The Triangular Challenges of MIS Implementation in African Countries: A Case Study of a Nigerian University

Sunday Adewumi
Management Information Systems (MIS), University of Jos, Nigeria adewumis@yahoo.com

Adekunle Okunoye
Williams College of Business, Xavier University, Cincinnati okunoye@xavier.edu

ABSTRACT

Implementing management information systems is generally a complex process and it becomes more challenging in Africa due to their pertinent social economic and infrastructure problems. Using the three major steps in the process of transformation of data to useful information (input, processing and output), we discuss how the process of gathering data, storage/processing and production of output could hinder the smooth implementation of MIS in an organizations. After detailed analysis of the case of University of Jos, Nigeria, we recommend some measures that could help in implementation of MIS in similar environments.

INTRODUCTION

Management information systems (MIS) is a system that includes among other things, procedures for collecting data, a database for storing data, and software tools for analyzing data and producing a variety of reports for different level of management. It helps in planning, organizing, directing and controlling the organization's objectives and purposes (Beekman 1999, Simon and Fielden 1997). It helps in handling routine management tasks. The task of MIS is triangular. The input is processed to produce an output; this, when refined, could be fed into the system as input which is again re-processed to produce a better output. Figure 1 represents the triangular process – the challenge. At every stage, care should be taken to secure an error free input, otherwise the input-output process will merely be a garbage-in, garbage out.

In Nigeria, like many other African countries, the much needed supports to sustain the triangle are lacking. This could be partly attributed to resistance to change, which is a common phenomenon in MIS implementations (Adewumi, 2001, Bell and Wood-Harper, 1992). More significant is the initial efforts of even getting a working information systems. Often, the resistances are based on past experience where such changes have not yielded the desired result. Another noticeable cause of resistance to change is that the people who benefit from a manual system may not totally support a system that will promote accountability. The activities of the so called experts have discouraged many at implementing an MIS when they are not able to fulfil all the promises made during the earlier phase on systems developments. Often, the reasons could be associated with economics problems but also lack of adequate expertise contributes in large proportion. This problem is general to all sectors but specifically it is even more pronounce in higher education institutions. Most of the institutions rely on government for funding and they are restricted by government policy (on salary and remuneration) in getting adequate support on MIS implementation

In this paper we discuss our conceptualization of what we termed "triangular challenges" of input, processing and output (see Figure 1). In the triangle, the apex is the PROCESS; the left vertex is the INPUT which is very critical to the success of the activities in the triangle. The right vertex is the OUTPUT which depends on the quality of INPUT and the PROCESS employed. We illustrate the challenges with each of the components with the experience of an MIS implementation at the University of Jos, Nigeria. From this experience, we draw up some recommendations.

The triangular challenge

Developing countries face a lot of challenge in the quest to advance technologically (Samaila, 2000). This is in addition to the fundamental problems of poverty. It has even been argued whether developing countries should be concerned with technological development in the face of other numerous supposedly pressing challenges. Although, this thinking could be discarded as too narrow, but closer examination could reveal how poverty is eroding most of the abilities required to remain focused and committed to technological breakthrough and developments. The much hyped technology transfer has not provided the much needed leap. If anything, it is more of a theory transfer and in some cases leading to an unsustainable system. Developing countries therefore, appear not to have a good grasp of information technology development that is becoming pivotal to other developments. Lack of adequate national information technology infrastructure could affect the organizational technology capabilities, especially, those organizations that primarily depend on government for supports and funding. The information technology inadequacy could be explained using the problems associated with input, processing and output components of information systems. We next explain the three components.

Input stage (Data Gathering) is the most important and has proved to be the most difficult. If we don't have accurate data, the system becomes merely garbage-in, garbage-out. Data gathering should involve a formalized procedure; employing an effective policy for gathering data. This should be put in place to ensure that the means for gathering data are enforced at all levels of an MIS implementation. The world today employs an enterprise, web-enabled data management applications to gather and capture data. Where a type of system for gathering data is in place in the developing countries, most often, such systems
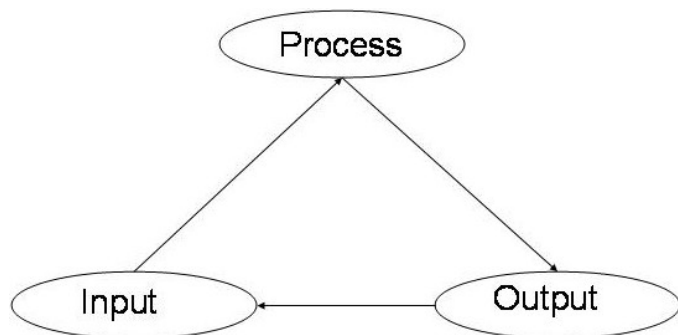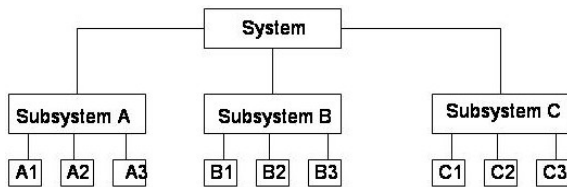
Figure 1: The Triangular Challenge

Figure 2: A unique system factored into Subsystems

Figure 3: Communication between management, programmer and user.

are obsolete, employing outdated procedures for harnessing data. It is common to see many MIS relying on forms completed and entered by third parties for gathering data. This is in contrast to the web-enabled approach that is becoming prevalent in developed countries. The use of forms, entered by a third party could introduce data entry errors that tend to corrupt the system and render it unusable. This could cause delay and extra costs. Most systems employing these procedures are hard to implement and constitute pitfalls that characterize their implementation. Another source of major concern is the lack of basic computer training among users in developing countries. Data cannot be effectively gathered until people have been trained on the type and the use of data.

The power of computing must be sufficiently demonstrated to prove the point that computer can actually takeover routine tasks carried by humans; and that human efforts can then be ploughed back to research and development using the same tool (computer). Once a sufficient assurance is given, and a demonstration is provided to show that data provided can actually be analyzed to provide useful information for planning and also take off routine tasks from people; they will be willing to part with their data. Developing countries need an aggressive drive to create awareness among communities who need to gather and process data.

Process stage (Data processing and storage) in this sense is the actual manipulating of all data fed into the system. This stage requires a platform that is efficient and cost effective. It must be modern, able to re-use existing data and response to adequate system queries. The ultimate system is a web-enabled system where users must be able to log on based on a commonly allowed format for accessing the system. The system may be factored into subsystems, but yet acting as one. It must have a dynamic data manipulating capabilities. Figure 2 is an example of this type of system factored into other subsystems. Developing an efficient processing system is still a challenge for many organizations in developing countries. This could be attributed to lack of fund to acquire state of the arts tools and more often to lack of technical expertise. We recognize the recent significant changes that are ongoing in this regards, however there is still much to be done before the benefit of an efficient processing systems could be reaped.

Data storage is another important challenge that needs attention in the developing countries. The means for storage are expensive as the larger part of the developing countries is in the tropical region with unreliable power supply. In this kind of circumstances, data storage becomes difficult and near impossible. Data must be stored properly to avoid loss.

The system must allow for communication between the management, users and those involved with the design of the system as represented in figure 3. The present curriculum of most information systems and computer science programmes does not provide for adequate training that emphasis user-oriented IS. The graduates of these programmes work in systems design and related jobs but lack the real understanding of the fundamental IS issues. This is one the reasons why there has been recent call for more IS education in Nigeria (Bada et al. 2003) and developing countries in general (Okunoye et al. 2003).

Output (report)

An imperfect output comes from a wrong input and sometimes from an erroneous process. Bad output leads to bad planning. When planning is done with an imperfect output, failure is inevitable. This has been the bane of developing countries which must be corrected. Before an output is used, management must ascertain its source. For it to be reused as input, it must be mandatory to ascertain the initial input and the process (procedures) that acted on the input to produce that output.
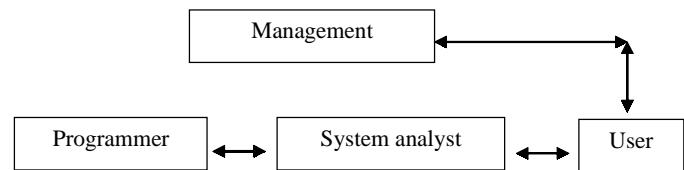
Reports are generated from the information that has been stored in advance in the database. The reports are the results of querying the database. They should be able to aid management in their decision making process. The output should be able to meet management's original thoughts, aspirations and the design. When this is not achieved, the input and the process must be further looked into for a better design.

OUR EXPERIENCE

The case we present here focus on the MIS implementation in the Nigerian University systems using the case of the University of Jos (UNIJOS), Nigeria. UNIJOS is one of the leading federal universities in Nigeria. It is one of the first generation universities in northern Nigeria located in Jos, a city that is 313km to Abuja the capital of Nigeria. Jos has one of the best weather in Nigeria and the city attracts many expatriates and it is well developed. This also could account for the development of the university and the rapid diffusion on information technology (IT). University of Jos has also been able to attract excellent students and faculties and there has been pressing need for adequate management of information. It was established in 1976 and currently has 8 faculties and 12,000 undergraduate students' population. The MIS project was championed by a core of ICT professionals with a director of MIS. He has an extensive experience in MIS implementation and special interest and a well defined vision of taking an enabling information management at all level at the University of Jos. He is supported and encouraged by the senior management.

The evolution of the management information system (MIS) in the Nigerian universities commenced in 1987. At conception, it was recommended that an MIS be introduced to minimize the difficulties encountered in data collection, processing and storage in Nigerian Universities.

The corporate objectives in embarking on the MIS project are:

- Standardization of system of obtaining reports and statistics on staff and students from all universities
- Ensuring that timely and accurate information is obtained and stored for use by National Universities Commission (NUC)
- Rapid generation of increased information for analysis and future retrieval
- Efficient management of information.

After conception of this project, practical action started with the selection of four pilot universities for this project; two each from the first generation universities and one each from the 2nd and 3rd generation universities. University of Jos is one of these pilot universities. The efforts of the pilot universities to implement these objectives have been difficult. The drawback to this implementation partly is slow hardware/software platform and lack of awareness on the part of the university community. But the major drawback has been the resistance to change. There is the concern that IT will take over people's job. This has forced people not to want to support ICT initiatives. With information systems education, although not sufficient yet, potential IT users are beginning to see the need to embrace IT culture. The IT phobia is gradually being overcome by many.

In furtherance of these laudable objectives, data on all staff and students from the inception of this project in 1992 have been captured. The systems have records of about eighteen thousand students (including all the courses they registered for). These records include those students that have graduated from the university. That of staff stands at about

three thousand records. This implementation has witnessed some pitfalls and successes as enumerated below:

Pitfalls have been experienced in input, process and output as follows:

- Input
  Some of our major pitfalls have been in the areas of form harvesting and the lack of adherence to deadlines of registration of students. Most students want to keep their forms until they have certified that the courses they registered for are courses they can easily pass. When forms are not received on time, it will be impossible to capture them and make processing of it useful to decision makers and the users. The attempt to solve all problems all together has been one of the pitfalls we have experienced.
- Process
  The process has seen us going through various platforms in an attempt to solve these problems of getting an appropriate system in place for the use by this university. Going through the memory lane in these efforts has left us with the use of dBase IV platforms from 1991 – 1998. National Universities Commission (NUC) coordinated this period, however there was lack of adequate maintenance for the system due to lack of funding. In 1998, when we saw that the NUC platforms were not being sustained, we started work on the conversion of the systems to MS Access. This experience left us with quick access to basic reports but complex reports were difficult. We also discovered that security in MS Access is not strong enough for use in our environment. When it was obvious that the system in MS Access will not sustain the kind of systems we envisaged, we began to look for ways of migrating to a more robust systems with SQL backend. From 2003, with the support of Carnegie University, we have been able to upsize our data to SQL server. This system is gradually being built to stand the test of time.
- Output
  The major pitfall in the output is that users expected so much from a system they have provided little information for processing, however, the system has been able to assist the university in report generation.

Successes

The successes that we have recorded have been by the tremendous support that we have received from the administration and the ICT Board. The system has not however been able to reciprocate this support. However, a lot of student and staff data have been captured with reports generated for internal and external consumption. Some fraudulent practices arising from the use of manual systems have been checked. Student ID cards are produced from the database; this has helped in the proper identification of all the university students and staff. Reference is now made to us when some divisions of the university are in doubt of the status of any student or staff. The MIS web site on the Intranet has the list of students that have matriculated from the institution since 1992.

OUR PRESENT STATE

University of Jos and like many other Nigerian universities, in an attempt to forge ahead, are planning comprehensive web-enabled enterprise management software where all users can tie in and get all necessary information needed for planning. A lot of efforts is currently geared toward solving the triangular challenge of data gathering, data storage/processing and data output. This initiation will be preceded by a major awareness drive and fundamental computer training for users. The type of system being envisaged for Nigerian system is expected to have the following minimum capabilities:

- An integrated web-enabled systems that allow staff and students access any time, any where to stored information on their records
- Allow the entry of grades by faculty members

- Process all examination results and provide reports in any desired format
- Enable students register for their courses of choice online
- Deny students access where fees have not been paid
- Advice management on staff who are due for retirement
- Allow the query of the database in accordance with set criteria

To be able to achieve this, a lot of resources are required to rebuild and overhaul the entire systems, rebuild the culture of the community on the information technology and sustain this kind of idea.

Further, for objectives to be achieved, fundamental changes are required in the way we have been doing business. Some of these changes will require building bridges among human – machine relationship to enhance the workability of the current system.

Security

Some important issues relating to this kind of system are the security and the issue of user exclusion from certain aspects of the automated system. The issue of exclusion arises because an inexperienced, unauthorized or malicious user allowed free access to a computer based information system could cause wilful or unintentional harm to that system. The System should be harmonized to ensure the judicious use of the system in order not compromise the security of stored data.

RECOMMENDATIONS

Based on the above analysis and the relevant literature (Simon and Fielden, 1997), we make the following recommendations for enhancing the quick implementation of MIS in developing countries in other to avoid common pitfalls enumerated above:

- MIS design should be decentralized and be made closer to the users
- Design must be done in conjunction with user
- Developing countries must be willing to invest in ICT to bring about the much needed change
- To avoid pitfalls, the components of the information system must be properly laid out to resolve all ambiguities.
- Training/awareness drive must be properly coordinated and implemented
- Consultants of repute must be engaged from onset to ensure that international standards are conformed to and enforced.
- Discard the notion that once a computerization project starts it must produce result immediately. Project must be allowed to mature gradually. For non-driven data systems it is possible but not with data driven systems.
- Attempt must not be made to solve all problems all at once; as doing so will almost likely to result in project failure.

CONCLUSION

In this paper, we present the challenges of MIS implementation in a developing country from the perspectives of input, output and processes. This implementation has been near impossible partly because of the misconception about computing and all the benefits it has to offer as a tool for solving problems. It has also attempted to put together the Nigerian experience and the way forward. MIS from design to implementation needs all the professional advice, the interest of administrations, the awareness of users and the involvement of stakeholders to ensure collection of reliable data (input), for efficient processing (process) and effective decision making (output).

REFERENCE

Adewumi, S.E. (2000) *The University of Jos Experience. Working Paper, University of Jos, Jos.*

Bada A., Okunoye A., Aniebonam M. and Owei V. Introducing Information Systems (IS) Education in Nigerian Higher Institutions of Learning: A Context, Content and Process Framework. In *Proceedings of The Nigeria Computer Society*, Vol.14, Number 1, 2003.

Beekman G. (1999). *Computer Confluence* Addison-Wesley Longman Inc. California.

Bell S., and Wood-Harper T. (1992) *Rapid Information Systems Development* McGaw-Hill Book Company

Okunoye A. Bada A. Pick J. Adewumi S. Call for More Information Systems Education in Developing Countries: Perspectives From Information Systems Researchers and Practitioners. In Palvia P. and Liu X. , Proceedings of the 4th *Global Information Technology Management World Conference*, p.319, June 8-10, Calgary 2003

Samaila I. (2000) Management Information Systems for Nigerian University. A report on the MIS conference 2000. A publication of National universities Commission.

Simon T. and Fielden J. (1997) *Implementation of Management Information Systems (MIS) – Pitfalls and Lessons* Commonwealth Higher Education Management Service, ABCD NO. 132.

Related Content

Graph Modification Approaches
 (2018). *Security, Privacy, and Anonymization in Social Networks: Emerging Research and Opportunities (pp. 86-115).*
www.irma-international.org/chapter/graph-modification-approaches/198296

Testable Theory Development for Small-N Studies: Critical Realism and Middle-Range Theory
Matthew L. Smith (2010). *International Journal of Information Technologies and Systems Approach (pp. 41-56).*
www.irma-international.org/article/testable-theory-development-small-studies/38999

Mixed Methods in Knowledge Management and Organisational Research
Sally Eaves (2015). *Encyclopedia of Information Science and Technology, Third Edition (pp. 623-632).*
www.irma-international.org/chapter/mixed-methods-in-knowledge-management-and-organisational-research/112375

Apps as Assistive Technology
Emily C. Bouck, Sara M. Flanaganand Missy D. Cosby (2018). *Encyclopedia of Information Science and Technology, Fourth Edition (pp. 266-276).*
www.irma-international.org/chapter/apps-as-assistive-technology/183741

Computing Gamma Calculus on Computer Cluster
Hong Lin, Jeremy Kempand Padraic Gilbert (2012). *Knowledge and Technology Adoption, Diffusion, and Transfer: International Perspectives (pp. 275-286).*
www.irma-international.org/chapter/computing-gamma-calculus-computer-cluster/66950