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# CURRENT PRACTICES IN INFORMATION SYSTEMS DEVELOPMENT OF ACADEMIC INSTITUTIONS IN TAIWAN

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*The main objectives of this study are to identify the current practices of information systems development of academic institutions in Taiwan. A questionnaire was developed and distributed to chief information officers (CIO) of 88 academic institutions in Taiwan. Results show that approximately 90 percent of the computer information centers are performing evaluation of their installed information systems. They perform evaluation at a time when the system is not fully functioning or when the system is fully installed with some meaningful performance data. The most frequently evaluation criteria and the most important perceived benefits are identified. In addition, the most likely reasons to inhibit evaluations are recognized. The results of this study are intended to raise the awareness of CIOs in order to enable them to evaluate information systems more effectively. For the researcher, this study identifies areas that require further research efforts and will be relevant to the academic CIOs' evaluation needs.*

## 1 Introduction

The uses of computing facilities and information systems by executives, managers and professionals have rapidly increased within the past decade. This phenomenon has been referred to as end-user computing (Hoopes, 1990). The success of these systems depends on the effective and efficient information system design and use process. Moreover, a sound and complete design paradigm evaluation is a key element to achieve such success (Kokol et al., 1991). Therefore, the evaluation of the information systems is becoming an important issue in the management and control of information systems (Kumar, 1990). Hoopes (1990) stated that the establishment of information centers could solve many problems associated with the end-user computing. However, the need to evaluate the performance of information centers in order to meet the objectives of organizations is increasing. It was also suggested that the concepts and problems from information systems evaluation can be transferred to the information centers evaluation. This points out that the importance of the information systems evaluation in information centers. Despite the fact that information system have been in existence for decades, Rainer et al. (1993) noted that information systems have not fully developed as a cohesive academic discipline. The authors went on to define the end-user computing construct and operationalized the construct through development of a valid and reliable

measure in a university setting. In addition, it was pointed out that academic institutions are considered to be knowledge and information intensive organizations (Sabherwal et al., 1994).

The main objectives of this study are to identify the current practices for information systems development of academic institutions in Taiwan. It intends to gain insights and directions for further empirical work. Eight categories of research questions are studied. These questions include: roles of the information center, acquisition of information systems, percentage of systems being evaluated, timing of systems evaluation, participants of systems evaluation, criteria of systems evaluation, uses and benefits of systems evaluation, and inhibitors of system evaluation.

## 2 Research Methodology

One survey instrument was used to evaluate process of information systems installed in the information center in this study. The questionnaire was mainly adopted from Kumar's previous research (Kumar, 1990). For the purpose of this research, it was translated into Chinese and then administered in Taiwan, Republic of China (R.O.C).

In order to assure the questionnaire's content validity, a content validation of these items in Chinese was conducted by two rounds of pilot study. Participants were invited to study the questionnaire and comment on those items which were vague and/or irrelevant to IS evaluation activities. First, four IS academicians were interviewed. Second, the revised version of the questionnaire was sent to 20 academic CIOs. Finally, the revisions were made to clarify the meanings of items which may be damaged in the translation process.

The sample was chosen from the Directory of the Republic China Technological Organizations published by the National Science Council in 1993. Due to the exploratory nature of this study, it is appropriate to use a single round mailed survey approach. Each mailout included a questionnaire, a letter, explaining the purpose of this study, and postage-prepaid return envelope. There were 88 questionnaires mailed. 33 of them returned with sufficient data included in this study. The usable response rate was 37.5 percent.

## 3 Results

This section presents the research findings regarding information system evaluation practices in the respondent information centers of Taiwan's academic institutions. All returned questions were coded to obtain institution types

and additional information. The sample contains responses from a variety of institutions. More than 76% of these institutions had maintained information centers for more than five years. 75% of the responding institutions employed less than 10 persons.

The three most important functions were to support teaching activities, to support administration activities and to support academic research. To support neighboring industries played the least important function. The most important way of obtaining information system was developed by the information center itself. Others included buying from the market, outsourcing, and being donated by governmental institutions or business organizations. This finding reflects that the nature of academic institutions is to support teaching-related activities.

More than 90% of the information centers surveyed were evaluating their installed information systems. That is, less than 10% of information centers were not evaluating any of their installed information systems. These respondents were eliminated from further analysis.

The two most frequent stages to perform systems evaluation appear to be before the cut-over to the newly installed information systems and six months after systems installed (21 percent for each case). The results indicate that the evaluation process was performed with two totally different viewpoints. One viewpoint was to perform evaluation at a time when the system is not fully functioning. The other was to perform evaluation when the system is fully installed and has some meaningful performance data. Furthermore, half of the respondents performed their system evaluations during the period "just prior to" and "immediately following" the cut-over to the newly installed system (1 month after, 18 percent). This finding is consistent with Kumar's previous research (Kumar, 1990), which indicated that approximately 52 % of the organizations performed their evaluations during this period of time.

As to the major participants in system evaluation process, the result shows that CIOs are the major participants. 75% of responding CIOs actively manage and perform evaluation. 68% of responding CIOs determine the evaluation criteria. 65% responding CIOs determine the evaluation method and review the evaluation results. Also 21% of responding CIOs are allowed to approve follow-up action. The user department managers mainly participate review-evaluation-results (65%) and management-and-performance-evaluation (54%) activities. This finding may suggest that the user departments are very interested in adopting an effective system and maintaining adequate quality of the installed systems. Although the system development team members participate in system evaluation process, they are not the highest ranking participants. It is interesting to find that the faculty of MIS departments also play an important role in determining evaluation criteria and method (59%). 65% of the external audit departments and 48% of the internal audit

departments are not involved in any system evaluation activities.

Sixteen items of systems evaluation criteria were provided to allow respondents to indicate how often they consider these criteria in evaluation process. A five-point Likert scale ranging from 1 ("never evaluated to") to 5 ("always evaluated") was used for each criteria to allow respondents to indicate the degree of perception. The result shows that the top five most frequently evaluated criteria and their corresponding mean values were: the accuracy of information (4.35), user satisfaction and attitudes towards the system (4.29), the system's fit with and impact on the organization (4.17), system usage (4.14), and timeliness and currency of information (4.00). These top criteria are reflected in the high percentage of evaluation participants, as discussed, that the evaluation criteria were determined by the CIO, the system development team, and the user department. The criteria of accuracy and timeliness of information were used to evaluate the quality of information product. Along with the criteria of user satisfaction and attitudes towards system reflect the current value biases of system developer (Kumar, 1990). It is surprising to find that socio-technical factors such as system's fit and impact on organization, and system usage were among the top five criteria. These criteria were indicated to be lack of interest by the system professionals (Kumar, 1990). There is no comparable data available to show the reasons for such a difference. However, it is reasonable to say that the different organizational settings may view the usage of information systems in a very different way. In addition, it may suggest that the main concern of the Taiwan's academic CIOs is to see how the installed systems being accepted by the users and their organizations. The five least frequently evaluated criteria and their corresponding mean values were: the project schedule compliance (3.31), the internal controls (3.35), the hardware performance (3.45), the net operating costs-saving of the system (3.52), and the appropriateness of information (3.66). It is no surprise that the criterion of project schedule compliance was the least frequently used to evaluate the information systems because developing information systems was not the major function of the information centers. Also, because the internal audit departments were not the major participants of evaluation, the criterion of the internal controls was not used often. The hardware performance could reflect that the rapid improvement of the hardware technology has made hardware evaluation become unimportant. Finally, although the cost-benefit analysis of information systems is an important process in developing systems, the criterion of the net operating costs-saving of system was in the least frequently evaluated.

Twelve items were used to indicate the perceived benefits and uses of evaluation. A seven-point Likert scale ranging from 1 ("not at all important") to 7 ("extremely important") was used for each criteria to allow respondents

to indicate the degree of importance. The result shows that the five most important perceived benefits and their corresponding mean values were: to evaluate and refine the system controls (6.29), to verify that the installed system meets system requirements (6.03), to provide feedback to system development personnel (5.89), to clarify and set priorities for needed modifications to installed systems (5.72), and to provide feedback for modification to development methods (5.69). These findings show two different purposes for evaluation. One is that to verify that the installed system meets system requirements, and to clarify and set priorities for needed modifications to installed systems are important activities for closing out the system project and disengaging from the system. The other, however, is that to evaluate and refine the system controls, to provide feedback to system development personnel and to provide feedback for modification to development methods are for the purpose of either long-term assessment of the system impact and effectiveness or for the purpose of providing feedback to modify inappropriate development and project management practices. The least important use and its corresponding mean value was to evaluate the system development project personnel (5.11). This finding reinforces the first observation discussed above that the use of evaluation is to disengage from the system. It may also clarify those who consider the evaluation as a personnel evaluation device. Finally, to close out the system development project (5.18) and to transfer responsibility of system from developer to users (5.28) were also of low important uses of the evaluation process. This reinforces the second observation discussed previously that the uses of evaluation were for the purpose of long-term assessment and feedback to modify installed systems.

Although about 90 percent of the surveyed information centers in Taiwan's academic institutions were performing evaluation of the installed information systems, only 19 percent of them evaluated 75% or more of their installed systems. Still 9% of the information centers did not perform any system evaluation. In order to understand the reasons that the system evaluation process was not performed, seven items were used to assess the extent to which reasons prevented them from performing evaluation. A five-point Likert scale ranging from 1 ("very unlikely to inhibit evaluation") to 5 ("very likely to inhibit evaluation") was used for each criteria to allow respondents to indicate their degree of perception. The result shows that the two most likely reasons to inhibit evaluations and their corresponding mean values were: the lack of evaluation methodologies (3.76) and the lack of agreement on evaluation criteria (3.69). Since appropriate criteria, measures, and methods for information evaluation are still controversial (Kumar, 1990), this finding is no surprise. That the users are not available to spend time on evaluating activities is also considered to be a possible hindering reason. Finally, those decision makers seem to have perceived adequate benefits from evaluation. This may prove that system evaluation

does provide the management useful information regarding the installed information systems.

#### 4 Conclusion

This paper presents results of the current evaluation practices of information systems development of academic institutions in Taiwan. On the criteria of systems evaluation, the study shows that the top five most frequently evaluated criteria are: accuracy of information, user satisfaction and attitudes towards the system, the system's fit with and impact on the organization, system usage, and timeliness and currency of information. On the uses and benefits of systems evaluation, the study indicates that the five most important perceived benefits and uses are: to evaluate and refine the system controls, to verify that the installed system meets system requirements, to provide feedback to system development personnel, to clarify and set priorities for needed modifications to installed systems, and to provide feedback for modification to development methods. On the inhibitors of systems evaluation, the study shows that two most likely reasons to inhibit evaluations are the lack of evaluation methodologies and the lack of agreement on evaluation criteria. Also, that the users are not available to spend time on evaluating activities is also considered to be a possible hindering reason.

In conclusion, the results of this study provide individual CIO with current state of practice in evaluating information systems nationwide in order to understand which areas do not receive adequate attention. For the researcher, this study identifies areas that require further research efforts and are relevant to the academic institution executives' evaluation needs.

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# Information Technology and Communication Networks in Banks : An Indian Perspective

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## Abstract

*Implementation of Information Technology application in Indian banks remained at a very slow pace because of various reasons. Priorities of top management, in the Indian public sector banks were to spread the banking network in the country rather than look into the profitability of the banks. However, the changed scenario of liberalization and globalization has thrown many important issues for Indian banking and financial sector. Today, almost all banks in the country are concerned about the bottom line – profitability, global competition and providing efficient services to customers. All these are possible if computers, communication networks and quantitative tools are used appropriately in the banking sector. Almost all banks in the country are planning strategies to implement IT tools.*

*A study is being conducted to examine and analyze the implementation of computerization and communication network applications in the Indian banking sector. This Paper deal with the needs of IT tools in the banking sector and the current status, the future prospects, problems and issues of IT in Indian banks.*

## Introduction

Banks and financial institutions constitute the backbone of a country's economy as they provide the catalytic effect to the economy of the country by mobilizing financial resources. To achieve full productivity potential, the Government of India launched a series of structural changes in industrial, trading, agricultural and financial sectors. The basic strategy is to improve the efficiency of the systems by deregulation and globalization of the country's economy. In the changed environment, government's control over various industries and sectors is being reduced or removed indigenously. Organizations have to compete not only within the country but also with organizations from abroad. To survive in the competitive and global environment, the organizations have to be constantly on the improvement track. Organizations have to accept the international standards and practices in providing products and services.

The changed market scenario in India has thrown up many complex problems in decision making, operational control and strategic requirements of information. Information may be required from or delivered to many points of sale across centres, organizations and countries. In many cases further filtering/analysis of information is needed to arrive at the most suitable decision. All these are possible if computers, telecommunication networks and quantitative tools are used appropriately.

## Current Status

Some of the factors responsible for non-implementation of IT tools in the Indian Banks were : (a) 'other' priorities of the top Management, (b) IT planning was not a part of the overall goal of the organization, (c) organization culture was not tuned to the new technologies, (d) lack of competitive spirit, and (e) the resistance from the unions.

As a matter of fact, the urgent requirement of the Indian banking sector was to develop a vast branch network throughout the country and particularly in the rural and semi-urban areas which has been satisfactorily achieved as a result of nationalization of the banking sector in 1971 by the then Prime Minister, Mrs Indira Gandhi. Today, Indian banks and financial institutions are highly developed entities with more than 61000 branches of 274 scheduled banks.

However, there is a major shift after the October 1993 agreement of banks employees unions and management of banks. Now bank unions have agreed for the computerisation of a wide range of actions including development of communication networks. In the last one year, around 180 branches of the nationalized banks have been fully computerized and around 1000 branches are in the process of computerization. Even the utility of Society for Worldwide Interbank Financial Telecommunication (SWIFT) network is also growing. Unfortunately, BANKNET, the national network developed for Indian banks in 1991, did not take off as expected.

So far, induction of IT in Indian banks was guided by industrial relations. Banks, unions allowed very restricted computerization activities. Till the last agreement of October 1993, Indian banks were allowed to computerize part of the branch activities known as Automatic Ledger Posting Machine (ALPM) for saving, current accounts, cash credits, general ledger, term deposit, etc. In the beginning of 1994, around 3000 branches of nationalized banks were using around 8900 ALPMS, also 18 banks installed mainframe computer systems at their head quarters and 400 mini computers were under operational at zonal offices, regional offices and headquarters of various banks. No Indian bank has yet implemented corporate network but 3 banks have started linking their branches using point to point connection. It is interesting to note that the top 100 centres in the country account for about 60 per cent of the total banking business. Today, there are around 500 totally computerized branches of all banks in the country and many more banks are in the process of computerizing their branches. It is expected that around 4000 branches having 70 per cent of the total banking transactions in the country will be computerized within the next five years.

## A Proposal for Future IT Plans in Indian Banks

In the Indian banking system, till now the main focus remained on computerisation of transaction processing. Now the need is a systematic plan of other IT applications, communication and integration with transaction processing. For example, the application of IT in office automation and communication will increase the overall productivity of the organization manifold. Today, the major concerns of each bank is to minimize non-performing assets (NPAs), loss making branches, increase the business with the lowest risk. If simple software packages such as word processing, spreadsheet, Data Base Management Systems, etc., are used in branches and administrative offices then the staff and officers will have enough time to look into other problems such as NPAs, increasing in business, etc. These machines can also be used to generate new ideas, products, derivatives, etc., from the employees and customers and can be passed on to an appropriate authority in the bank.

Other applications such as Decision Support Systems, Executive Information Systems, Expert Systems should be implemented in specialized centres such as forex dealing, funds management, regional offices, head office, etc. Before a plan of computerization is developed and the actual implementation starts, the organization should also try to simultaneously integrate with this the financial telecommunication and network services.

It is proposed that a bank should have Total Branch Computerization (TBC) in 20 per cent of branches and office automation in other 40-50 per cent branches having power supply and telephone facilities, and 5 per cent locations such as HO, RO, ZO, forex, funds management, clearing operations, etc., should implement DSS, MIS, expert systems and corporate network, etc. The corporate network is designed and developed such a way that it can be linked to intra bank/financial institutions, (domestic, international) networks, or to specialized functional networks to integrate all business activities.

Finally, the Indian banking and financial system will have five types of networks as given below :

- (a) Corporate network of a bank/financial institution or group of banks and financial institutions;
- (b) BANKNET/RBINET – Intra banks/financial institutions/ RBI network;
- (c) SWIFT, international financial network,
- (d) Dedicated set of activities network such as clearing operations networks, shared ATMs, etc.
- (e) Financial information service network such as Reuters for forex information, National Stock Exchange network for securities.

Eventually 65-75 per cent locations of a bank will have IT tools and various applications integrated and implemented as shown in Figure 1. The above agenda of introduction of IT tools will require proper planning implementation schedule. This can be achieved in phases and ultimately with integration of all applications. The time frame to achieve this may range from 3-5 years depending on the resources available with the organization. Cost of the system at each stage will vary on the requirement type of solution. It is estimated that a bank having 1000 branches

may be Rs. 100 crores (\$ 33.33 million).

As far as return on the investment is concerned, it is that it will be paid back within five years. Some of the tangible benefits are :

- (a) Saving in the current operating expenditure by reduction of various cost.
- (b) Saving on the salary of surplus staff which may be used for other business. Around 50 per cent staff becomes surplus if the transaction are computerized at branch level.
- (c) Increase in the business volume and generation of new business.

These tangible benefits are possible if a systematic plan is developed otherwise the recurring expenditure can go up without any monetary benefits to the bank. Of course, one should not only see the tangible benefit as the reason to make the investment on IT. Apart from improving the customer services there are numerous other benefits which may not be visible in the immediate future but they are going to be important factors for the survival of the organizations in the long run.

## Conclusion

The top management should look into the IT strategy as part of business goal. The corporate strategy must be aligned with IT strategy and the corporate strategic plan should be influenced by IT strategy. There has to be complete integration of both as a part of business goals. To implement IT strategy for business goals, the top management should not view the benefits in terms of return on investment or cost displacement. Particularly, when IT applications are implemented for office automation, communication, DSS and expert systems it may be difficult to estimate the gain in monetary terms immediately. But the benefit which will accrue other than saving on cost will be much more. The whole culture will change and the organization will be ready to take up new challenges in the coming years.

The implementation approach must be outward looking rather than inward looking. Instead of looking at computers and network goals one should envision and perceive the business goals of an organization and draw up plans for IT accordingly. The IT plan has to be achieved in phases. The long term objective must be planned and updation from one phase to the next phase must be smooth. Other issues such as integration of all applications, training of IT personnels and users must be simultaneously thought.

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