Information Systems in Engineering Colleges of Punjab-Design, Implementation and Challenges

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Abstract*—A large number of engineering colleges in Punjab have started to solve problems of strategic planning and control systems improvement by means of modern information-communication technologies only few years ago. Despite of use of computers and local area networks, there are a large amount of troubles and barriers basically of organizational and methodical character which are necessary to solve for successful MIS introduction. The purpose of the paper is to purpose a design of MIS for colleges, examine the implementation level of management information systems in various colleges of Punjab and scrutinize various challenges to it. The study used the qualitative survey methodology. Data were collected from a sample of 50 subjects from various colleges in Punjab. Data collected were analyzed, graphs were formulated and challenges were scanned.*

Keywords: *Management Information System (MIS), colleges, decision making, challenges, implementation*

I.   INTRODUCTION

Today there are a significant number of private universities & colleges in various states of India and the numbers are growing very rapidly day by day. Punjab is also one among them. [9] Punjab is a progressive State of India with an average growth rate of 10% and has evolved into a land of boundless opportunities for investment, industry, education and employment. Punjab is ranked seventh in terms of education amongst the States. Being an agricultural state, a large part approximately 66% of

the population lives in the rural area while the rest 34% is urban resident. As per all India Education Index, Punjab has been adjudged at No 6 place and as per infrastructure index; the State is at No 1 position. Private sector accounts for approx. 90% of the technical institutes in the State. There is a strong higher educational network with 136 Government aided and 188 private colleges out of which there are approximately 80 engineering colleges. With growing pace of industrialization in Punjab, the main stress has been on expansion, modernization and reorientation of professional and technical education system so as to ensure quality. But most of the educational institutes are lacking in effective utilization of resources leading to inefficiency in management system which leads to the requirement of effective implementation of management information system.

Management Information System (MIS) is organized approach to design and implement man-machine procedures, processes, and routines that provide suitably detailed reports in an accurate, consistent, and timely manner to support the management operations in any organization. The success of decision-making, which is the heart of administrative process, is highly dependent partly on available information, and partly on the functions that are the components of the process. Modern, computerized systems continuously gather relevant data, both from inside and outside the organization. This data is then processed, integrated, and stored in a centralized database (or data warehouse) where it is constantly updated and made available to all who have the authority to access it, in a form that suits their purpose.

Why MIS is required in Educational Sector?

1) *For effective utilization of resources leading to efficiency in management system*

2) *To obtain accurate and timely information for planning, budgeting and decision making*

3) *To properly organize such information*

4) *To standardize the system of obtaining reports and statistical information from the various sources*

It is interesting to know that Management Information System can exist without computers but it is the power of the computer which makes it more feasible. Computer based user-machine features of an MIS affect the knowledge requirements of both System Developer and System User. Management Information System has become a must and should for every organisation looking towards progress.

II. LITERATURE REVIEW

According to **Aminu (1986**) , information resource is one of the major issues and indices of education planning. Where the relevant information required for planning are not available at the appropriate time, there is bound to be poor planning, inappropriate decision making, poor priority of needs, defective programming or scheduling of activities. Hence, the education system will not be efficient and effective in its operation.

The more complex an organization's structure is, the greater the need for coordination within and between sections and departments. However, central to the needed coordination is information. This view is expressed by **Murdick and Ross (1971)** , when they concluded that: Information is absolutely essential to the survival of an organization. As organisations grow, the higher demands of scale and complexities require large information processing. Thus, the information needed for effective decision making in colleges cannot be provided from people's often-deficient memories.

It is significant to note that the existence of alternatives, based on relevant information, is a necessary condition for making a decision. This analysis was supported by **Ogunsaju (1990),** when he pointed out that education decision must be based upon sound and well informed evidence that are highly intelligent, rather than those that are weak and baseless. For effective decisions to evolve in any organization, therefore, receiving information from, and supplying information to, people within the system are a necessity. The information so communicated must be accurate and up-to-date to cope with uncertainty. Uncertainty is the condition in which the manager has little information relevant to a decision and there is no way to predict the outcome of the decision.

Fabunmi (2003) stated that MIS is useful in making decisions to solve many of the problems facing educational institutions. Such problems include poor programme scheduling, poor estimate of staff requirements, lack of accurate information on students, personnel and facilities, piling-up of administrative matters, wastage of spaces, lack of feasible budget estimates among others.

According to **Knight (2005) [4],** there are mechanisms that drive continuous investment in bricks and mortar education, and deny the expenditures that would establish virtual universities by means of telecommunication networks. Even if they wanted to, administrators are restricted in their freedom to move in this direction by traditional funding formulae. Promotion and tenure procedures are seen as barriers in the universities. In many institutions, the primary requirements

for promotion and for tenure procedures are publications in traditional journals and teaching in traditional classrooms.

According to **Obi (2003) ,** MIS is useful in the area of decision making as it can monitor by itself disturbances in a system, determine a course of action and take action to get the system in control. It is also relevant in nonprogrammed decisions as it provides support by supplying information for the search, the analysis, the evaluation and the choice and implementation process of decision making.

Adesina (1988) upheld the important role of information in decision-making by elucidating that the amount of information available to a decision-making group affects the product of that group. **Sisodia (1992)** advanced the notion of decision-making as a total process involving discernible and separate activities. The first of such activities is information gathering, which is followed by evaluation of alternatives and finally a choice. The first task of the manager is to design and manage the flow of information in an organization, in ways that would improve productivity and decision-making. Information must be collected, stored, and synthesized in such a way that it will answer important operating and strategic questions.

According to UNESCO survey report [10], over forty World Bank education projects over the last four years have had components related to the development of education management information systems (EMIS), but little is known about best practices and lessons learned from such investments. While EMIS are perhaps the least glamorous types of ICT-related investments in education, they appear to be the most often deployed used of ICTs in large donor-funded the education sector. The sheer number and magnitude of such investments, combined with a lack of rigorous studies on their implementation and effectiveness, points to a potential for waste and inefficiencies. Anecdotal evidence suggests that EMIS in World Bank projects, as well as those supported by other donors, are often behind schedule and/or have to be significantly re-worked. Given the seeming ubiquity of their use in donor-funded projects and the absence of useful planning materials, case studies on EMIS planning and deployment, as well as best practices and lessons learned, would be useful planning tools for donor staff and educational policymakers. Just as a liquid changes shape to fit the receptacle into which it's poured, so too should an EMIS fit the particular environment into which it is introduced. This is especially the case in countries struggling to meet EFA and education-related Millennium Development Goals (MDGs) by 2015, which typically have great needs related to data collection, analysis and dissemination, but limited experience with and capacity for the effective use of EMIS.

The effective use of EMIS can be confounded by a variety of social and cultural factors. Some governments complain that EMIS are imposed by donors more as control mechanisms than as tools for learning and effective planning. Local governmental authorities may have similar complaints about their participation in EMIS managed by a central governmental authority, especially where there is no history of (and trust for) sharing information and receiving anything useful in return. Management information systems in the education sector are often designed by technical people, ignorant of prevailing educational policies and with insufficient input from education specialists, as stand-alone systems, not integrated with information systems in other parts of government. It should be noted that integration with other systems and planning mechanisms may be increasingly critical where donors are moving toward sector-wide approaches (SWAPs) to enhance their cooperation and collaboration.

III. DESIGN OF AN MIS FOR COLLEGES

There are four categories of management information systems: (1) databank information system, (2) predictive information system, (3) decision-making information system, and (4) decision-taking information system.

Following steps can be followed for designing an MIS:

A.   Step One: *Evaluate Information Needs for Planning, Monitoring, and Evaluation*

An investigation needs to be conducted into the types of decisions that college management has to make. For example, staff seeks solutions to their problems from their seniors. In turn, senior staff needs to be in a position to resolve these problems and to document how problems were solved for future reference.

B.   Step Two: *Decide the Levels of Information Groups, Information Frequency, and Content*

The number of information groups within a particular college has to be decided because each group requires a different type of information. Data processing consists of identifying each item of data and systematically placing it within a scheme that categorizes data items on the basis of some common characteristic or feature. Information retrieval refers to the ability to take different types of data in the storage media A properly designed storage and retrieval system matches the related variables efficiently and accurately. In some cases, it even suggests alternative courses of action for management to take.

Presentation of information should be in a form and format suitable to the needs of management and employees. Generally, information is presented in reports, statistical summaries, analyses, and so forth in the form of text, figures, charts, tables, and graphs. The presentation of information should be precise, clear, and appealing.

C.   Step Three: *Ensure System Flexibility and Compliance*

Flexibility means the ability to retrieve information from a system in whatever form it may be needed by decision makers. Therefore, data need to be collected in some detail so that they can be rearranged or summarized according to the needs of managers. But system design should not be too complex because it must first serve the needs of all levels of management that are likely to be instrumental in collecting important components of the original data. Therefore, considerable care must be taken in assessing what types of information are required by management at the different levels. At the same time, effort must be made to ensure that the information collected meets acceptable standards of accuracy, timeliness, and coverage for each level.

D.   Step Four: *System alternatives and evaluation: Centralization versus decentralization*

A completely centralized information system handles all processing at a single computer site, maintains a single central database, has centralized development of applications, provides central technical services, sets development priorities centrally, and allocates computer resources centrally. The system's remote users are served by transporting input and output data physically or electronically.

A completely decentralized system may have no central control of system development, no communication links among autonomous computing units, and stand-alone processors and databases at various sites. Each unit funds its own information-processing activities and is totally responsible for all development and operation.

An advantage of centralized information systems is that they provide for standardization in the collection of data and the release of information. There also are some *economies of scale. A* centralized system reduces the need for multiple hardware, software, space, personnel, and databases. It may be possible to recruit more qualified personnel in a central facility.

Observations indicate that user motivation and satisfaction are increased under a decentralized environment. This is attained because users feel more involved and more responsible, systems are better customized to their specific needs, and they usually get better response time in routine operations as well as in requests for changes.

It is likely that for an educational organization, neither a completely centralized nor a completely decentralized system is desirable. While it may be useful to decentralize hardware and software resources at different locations, the development of applications and provision of technical services may better be centralized.

E.   *Step Five: End-user computing*

The extensive use of personal computers and computer-based workstations has brought with it the age of end-user computing. End-user computing is a standard term for any information-processing activity performed by direct end users who actually use terminals or microcomputers to access data and programs. The manager as end user may be provided with powerful software (like DBMS) for accessing data, developing models, and performing information processing directly. This has brought computing directly under the control of the end users and eliminates their dependence on the information systems specialist and the rigidities of predesigned procedures. They may now make ad hoc queries of information and analyze it in various ways. They may write programmes, or may often use ready-made programmes stored in the computer, using the computing power of a local PC or the mainframe to which it is connected.
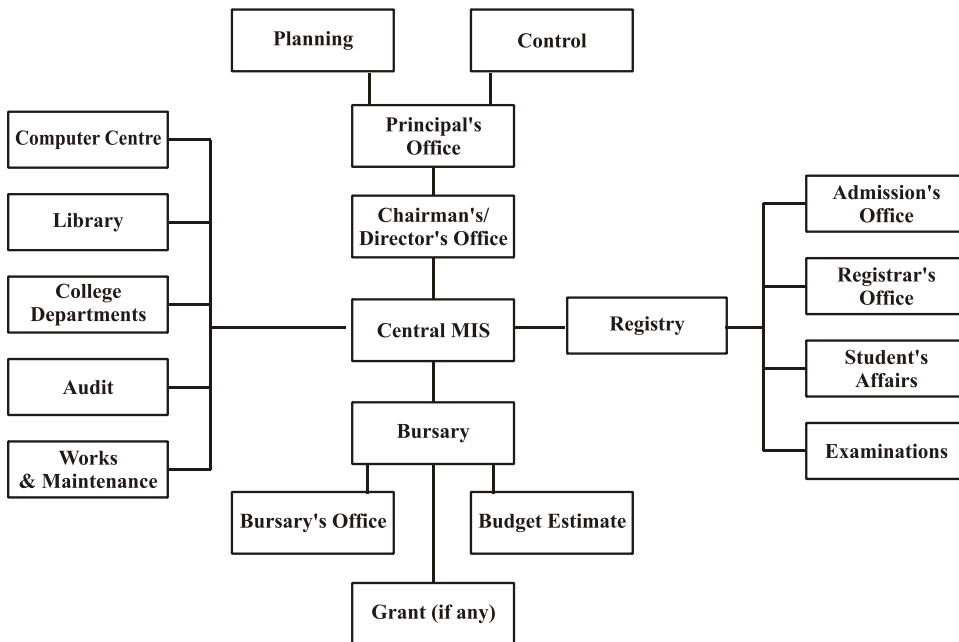

Figure 1: *A typical MIS for a college*

IV. METHODOLOGY

The study populations used involve 50 teaching and non teaching staff of various engineering colleges of Punjab. A set of questionnaire was given which contained 9 items on the use of management information systems for decision making in engineering colleges. The respondents were also asked to cite the biggest challenge, which they think is there to the implementation of Management Information Systems in colleges. Their responses have been concluded in tabular form as shown:

Frequency of usage	Expenditure estimate	Revenue estimate	Student enrolment estimation	Staff recruitment practices	Stocking library with books and journals	Promotion of staff	Staff training and development	Academic Records	Average percent usage
Always	36%	40%	80%	44%	60%	10%	34%	80%	48%
Occasionally	44%	42%	20%	34%	40%	40%	66%	20%	38%
Never	20%	18%	–	22%	–	50%	–	–	14%

Table 1:

The table shows the percentage use of MIS in various decision making systems in engineering colleges of Punjab
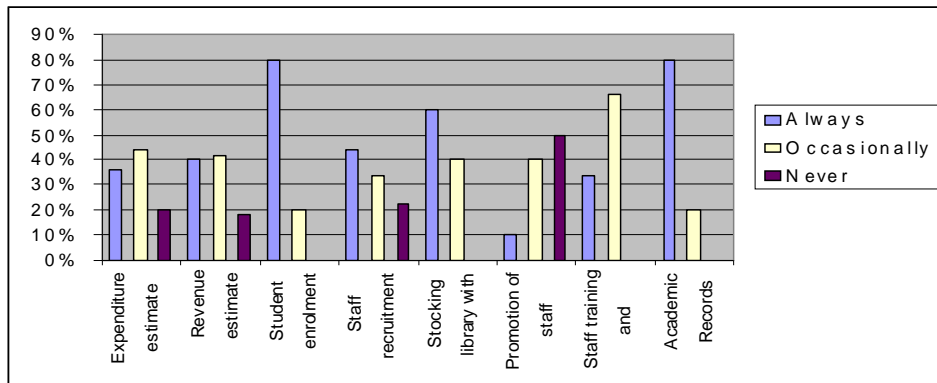

Figure 2:
The percentage use of MIS in various decision makings in engineering colleges of Punjab
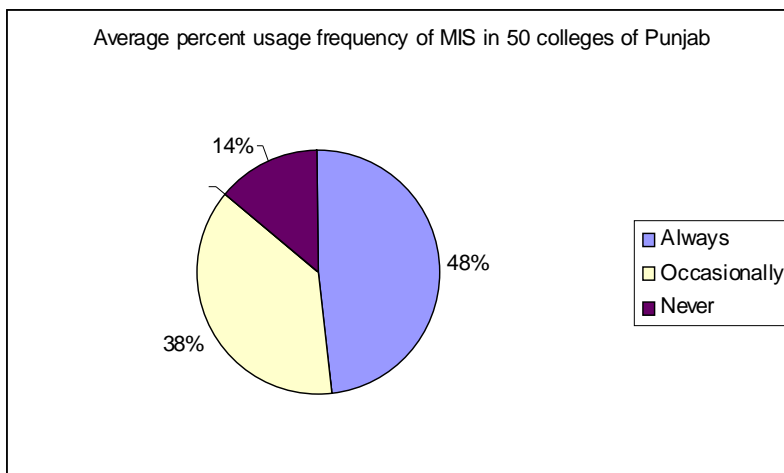
Figure 3: *The average percent use of MIS in 50 engineering colleges*

V.   FINDINGS

The above findings indicate that around half of the engineering colleges implement MIS in decision making in various fields. Out of this, highest usage is in student enrolment and maintenance of academic records followed by libraries. On the contrary, the use of MIS in student enrolment, budget and expenditure was below average. The minimum use was found in decision making regarding promotion of staff. It is also found that libraries, staff training and development programs and student enrolment programs are either fully or partially automated.

CHALLENGES FOR MIS	% Of Respondents
Do not know	24%
Making IT Accessible to all	22%
Poor Maintenance and Update Culture	18%
Getting Used to MIS	14%
Non allocation of sufficient budget	10%
Lack of educational program for MIS users	8%
Used software complexity in MIS	2%
Electricity problem	2%

Figure 4: *Challenges for MIS*

VI. CHALLENGES FOR MIS IMPLEMENTATION

MIS Implementation in engineering colleges of Punjab is loaded with challenges. This is proved with the above survey. The respondents cited different challenges for MIS implementation.

F.   *Do not know:*

Surprisingly, the highest number of respondents i.e. twelve said that they did not know about any challenge to MIS implementation.

G.   *Making IT Accessible to all:*

22% subjects cited that a lot of the staff especially senior staff is still not computer literate. This is a great thwart in computerization. Some are hesitant to chuck out their old mindset which resists change. Many are conservative and suffer technology phobia. Although the use of electronic information increases job satisfaction, confidence, and the effectiveness of people in their work, lack of technical expertise can be very exasperating.

H.   *Poor Maintenance and Update Culture:*

Nine people raised the issue of poor maintenance culture in Punjab. This erosion is evident in the frequent computer and network breakdowns and/or failures. To handle the growth of the database and ensure fast data entry, retrieval, and inquiry there is need for regular and consistent upgradation of computer facilities.

I.   *Getting Used to MIS:*

The lack of IT skills and the slow process of automation mean that the staff will take a very long time to become very familiar with the package. There is also a lack of technical support. Only few persons are formally trained to initiate, develop, implement, and maintain computerized applications. Those who had been trained gain only limited, or no access, to the packages in which they had been trained.

J.   *Non allocation of sufficient budget:*

Poor financial support is often a major challenge to many colleges. A high rate of inflation continues to water down whatever budgetary provision is made for colleges.

K.   *Lack of educational program for MIS users:*

8% of the respondents still buttress the fact that most administrative staff is trained in traditional administration. They are finding it difficult to cope with the

requirements of the electronic age. Staff training and retraining have not been given a pride of place.

L.   *Used software complexity in MIS:*

One respondent said that softwares used in MIS are too complex for layman to understand.

M.   *Electricity problem:*

One subject also believed that although Punjab is considered a developed state, regular power generation remains a problem in Punjab. Frequent power cuts constitute a serious bottleneck to automation. The cost of running generating plants is expensive.

These challenges have far-reaching effects on the implementation and sustenance of the Management Information System

VII. CONCLUSION

Making IT accessible and poor maintenance and update culture are basic challenges to our educational system. In addition, automation of information resources and services pose new problems. These consist of the acquirement and selection of online information resources, the construction of databases, providing information literacy education for MIS users, and the new skills required by employees. However, if the college guarantees sound and quality automation of services and information resources, creates new advancement to user education, pays attention and helps the employees to master the new techniques obligatory for the management of electronic and the networked information resources and services, the achievements of management information systems are immense.

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