voor Ontwikkelingssamenwerking., "In Brief" *Information from the NAR*, 16, December.
11. North, D. C. (1990) *Institutions, Institutional Change and Economic Performance*, Cambridge University Press, Cambridge, UK.
12. North, D. C. (2005) The Chinese Menu (for Development), *Wall Street Journal*, April 7, A.14.
13. Olson, M. (1965) *The Logic of Collective Action: Public Goods and the Theory of Groups*. Harvard University Press, Cambridge, MA.
14. Orlikowski, W.J. and Baroudi, J.J. (1991) Studying Information Technology in Organizations: Research Approaches and Assumptions, *Information Systems Research*, 2, 2, 1-28.
15. Parkhe, A. (1993) 'Messy' Research, Methodological Predispositions, and Theory Development in International Joint Ventures, *Academy of Management Review*, 18, 2, 227-268.
16. Parto, S. (2005) Economic Activity and Institutions: Taking Stock, *Journal of Economic Issues*, 39, 1, 21-52
17. Rice, R. E. and Aydin, C (1991) Attitudes toward new organizational technology: Network proximity as a mechanism for social information processing, *Administrative Science Quarterly*, 36, 219-244.
18. Richards, A. (2003) Modernity and economic development: The "new" American messianism, *Middle East Policy*, 10, 3, 56.
19. Schneider, A. (1999) US Neo-conservatism: Cohort and cross-cultural perspective, *The International J. of Sociology and Social Policy*, 19, 12, 56-86.

20. Scott, W. R. (1995, 2001) *Institutions and organizations*, Sage, Thousand Oaks, CA.
21. Sen, A. K. (1981) Public Action and the Quality of Life in Developing Countries, *Oxford Bulletin of Economics and Statistics*, 43, 4, 287–319.
22. Selznick, P. (1984) *Leadership in Administration*, Peterson, Evanston, IL.
23. Stake, R. (1994) Case studies, in N. K. Denzin and Y. S. Lincoln (Eds.) *Handbook of qualitative research*, Sage, Thousand Oaks, CA, 236-247.
24. Todaro, M. P. (1994) *Economic Development*, 5th ed., Longman, New York, NY.
25. UNDP (2004) *Human Development Report 2004: Cultural Liberty in Today's Diverse World*, *United Nations Development Program*, <http://hdr.undp.org/reports/global/2004/>.
26. Yin, R.K. (1989, 1994) *Case Study Research: Design and Methods*, Sage Publications, Newbury, CA.

Table 1: A comparison of the two ICT projects in terms of major characteristics

	AP	OSS in China
Main beneficiaries	IT educated population	General population
Focus on export vs. consumption	Export	Export and consumption
Sponsor	Government	Government
Level of skills	High	Low/high
Capital required	High	Low/high
Geographic focus	Hyderabad (the capital city: urban area)	National

Table 2: A comparison of economic and socio-cultural indicators of India and China

	India	China
Per capita GDP - \$ 2002	487	989
Per capita GDP (PPP) - \$ 2002	2670	4580
Males' per capita GDP (PPP \$) 2002	3820	5435
Females' per capita GDP (PPP \$) 2002	1442	3571
Females' GDP as a percentage of males' GDP	0.38	0.66
Composition of economic activities		
Female (adult) literacy rate (% ages 15 and above) 2002	46.4	86.5
Male (adult) literacy rate (% ages 15 and above) 2002	69.0	95.1
Overall (adult) literacy rate (% ages 15 and above) 2002	62.3	90.9
Internet users per 1,000 people 2002	15.9	46
Main telephone per 1,000 people 2002	40	167
Cellular telephone per 1,000 people 2002	12	161
Seats in parliament held by women (% of total)	9.3	20.2

Source UNDP (2004)

Table 3: Institutional legitimacy and ICT-Economic Development Nexus: A comparison of three cases

Institutional pillar	ICT projects in AP	OSS in China
Regulative	<ul style="list-style-type: none"> ○ Democratic system in India: people's sanctioning power over the project. ○ World Bank: sanctions loans to economies that carry out economic reforms. ○ Naidu's government: enacted rules against reservation to backward classes. 	<ul style="list-style-type: none"> ○ Local procurement and anti-monopoly laws ○ Strict piracy laws ○ Government's technology priority
Normative	<ul style="list-style-type: none"> ○ Higher marriage market value of male IT graduates ○ Government: moral obligation to reduce poverty 	<ul style="list-style-type: none"> ○ National security concerns ○ Principal of self reliance and national pride
Cognitive	<ul style="list-style-type: none"> ○ Bureaucrats: ICT perceived threats to job and against their habit ○ Farmers: Viewed as elitist development model ○ Development agencies and foreign governments: perceived successful ICT model ○ Upper social class: IT services beyond expectation ○ Foreign investors: high velocity of decision making 	<ul style="list-style-type: none"> ○ Perception of exploitation by foreign MNCs ○ Attitude toward software sharing

Endnotes

¹ Although Russo's assertion is based on a narrow definition of institution, we argue that it can be extended to include the cognitive component not included in his definition.

² Hodgson (2003) has defined institutions along similar lines.

³ See "Naidu: India's leading reformer," Rediff Business Desk, May 12, 2004, <http://us.rediff.com/money/2004/may/12spec.htm>.

⁴ <http://www.globalsecurity.org/wmd/library/news/india/2004/india-040513-rferl01.htm>

⁵ The policy of reservation of export-oriented sectors arguably resulted in slow growth of this sector in the Indian economy (Henley 2004).

⁶ Indian journalist Lionel Messias points out: "Government officials do not hesitate to point out that with IT gaining precedence over all other sectors in [Andhra Pradesh Chief Minister Chandrababu] Naidu's scheme of things, little attention is being paid to agriculture, the main and proven base of [Andhra Pradesh's] economy" (Quoted from Malhotra 2001).

⁷ <http://www.indian-elections.com/latest-news/india-elections-news237.html>.

⁸ Because the fiscal year ends in March, government statistics in India are reported in overlapping year formats. Thus, the reported end points of this period are 1996-97 and 2000-01. We have simplified the dating system throughout by using the first of the hyphenated calendar years.

⁹ Also see <http://www.perkinscoie.com/page.cfm?id=534>.

¹⁰ Also see, China Briefing, *Far Eastern Economic Rev.* 167 (July 15), 28.

¹¹ See, MII Unveiled 19 Government-Sponsored IT Projects. *SinoCast China Business Daily News.* (July 19, 2004) 1.

¹² In China, the state arguably bolsters its legitimacy through invoking a deep sense of "Chineseness" among citizens (Ong 1997; Barme 1999; Hansen 1999). This factor has strengthened the orientation towards domestically manufactured products.

¹³ For instance, China is the world's largest maker of DVD players. Adopting its own technology, it can save \$2 billion a year in royalties being paid to an 18-company consortium (Calbreath 2004).

¹⁴ See *SinoCast China Business Daily News*, August 4, 2004.

¹⁵ See "List for June 2004" at <http://www.top500.org/list/2004/06>