An Expanded Global Information Technology Issues Model: An Addition of Newly Industrialized Countries

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ABSTRACT

This paper compars the key MIS issues of the Republic of China (R.O.C., Taiwan), which were identified by Wang (1994), with those of the U.S. as reported by Niederman et al. (1991), as well as a with those of India identified by Palvia & Palvia (1992). This comparison results in an expansion of the model of global MIS issues developed by Palvia et al. (1992) by adding to it a fourth category of newly industrialized countries. This model is based on the level of economic development of nations. Finally, suggestions are made for future research in order to develop an improved understanding of the global information technology environment.

INTRODUCTION

During the last few years we witnessed an increased globalization of business activities in terms of joint ventures and MNCs activities. At the same time there has been a recognition in the importance of information technology (IT) as an essential support to many business processes and as an important ingredient in business process reengineering.

Therefore, it is extremely important for corporate executives and chief information officers to understand the issues surrounding IT in various countries. Management information system (MIS) issues and their relative importance have been monitored in the U.S. for over a decade. For example, a stream of articles of domestic prioritization of MIS issues in the U.S. have appeared in *MIS Quarterly* [10, 3, 34, 42]. A study by Deans et al. [9] has identified and prioritized important international MIS issues in U.S.-based multinational corporations, and compared them to the domestic MIS issues. Such studies are perceived to be of value as they not only identify MIS issues fundamental to organizations but also provide direction for future MIS education, practice and research.

As technology assimilates throughout the world, researchers have begun to identify and compare MIS issues in other parts of the world. Representative examples of such studies include: Australia issues [47], Greece issues [11], Gulf Cooperation Council countries issues [2]. Hong Kong issues [4], India issues [36], the Republic of China issues [15, 45, 46], Singapore issues [39], and Western Europe issues [8]. The utility of these studies is evident as more and more corporations and governments increasingly rely on IT for international business. A comparison of the cited studies reveals that the key MIS issues in different countries vary to a considerable degree. In order to exploit IT fully for global business, it is imperative that the key MIS issues of different countries in different stages of economic development are identified and dealt with appropriately. A model for comparing MIS issues in different countries, and classifying the countries into three categories (advanced, developing, and underdeveloped countries) was proposed by Palvia et al. [37].

This paper compares the key MIS issues of the Republic of China (R.O.C., Taiwan), which were identified by Wang [45], with those of the U.S. as reported by Niederman et al. [34], as well as with those of India identified by Palvia & Palvia [36]. This comparison results in an expansion of the model of global MIS issues developed by Palvia et al. [37] by adding to it a fourth category of newly industrialized countries.

THE FINDINGS OF THE R.O.C. SURVEY

Two hundred and ninety-seven R.O.C. senior managers knowledgeable about MIS responded to a R.O.C. mail survey. Each of them was asked to rank the current and future

Table 1

MIS Issues in the R.O.C. (N = 297)

Rank	Issue Name	Mean	s.d.	Rank	Issue Name	Mean	s.d.
1.0	Communication between the IS department and end users	5.74	1.18	15.0	IS funding level	5.10	1.29
2.0	Top management support	5.73	1.33	16.0	IS role and contribution	5.08	1.37
3.0	IS strategic planning	5.66	1.29	17.0	User participation	5.05	1.34
4.0	Competitive advantage	5.48	1.38	18.0	Recruit, train, and promote IS staff	4.97	1.39
5.0	Goal alignment	5.46	1.50	19.0	Information architecture	4.89	1.49
6.0	Computerization of routine work	5.41	1.28	20.0	Placement of IS department	4.88	1.48
7.0	IT infrastructure	5.35	1.39	21.5	Measuring IS productivity	4.62	1.46
8.0	System integration	5.34	1.33	21.5	Insufficient human resources	4.62	1.46
9.0	Software development productivity	5.30	1.30	23.0	Office automation	4.59	1.37
10.0	System friendliness	5.22	1.29	24.0	Organizational learning	4.47	1.35
11.0	Security and control	5.21	1.33	25.0	Open systems	4.44	1.53
12.5	Software development quality	5.15	1.25	26.0	Distributed systems	4.25	1.44
12.5	IS standards	5.15	1.31	27.0	Telecommunications	4.24	1.41
14.0	Data resource	5.14	1.29	28.0	End-user computing	3.98	1.48
				29.0	CASE	3.70	1.48
				30.0	Expert systems	3.51	1.57

importance of 30 issues. Table 1 lists the rank order of importance of current issues. In order to better understand the findings of the R.O.C. survey, we list here the top ten issues, in a descending order of importance, and briefly discuss the relevant literature and what we believe are the reasons that these issues were ranked at the top.

1. **Communication between the IS department and end users.** End users in the R.O.C. often cannot accurately specify their information needs. Therefore, they tend to have an unrealistic expectation of the computer's capabilities and expect the IS staff to quickly automate all of their operations [13]. At the same time, IS employees may lack a good understanding of the organization's business processes, and they use terminology that end users do not understand [31]. The communication problem between the users and the IS community is further aggravated due to the low level of communication skill of IS employees (see Gupta et al. [14] who found that IS graduates in the R.O.C. were quite deficient in their communication skills).

2. **Top management support.** The importance of top management support is pervasive in the general MIS literature; the R.O.C. is no exception. Top management support has been found to be especially important in encouraging the use of microcomputers in the R.O.C. [20]. Senior management is expected to demonstrate its support by both allocating suitable budget for the Is department, and by showing leadership and involvement (e.g., leadership via steering committees and project planning meetings). It has been suggested that top management support will strengthen the IS department by helping acquire the support of the functional departments [6, 27, 50]. Without strong top management endorsement and support, the IS department in the R.O.C. would have little chance to achieve its mission [5, 18,30, 40].

3. **IS strategic planning.** IS strategic planning is difficult in the R.O.C. due to the following reasons: rapid changes in the technology, inadequate understanding of business processes, short term orientation of R.O.C. business firms, absence of successful domestic planning models, top management's unwillingness to provide adequate funding to implement strategy, lack of top management support (issue #2) for the planning process [30], and IS staffs' lacking of adequate expertise in IS planning methodologies as discovered by Gupta et al. [14]. Lack of appropriate IS strategic planning in other countries has created the problems of system failures and uncoordinated "islands of automation" [32].

4. **Competitive advantage.** The utilization of IT to improve the competitive advantage of a business firm has been reported in anecdotal manner by many U.S. firms in the past decade [e.g., in 25]. In the R.O.C. private sector, several retail, wholesale, transportation, and media firms have begun

to build information systems that can be utilized to make new inroads, create business opportunities, and enable an organization to differentiate itself in the market place [18,, 19, 29, 33]. Stories of how public organizations (e.g., a government-run hospital and the administrative office of a village), use IT to improve their administrative effectiveness and reduce the waiting time of clients, have been reported [22, 41]. The aggressive promotion of IT by the R.O.C. government has helped to further raise the IS practitioner's consciousness of the competitive impacts of IT.

5. **Goal Alignment.** IS staff in the R.O.C. are often interested in developing large scale and technically advanced systems which may not meet the needs of the business and the end users. In order to assure goal alignment, senior management needs to clearly communicate the organizational goals, policies, and strategies to the IS staff [17]. In fact, a carefully crafted IS strategic planning process (issue #3) could facilitate goal alignment.

6. **Computerization of Routine Work.** Even though the R.O.C. is classified as a newly industrialized country, the extent of using computers in business is far behind that of the U.S. In a sense, the IT evolution in many R.O.C. organizations is still in the initiation phase of Nolan's stages hypothesis [35]. Therefore, for these organizations, automation of routine work (i.e., the transaction processing system) is still evolving and therefore important.

7. **Infrastructure.** In developed countries, a responsive IT infrastructure is vital to the flexibility and to the changing needs of a business organization. The technology infrastructure issue is exacerbated by a combination of evolving technology platforms, integration of custom-engineered and packaged application software, and the rigidity of existing applications [52]. Many leading R.O.C. IS organizations are gradually realizing that building an infrastructure that will support existing business applications while remaining responsive to changes, is a key factor for the long-term enterprise productivity.

8. **Systems integration.** Many R.O.C. IS managers are recognizing the need to integrate the "islands of automation" (e.g., data processing, office automation, factory automation) into a single entity. In the past, the execution of systems' integration had encountered great difficulty due to lack of IS standards, insufficient technical ability, and inadequate coordination among functional departments. However, open systems, networks, client/server architecture, and standardization of IT products (promoted by the government), are expected to make systems integration in the R.O.C. easier in the future [12, 21].

9. **Software development productivity.** Both IS professionals and end users have complained in informal interviews conducted during the pilot study, that it takes too long to build application systems. The speed of development cannot respond in a timely manner to changing business needs. Possible reasons that were stated include: insufficient technical skills (this reason is also supported by the study of Gupta et al. [14]), high IS staff turnover, lack of use of software productivity tools, and inadequate user participation.

10. **System friendliness.** As per Yueh [15], unfriendly and difficult-to-use systems encounter strong resistance from end users at all managerial levels in the R.O.C. The development of a friendlier interface is critical not only to the success of the software and hardware vendors, but also to the ultimate acceptance by the end user. Palvia & Palvia [37] offered two reasons for the significance of this issue in a not fully developed country. First, the users may be comparatively unfamiliar and untrained in the use of IT, and therefore uncomfortable with the unique computer interfaces. Second, a lot of software imported from the advanced nations of the West may not necessarily meet the human factor requirements of the non-advanced culturally distinct nations of the East.

An overall comment on the top ten issues: it is noteworthy that the top five of the ten are all managerial issues. These five can be summarized as:

An understanding of the organization's business, goals, and strategies is necessary for developing an effective IT plan and developing strategic IT applications; effective communication between the end users and the IS department is essential; and senior management support is critical for the survival and success of the firm's computerization efforts.

Comparison of the R.O.C. Issues with the U.S.A. Issues

It was decided to compare the R.O.C. issues with the U.S. issues reported by Niederman et al. [34] for two reasons. First, the initial issue list of the R.O.C. survey was primarily based on that of Niederman et al. Thus, the considerable overlap of two issue lists makes the comparison more meaningful. Second, the time frame of the two surveys is quite close, as the Niederman et al. survey was conducted during 1989-1990 and the R.O.C. survey was conducted in 1992.

The U.S. MIS issues can be considered as representative of advanced nations. For example, Watson [47] and Watson and Brancheau [48] found that there was a positive relationship between the rankings of the MIS issues in some advanced western nations of Europe, as reported by Davenport and Buday [8], and the U.S. rankings as found by Brancheau & Wetherbe [3]. Table 2 presents the U.S. rankings adjacent to the R.O.C. rankings. The similarities and differences are discussed below.

The Similarities Between the R.O.C. and the U.S.A. Issues

There are only three common issues on the top ten list of both countries. These are IS strategic planning, competitive advantage, and IT infrastructure. These issues reflect a desire on the part of IS managers to utilize IT in a more strategic

Table 2

MIS Issues in the R.O.C. and the U.S.

Rank	Issue Name	R.O.C. Ranking	U.S. Ranking
1	Communication between the IS department and end users	1.0	
2	Top management support	2.0	
3	IS strategic planning	3.0	3.0
4	Competitive advantage	4.0	8.0
5	Goal alignment	5.0	
6	Computerization of routine work	6.0	
7	IT infrastructure	7.0	6.0
8	System integration	8.0	22.0
9	Software development productivity	9.0	
10	System friendliness	10.0	
11	Security and control	11.0	19.0
12	Software development quality	12.5	9.0
13	IS standards	12.5	
14	Data resource	14.0	2.0
15	IS funding level	15.0	
16	IS role & contribution	16.0	11.0
17	User participation	17.0	
18	Recruit, train, and promote IS staff	18.0	4.0
19	Information architecture	19.0	1.0
20	Placement of IS department*	20.0	7.0
21	Measuring IS productivity	21.5	16.0
22	Insufficient human resources	21.5	
23	Office automation	23.0	
24	Organizational learning	24.0	5.0
25	Open systems	25.0	
26	Distributed systems	26.0	12.0
27	Telecommunications	27.0	10.0
28	End-user computing	28.0	18.0
29	CASE	29.0	12.0
30	Expert systems	30.0	
31	EDI		12.0
32	Planning and managing the application portfolio		15.0
33	DSS and ESS		17.0
34	Disaster recovery capability		20.0
35	Organizational structure		21.0
36	Global systems		22.0
37	Image technology		24.0
38	IS asset accounting		25.0

* This issue was labelled as "IS organization alignment" in the U.S. survey.

manner, beyond the classical operational automation. Additional agreement on relative ranking for issues not included in the top 10 are software development quality and measuring IS productivity. However, managers in both countries felt that these two issues are of only moderate importance.

Three highly ranked issues in the R.O.C. survey (communication between the IS department and end users, top management support, and goal alignment) were not even listed among the 25 issues of concern in the Niederman et al. [34] survey. However, it is worth pointing out that these issueshave been considered to be of high importance in several previous U.S. studies from the mid-eighties [1, 16, 24, 44].

DISCUSSION OF THE DIFFERENCES BETWEEN THE R.O.C. AND THE U.S.A. ISSUES

For the purpose of discussion, the issues are classified here into strategic, organizational, technological, and management and control issues.

Strategic Issues. In the U.S., IT has been in use for over four decades. Consequently, operational issues have either been largely resolved or dropped to the background, while the strategic issues have come to the forefront. The U.S. issues are dominated by strategic concerns. Of the top ten U.S. issues, six could be considered strategic issues. Besides the three that are shared with the R.O.C. (IS strategic planning, competitive advantage, and IT infrastructure), the other three are developing the information architecture, making effective use of data resource, and placement of the IS department. Thus, there are more strategic issues on the U.S. list than on the R.O.C. list.

Organizational Issues. Several organizational issues that are salient in the U.S. are not that important in the R.O.C. These issues include recruiting, training, and developing of

IS human resources; organizational learning; and the placement of the IS department. Given the burgeoning IT investment in the U.S. and senior management's persistence on showing a return on IT investment, many IS executives are reexamining organizational alternatives to maximize performance (e.g., the increasing use of downsizing and the outsourcing of IS activities). Giving further impetus to organizational issues are the acute shortages of skilled IS employees forecasted in the U.S. by the year 2000 due to changing demographics [43]. In contrast, the human resource issue was not perceived to be important by R.O.C. respondents. This is probably because more than 50 universities and colleges are turning out an adequate number of IS graduates to cope with the need of the nation. Generating enough IS graduates is an important part of the national IT plan in the R.O.C.

Organizational learning is ranked high in the U.S., as the IS practitioners believe that expanded use of new technologies throughout the entire organization will lead to further prosperity. This will require continuous learning about ways to better utilize the information resource and integrate new technology into the organization. This issue is ranked markedly lower in the R.O.C. Possible reasons are first, the IS departments in the R.O.C. believe that employees should learn new technologies through self-study, a view supported by Igbaria [20]; second,m organizational learning is a relatively new concept for IS practitioners in the R.O.C. as they are preoccupied with automating the basic business processes. Note that the two organizational issues (organizational learning and place of the IS department) have a strategic impact on the organization. Finally, end-user computing is rated at a moderate level in the U.S. and almost at the bottom in the R.O.C. End-user computing has pervaded most organizations in the U.S., and its management is important in order to effectively utilize technology. In the R.O.C., the development of IS is considered to be the exclusive domain of IS professionals.

Technological Issues. Several advanced technology issues are in the top ten in the U.S. These are technology infrastructure, software development, and telecommunications. In addition, CASE and distributed systems are both ranked #12. The technology issues, except technology infrastructure and software development, are ranked almost at the bottom in the R.O.C. Again, the difference in priorities can be explained by the advanced stages of technology adoption in the U.S., and the U.S. executives' desire to exploit fully modern technologies for strategic advantage. Specifically, in terms of telecommunications and distributed systems, these technologies reduce constraints due to time and space, and provide opportunity for global expansion [23]. Thus, IS practitioners in the Trauth et al.study [42] ranked the skills of telecommunications and distributed processing to be highly important in the future. In the R.O.C., the need for telecommunication capability is much lower partly because the average size of R.O.C. firms is much smaller than that of U.S. firms, and most of these firms operate in the capital city — Taipei. Furthermore, the R.O.C. is a much smaller country when compared with the U.S.

Management and Control Issues. Seven of the top 10 R.O.C. issues are not in the U.S. top ten list. Most of these can be termed "management and control" issues. Included are communication between the IS department and end users, top management support, IS goal alignment with the business, computerization of routine work, system integration, software development productivity, and system friendliness. In the U.S. some of these issues received high ranking in the early and mid-80s. However, since then they have dropped out of the top key issues presumably because more experience has been gained in the management of technology. In the R.O.C., however, these issues are of significance due to R.O.C. organizations' lack of experience with such issues. For example, system integration is an important issue in the R.O.C. As some IS organizations move from Nolan's growth phase [35] into its control phase, integration becomes critical. For similar reasons, security and control. is an important factor in the R.O.C. All of these issues collectively point to the need for sound management and control practices in the utilization of IT resources.

COMPARISON OF R.O.C. ISSUES WITH INDIA ISSUES

Using the nominal group technique and brainstorming, twenty-seven top-level and middle-level Indian managers knowledgeable about MIS were asked to generate and rank the importance of 23 issues. Table 3 presents the India rankings adjacent to the R.O.C. rankings. The similarities and differences are discussed below.

The Similarities Between R.O.C. and India Issues

System friendliness is the only issue that is ranked among the top ten in the two countries. In addition, security and control is considered to be quite important (but not in the top 10) by both countries, whereas issues of placement of the IS department and telecommunications are not perceived to be important in either. The low degree of similarities is probably due to different IT sophistication levels. Furthermore, issues of concern to the two countries' professionals are quite different because the two issue lists share only nine common items.

Discussion of Differences Between R.O.C. and India Issues

Strategic issues. Three strategic issues, IS strategic planning, competitive advantage, and IT infrastructure are

Table 3

MIS Issues in the R.O.C. and India

Rank	Issue Name	R.O.C. Ranking	India Ranking
1	Communication between the IS department and end users	1.0	
2	Top management support	2.0	
3	IS strategic planning	3.0	
4	Competitive advantage	4.0	18.0
5	Goal alignment	5.0	
6	Computerization of routine work	6.0	
7	IT infrastructure	7.0	
8	System integration	8.0	
9	Software development productivity	9.0	14.0
10	System friendliness	10.0	5.0
11	Security and control	11.0	9.0
12	Software development quality	12.5	
13	IS standards	12.5	7.0
14	Data resource	14.0	
15	IS funding level	15.0	
16	IS role and contribution	16.0	1.0
17	User participation	17.0	
18	Recruit, train, & promote IS staff*	18.0	2.0 6.0
19	Information architecture	19.0	
20	Placement of IS department**	20.0	13.0
21	Measuring IS productivity	21.5	
22	Insufficient human resources	21.5	
23	Office automation	23.0	
24	Organizational learning	24.0	
25	Open systems	25.0	
26	Distributed systems	26.0	
27	Telecommunications	27.0	20.0
28	End-user computing	28.0	
29	CASE	29.0	
30	Expert systems	30.0	
31	Quality of input data		3.0
32	Educating senior managers about MIS		4.0
33	Maintenance of software		7.0
34	Packaged application on software availability		10.5
35	Cultural style barriers		10.5
36	Maintenance of hardware		12.0
37	Need for external/environmental data		14.0
38	Applications portfolio		16.0
39	Computer hardware		17.0
40	Effect of country political climate		19.0
41	Government controls		21.0
42	Fear of loss of management authority		22.0
43	Fear of loss of employment		23.0

* Two IS human resources related issues were ranked in the India survey: human resources/personnel for MIS (rank #2); Continuing training and education of MIS staff (rank #6).

** This issue was labelled as "IS organization alignment" in the India survey.

ranked among the top ten by R.O.C. IS professionals. In contrast, India IS professionals do not perceive strategic issues (i.e., competitive advantage, placement of the IS department) to be important. This is probably because R.O.C. is more sophisticated than India in terms of IT development.

Management and control issues. The importance given to management and control issues by R.O.C. and India IS professionals differ drastically. The former ranked seven management and control issues among the top ten issues, whereas the latter ranked only one issue (i.e. system friendliness) among the top ten. This is probably because Indian firms are still in Nolan's contagion stage [35], and the challenges of the next stage—control stage—have not yet arrived.

Operational issues. Seven out of the top ten India issues are operational (management's awareness of MIS capabilities, human resources for MIS, quality of data, data security, training and education for MIS personnel). On the contrary, none of these issues was ranked among the top ten R.O.C. issues. This contrast phenomenon is probably because R.O.C. organizations have progressed to Nolan's third stage [35] — the control stage — whereas the India organizations are still in Nolan's second stage — the contagion stage. Thus, large R.O.C. and India ranking differences exist among operational issues.

AN EXPANDED GLOBAL INFORMATION TECHNOLOGY ISSUES MODEL

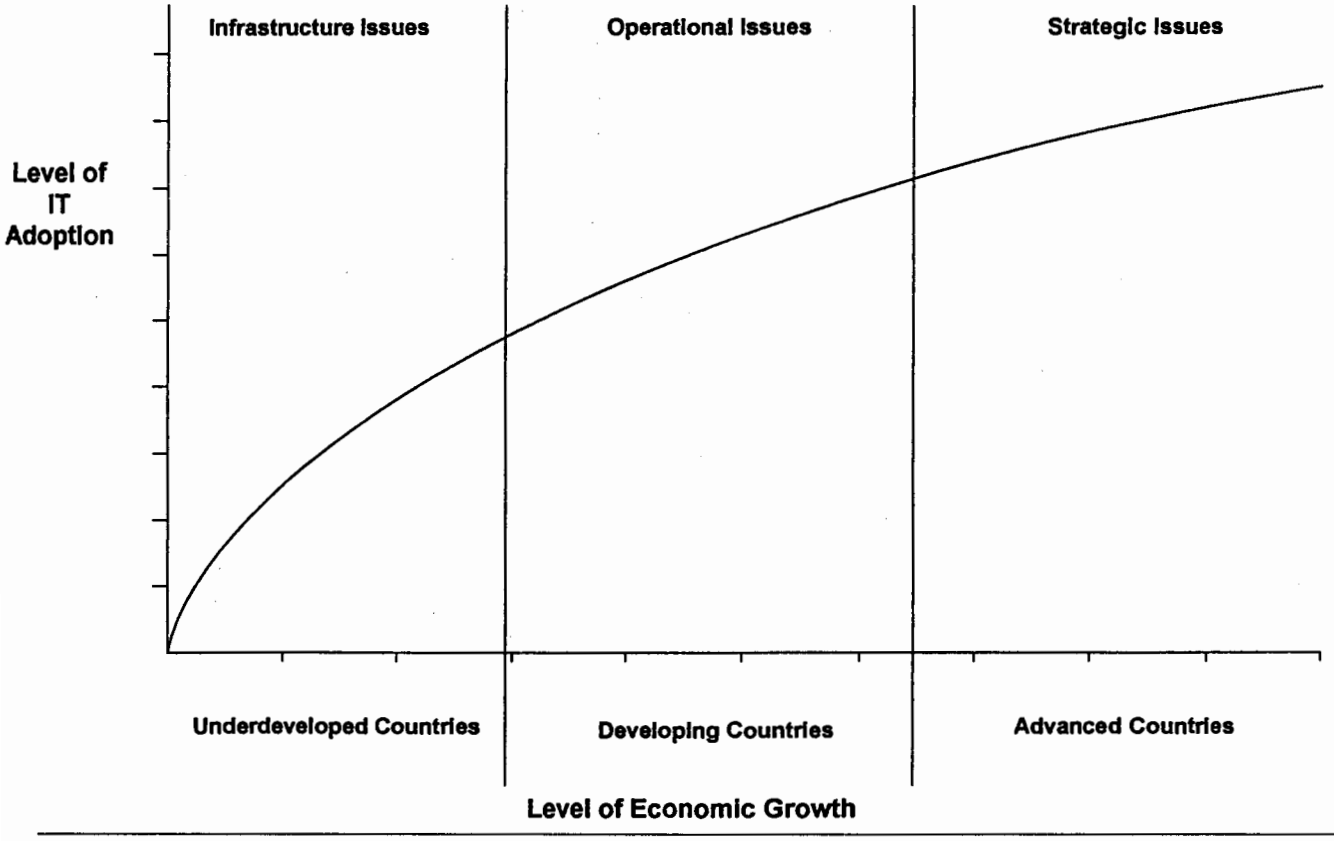
Palvia et al. [37] analyzed the key MIS issues in several countries. Based on their economic levels of growth, countries are classified into three categories — advanced countries (e.g., United States, Canada, Japan, Western European countries), developing/operational countries (e.g., India, Russia, Argentina, Brazil, Mexico), and under-developed/ basic countries (e.g., Kenya, Chile, Iran, Nigeria). Palvia et al. [37] included the following countries in their study: U.S.A. and European countries as examples of advanced nations, India as an example of a developing nation, and Kenya and Zimbabwe as examples of under-developed nations. Palvia [38] later noted that the placement of a country into a particular category may be the subject of a debate. Also a country may change categories over time. Nevertheless, they were able to make some broad generalizations on the nature of IS issues based on the level of economic growth of a nation. These generalizations were used as a basis for a global IT model.

The model that Palvia et al. [37] developed is a three-stage life cycle for IT growth. Their model, as further explicated by Palvia [38], is reproduced in Figure 1. According to the model, the level of IT adoption and the sophistication of the corresponding management issues increase from one stage to the next, i.e., from underdeveloped to developing to advanced nations. Quite striking are the types of MIS issues at each stage of economic development. For example, in stage one the IT infrastructure of the nation needs to be bolstered, which remains largely in the domain of governments and large powerful organizations.)We add that advanced countries and MNCs can also play a significant role in infrastructure enhancement of under-developed countries.) Exemplifying the nature of issues in under-developed countries are Kenya Zimbabwe, where the sheer availability of reliable hardware, software, and human resources is a critical bottleneck to IT deployment. Another critical concern is a lack of direction from the government and no clear policies or impetus on the use of IT.

In stage two of their model, the operational problems come to the forefront and need to be adequately addressed. In their example of India, the key MIS issues include such

Figure 1

A Model of Country-Specific MIS Issues



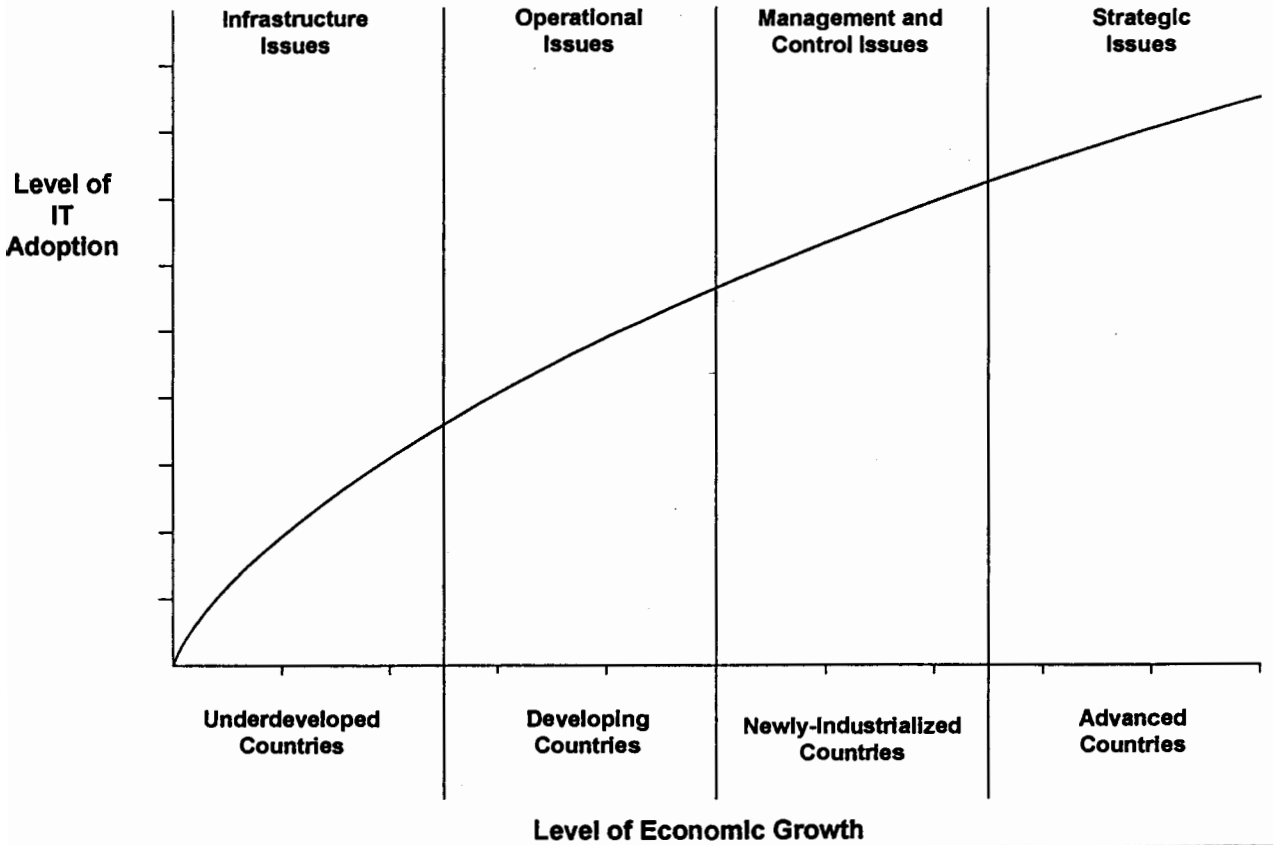
items as management's awareness of MIS capabilities, human resources for MIS, quality of data, data security, training and education for MIS personnel, and standards for hardware and software. Clearly, most of these issues are in the domain of first level management. There were a few issues which address higher management needs, but the preponderance was on operational issues. The authors observed that these issues are in the realm of lower and middle management.

Finally, in stage three of the model, the strategic MIS issues begin to dominate. As the authors put it, when an organization matures in the use of technology, then information systems and IT can be utilized in a strategic manner to enhance the competitive advantage, organizational learning of IT, IS's alignment in an organization, using data as a corporate resource, and developing an information architecture. Even the latest available U.S. study on key MIS issues generally corroborates the existence of strategic items.

The above model appears to be basically sound. However, the current R.O.C. study and results from other countries [e.g., 48] have led us to the model's refinement. Another class of countries has been added to the original three-way classification. We label this class of countries as "Newly Industrialized Countries," or NICs. Several countries have emerged as newly industrialized countries in the last decade and are now beginning to prosper. Examples of such countries include the R.O.C., South Korea, Ireland, Hong Kong, and Singapore. Once again, the categorization of a country into a particular class may be somewhat contentious, and movement over time may be expected. If we attempt to extrapolate the R.O.C. issues to NICs in general, then the majority of NIC issues are unique and different from the other three classes. To reiterate, representative NIC issues include communication between the IS department and end users, top management support, software development productivity, goal alignment, and security and control. Clearly, most of these issues are above the routine operational and infrastructural issues faced by organizations in underdeveloped and developing countries. Yet, they are lower in their strategic orientation as compared to the advanced nations. These issues then can most appropriately be labelled as management-and-control-oriented issues reflective of growing technology adop-

Figure 2

A Model of Global Information Technology Issues



tion. A revised "global information technology issues" model is shown in Figure 2. In a sense, our model is correlated with the Nolan stage model [35], which posited the need for a control stage to contain and manage the proliferation of Is activities in an Is organization. The main difference is that our model reflects the economic conditions in different countries.

It is noteworthy that "management and control" activities and policies are also being exercised by the government in these NICs. For example, the R.O.C., Singapore and South Korea have one or two government agencies which coordinate and implement rexplicit national IT plans since the 1980s. These three country governments explicitly promote and manage the production and use of IT products. For example, as a national goal in these countries, computerization is considered an essential means for maintaining the competitiveness of the national economy in the global environment. One of the control activities associated with achieving that goal is to allocate national resources to the training of Is professionals [26].

We recognize that there may be other elements necessary for a complete understanding of the global IT environment. However, the need for such a model cannot be overemphasized. The world is a large place, and attempting to understand the critical issues in each country, or even selected countries, is an arduous and perhaps an impossible task. Therefore, even an elementary model such as the one offered by Palvia et al. [37] and our subsequent refinement, can provide some direction and insights into the criticality of the various It issues in different countries.

CONCLUSIONS

This paper compares the key MIS issues of the Republic of China (R.O.C., Taiwan) with those of the U.S. as well as with those of India. This comparison provides an opportunity to expand the model of global MIS issues developed by Palvia et al. [37] by adding to it the category of newly industrialized countries.

The R.O.C. is recognized by many as a NIC. While generalizations are fraught with risks, the R.O.C. issues provide an approximation to other NIC issues to the extent the NIC countries are similar in their economic development level and explicit national IT plans.

The R.O.C. MIS issues can be summarized to be largely management and control oriented. Representative issues include communications between the IS department and end users, top management support, software development productivity, goal alignment, and security and control. There also appears to be an emergence of a few strategic issues such as IS strategic planning, competitive advantage, and IT infrastructure.

The U.S. MIS issues are dominated by strategic concerns which include information architecture, data resources, IS strategic planning, IT infrastructure, competitive advantage, placement of the IS department. Seven of the top ten India issues are operational issues which consist of management's awareness of MIS capabilities, human resources for MIS, quality of data, data security, training and education for MIS personnel, and standards for hardware and software.

The dominance of strategic issues in the U.S., the dominance of management and control issues and the appearance of strategic issues in the R.O.C., and the dominance of operational issues in India suggest the plausibility of an evolutionary path in information systems management based on the economic development level of a country.

Descriptive studies of MIS issues in different parts of the world are useful in international IT research. They provide early direction to both practitioners and researchers. Nevertheless, once the initial exploration is over, we would like to exhort the international IT research community to go beyond purely descriptive studies and develop insights into the nature of country issues as well as differences among countries. Some worthwhile lines of pursuit are:

1. Development and validation of sound models that seek to explain the country issues. An initial model of this type was presented in this article. Previous research indicates that a fully developed model may need to include factors related to culture, IT infrastructure, political/economic system, and governmental policies [9, 23]. A helpful step is to conduct more comparative studies. For example, Chow, Lu & Gibson [7] proposed a comparative study of key MIS issues in the Four Little Dragons in Asia.

2. Evaluating the predictive ability of such models as well as reporting on the use of the models for prediction. While descriptive studies are helpful in identifying the key issues of individual countries at a point in time, this can be an awfully time-consuming proposition given the number of countries on the globe and the temporal nature of the issues. However, if the determinants of the key issues are known, then a preliminary estimation of the issues can be made.

3. Using the model for focused research. For example, if culture is identified as one of the factors influencing IT needs, then it can be explored in more detail both in terms of culture components and IT components that are influence by it.

4. Developing specific practical implications and usefulness of the "key issues" results. How can they be incorporated into the formulation of national policy, corporate policy or IT policies within an organization?

The knowledge acquired in such studies can contribute to an improved technology transfer among countries. It can also derive better utility from IT regardless of the economic level of the involved country.

REFERENCES

[1] Applegate, L.M. and Osborn, C.S. "Philips 66 Company: Executive Information System," *Harvard Business School,* Case No. 9-189-006, 1988.

[2] Badri, M.A. "Critical Issues in Information Systems Management: an International Perspective," *International Journal of Information Management,* Vol. 12, 1992, pp. 179-191.

[3] Brancheau, J.C. and Wetherbe, J.C. "Key Issues in Information Systems Management," *MIS Quarterly,* March 1987, pp. 23-46.

[4] Burn, J., Saxena, K.B.C., Ma, L., and Cheung, H.K. "Critical Issues of IS Management in Hong Kong: a Cultural Comparison," *Journal of Global Information Management,* Vol. 1, No. 4, 1993, pp. 28-37.

[5] *Chang, Y-C. "Experiences of Computerization," *Information Management Association Communication,* Vol. 26, August 15, 1991, pp. 17-18.

[6] *Chou, C-K. "Top Management Is Responsible for the Success and Failure of Information Technology Application," *Information Management Association Communication,* Vol. 28, February 10, 1993, pp. 42-43.

[7] *Chou, W.S., Lu, M.T. and Gibson, H. "A Comparison of Key Information Management Issues in the Four Little Dragons in Asia," Research Grants Proposal, 1994.

[8] Davenport, T. and Buday, R. *Critical Issues in Information Systems Management in 1988,* Index Group, 1988.

[9] Deans, P.C., Karwan, K.R., Goslar, M.D., Ricks, D.A. and Toyne, B. "Identification of Key International Information systems Issues U.S.-Based Multinational Corporations," *Journal of Management Information Systems,* Vol. 27, No. 4, 1991, pp. 27-50.

[10] Dickson, G.W., Leitheiser, R.L., Nechis, M. and Wetherbe, J.C. "Key Information systems Issues for the 1980s," *MIS Quarterly,* Vol. 8, No. 3, 1984, pp. 135-148.

[11] Doukidis, G.I., Smithson, S. and Naoum, G. "Information Systems Management in Greece: Issues and Perceptions," *Journal of Strategic Information Systems,* Vil. 1, No. 2, 1992, pp. 63-75.

[12] *Fu, C-C. "Experiences of Computerization," *Information Management Association Communications,* Vol. 26, August 15, 1991, pp. 25-27.

[13] *Fu, C-C. "End-Users Profile," *Information Management Association Communication,* Vol. 27, January 27, 1992, pp. 7-8.

[14] Gupta, J.N., Wang, P. and Ravichandran, R. "An Assessment of Information Systems Education Needs in Taiwan," *International Journal of Information Management,* Vol. 14, No. 5, October 1994,k pp. 369-384.

[15] Harrison, W.L. and Farn, C-K. "A Comparison of Information Management Issues in the United States of America and the Republic of China," *Information & Management,* Vol. 18, 1990, pp. 77-188.

[16] Herbert, M. and Hartog, C. "MIS Rates the Issues," *Datamation,* November 15, 1985, pp. 79-85.

[17] *Huang, H-H. "Is Organizational Climate Sunny or Stormy?" *Information Management Association Communication,* Vol. 27, January 22, 1992, pp. 3-4.

[18] *Huang, L. "Visiting China Daily News Information Company," *Information Management Association Communication,* Vol. 26, August 15, 1991, p. 51.

[19] *Huang, L. "Visiting Hou Sen Company and Hsin Tsu Transportation Company, " *Information Management Association Communication,* Vol. 26, August 15, 1991, pp. 55-63.

[20] Igbaria, M. "An Examination of Microcomputer Usage in Taiwan," *Information & Management,* Vol. 22, 1992, pp. 19-28.

[21] **Information Industry Yearbook.* Institute For Information Industry, Ministry of Economic Affairs, the Republic of China, November 1992.

[22] **Information Industry Yearbook.* Institute For Information Industry, Ministry of Economic Affairs, the Republic of China, October 1993.

[23] Ives, B. and Jarvenpaa, S.L. "Applications of Global Information Technology: Key Issues for Management," *MIS Quarterly,* Vol. 15, No. 1, March 1991, pp. 33-49.

[24] Jarvenpaa, S.L. and Ives, B. "Executive Involvement and Participation in the Management of Information Technology," *MIS Quarterly,* Vol. 15, No. 2, 1991, pp. 205-227.

[25] Keen, P.G.M. *Competing in Time: Using Telecommunications for Competitive Advantage,* Ballinger Publishing, Cambridge, MA, 1988.

[26] Kraemer, K.L., Burbaxani, V. and King, J.L. "Economic Development, Government Policy, and the Diffusion of Computing in Asia-Pacific Countries," *Public Administrative Review,* Vol. 52, No. 2, 1992, pp. 146-155.

[27] *Lee, C-Y. "General Mobilization of Computerization of Manufacturing Firms," *Information & Computers,* December 1992, pp. 89-91.

[28] *Lee, H-C."Speedy Distribution Creates Business Opportunities," *Information & Computers,* August 1992, pp. 18-23.

[29] *Lee, J-C. "The Gradual Transition from HP to IBM, " *Information Management Association Communication,* Vol. 27, January 1992, pp. 54-55.

[30] *Lim, C-T. "Experiences of Computerization," *Infor-*

* Indicates that the journal or the report is published in the Chinese language.

mation Management Association Communication, Vol. 26, 1991, pp. 23-24.

[31] *Liu, H. "The Focus of IS Executives' Marketing Task Public Relations," *Information Management Association Communication,* Vol. 27, January 1992, pp. 9-10.

[32] McFarlan, F.W., McKenney, J.L. and Pyburn, P. "The Information Archipelago — Plotting a Course," *Harvard Business Review,* Vol. 61, No. 1, 1983, pp. 145-146.

[33] *MIC (Market Intelligence Centre). "Chung Yo Department Store Catches Information Fashion," *Information & Computers,* August 1992, pp. 24-28.

[34] Niederman, F., Brancheau, J.C. and Wetherbe, J.C. "Information Systems Management Issues for the 1990s," *MIS Quarterly,* December 1991, pp. 475-495.

[35] Nolan, R.L., "Managing the Crisis in Data Processing," *Harvard Business Review,* Vol. 57, No. 2, 1979, pp. 115-126.

[36] Palvia, P. and Palvia, S. "MIS Issues in India, and a Comparison with the United States, " *International Information systems,* April 1992, pp. 100-110.

[37] Palvia, S., Palvia, P. and Zigli, R.M., "Global Information Technology Environment: Key MIS Issues in Advanced and Less-Developed nations," *The Global Issues of Information Technology Management,* Idea Group Publishing, 1992,

[38] Palvia, P. "The Global Information Technology Environment," *Journal of Global Information Management,* Vol. 1, No. 2, Spring 1993, pp. 3-5.

[39] Rao, K.V., Huff, F.P. and Davis, G.B. "Critical Issues in the Management of Information Systems: A Comparison of Singapore and the U.S.A.," *Information Technology,* Vol. 1, No. 3, 1987, pp. 11-19.

[40] *Shieh, H.S. "Experiences of Computerization," *Information Management Association Communication,* Vol. 26, August 1991, pp. 20-21.

[41] *Sun, W-S. "The IS of General Hospital: Services Patient a Priority," *Information & Computers,* December 1992, pp. 43-46.

[42] Trauth, E.M., Farwell, D.W., and Lee, D. "The IS Expectation Gap: Industry Expectations Versus Academic Preparation," *MIS Quarterly,* pp. 293-307.

[43] U.S. Department of Labor. *Occupation Outlook Handbook,* Bureau of Labor Statistics, Government Printing Office, Washington, DC, 1989.

[44] Vitale, M.R. "General Motors Corporation: The Buick Epic Project," *Harvard Business School,* Case No. 9-188-058, 1988.

[45] Wang, P. "Information Management Systems Issues in the Republic of China for the 1990s," *Information & Management,* Vol. 26, 1994, pp. 341-352.

[46] Wang, P. and Turban, E. "Management Information Systems Issues of the 1990s in the Republic of China: An Industry Analysis," *International Journal of Information Management,* Vol. 14, 1994, pp. 25-38.

[47] Watson, R.T. "Key Issues in Information Systems Management: An Australian Perspective — 1988," *Australian Computer Journal,* Vol. 21, No. 3, 1989, pp. 118-129.

[48] Watson, R.T., and Brancheau, J.C. "Key Issues in Information Systems Management," *Information & Management,* Vol. 20, No. 3, March 1991, pp. 213-223.

[49] Wilder, C. "Foreign and U.S. Executives See Eye-to-Eye on the Top IS Issues," *Computerworld,* May 22, 1989.

[50] *Young, C-M. "Analyze Computerization Problems of Small and Medium-Sized Firms," *Information & Computers,* December 1992, pp. 68-76.

[51] *Yueh, M-H. "The Boss is in Charge of Computerization," *Information Management Association Communication,* Vol. 27, January 22, 1992, pp. 46-47.

[52] Zachman, J.A. "A Framework for Information System Architecture," *IBM Systems Journal,* Vol. 26, 1987, pp. 276-292.

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