Implementing Is In Developing Country He Context: Towards Creating A Favourable Implementation Context

AGNES N WAUSI & TIMOTHY M. WAEMA [*]
School of Computing and Informatics,
University of Nairobi

_____

Abastract:

The implementation of Information Systems (IS) in the higher education learning institutions in Kenya has been increasing and seen varied results. Research has reported higher chances of IS failures in developing countries. The organizational implementation of IS has continued to be a focus for IS researchers, and the organizational change perspective has been used to explore the actions and events that happen in organizations towards implementation efforts. A case study based on empirical investigation of the implementation process of a student management system in a university context, in Kenya, is used to explore the efforts of the implementers in creating an enabling environment for a successful implementation process. The study is guided by the authors' modification of Gallivan's framework [Gallivan 2001] and specifically focuses on the managerial construct to illustrate the relationship between organizational context and the student management system implementation process. The paper illustrates that organizational context shapes managerial interventions and decisions; that this context is both enabling and constraining in the creation of a favourable implementation context by implementers; and that IS implementation process results in organizational change that requires continuous change management mechanisms.

Keywords: Organizational IS implementation, Managerial Change Interventions, Higher Education Institutions (HEIs)

_____

1. INTRODUCTION

With the rapid evolution of information and communication technology (ICT) applications, Cadle and Yeates [2004] observe that the implementation of IS in organizations has become a complex process often involving several dimensions that include technological and organizational processes. Therefore, the introduction of IS within organizations almost invariably results in a wide variety of consequences that span from technological to organizational, that need to be explicitly reviewed and proactively managed. However, as Orlikowski and Hofman [1997] noted, effectively implementing organizational changes associated with the implementation of IS remains difficult. Nonetheless, world-wide, organizations are still involved in acquiring and developing IS to cope with the demanding environments that they operate in.

_____

[*] Author's Address: Agnes N Wausi and Timothy M. Waema. School of Computing and Informatics, University of Nairobi. waema@uonbi.ac.ke, wausi@uonbi.ac.ke

One such category of organizations is universities, often referred to as Higher Education Institutions (HEIs) in the literature.

Globally, there are tremendous changes in the higher education sector, resulting in increased pressure to operate as commercial entities as a result of diminishing government funding, escalating costs, increasing student numbers, growing demand for accountability and quality, and increasing competition [Seng and Churilov 2003]. Students are also joining universities with more demanding expectations, in terms of information and communication technologies and administrative efficiency. As a result of this, HEIs are moving away from traditional ways of managing towards new managerial styles. The emerging managerial styles are characterized by high staff student ratios; introduction of stringent financial planning and spending; increased focus on efficiency and effectiveness of individuals' and departments' research and teaching standards; and above all introduction of information support systems to gain a competitive edge [Seng and Churilov 2003].

From the foregoing, the role of IS in the 21st century is undisputable in the HEI sector. In a university environment, typical information systems include timetabling systems, library management systems, finance systems, student records systems, payroll and personnel systems, and facilities management systems. These systems are geared towards providing a university with effective, efficient administrative and academic processes, thereby enabling and facilitating sound management and control of the university.

Universities as organizations encounter similar challenges to commercial enterprises such as human and material resources planning constraints. Further, universities have also been noted to have distinctive features such as unique culture of the academy, institutional status, multiple power and authority structures, professional and administrative values [Kezar 2001], thereby giving a unique context.

As Pollock [2002] notes, though worldwide changes to higher education as a result of new ICTs are increasingly researched and reported, we still understand very little of the particular dynamics associated with the implementation and use of mundane information systems. While it is agreeable that the implementation of IS involves significant change management problems and that the use and adoption of these systems have both organizational and individual implications at present, there is little research evidence about how to effectively implement information systems in non-commercial settings such as universities, and in particular universities in the developing countries.

Universities in Kenya are undergoing tremendous changes occasioned by diminishing funding from the government, external pressure from government ministries, stiff competition from external HEIs, and the ever-increasing demand for higher education. In tandem with the "new" styles of managing universities, the management of these institutions are adopting integrated IS to improve service provision and management of the universities.

The implementation of information systems is critical to universities due to the following reasons:
a) The investments in IS infrastructure and tools in universities is high and, given the budgetary constraints of these institutions, IS projects should be managed effectively to realize gains;
b) The reliance on information systems in universities is growing. This is especially so, as universities aim to provide world-class education standards and services, that is a step towards "modernization"; and
c) Prior studies have concentrated on IS implementation in commercial organizations, and therefore it is not entirely clear from these studies what factors are more critical to the success of information systems implementation in academic environments especially in a developing country like Kenya.

Indeed, the challenge of organizational implementation of ICTs and its related services as observed by Walsham and Sahay [2006] is in tackling and resolving the difficulties during implementation. Therefore effectively implementing IS in organizations becomes both a proactive and reactive process in response to information systems implementation intermediate challenges, thereby focusing on the implementers and their actions towards managing the process.

In this paper, we use data collected from a wider case study to address how a case university implemented IS *to illustrate how the university context influenced managerial actions that were initiated in the case institution with the view of improving the implementation of information systems in the higher education sector.*

2. THEORETICAL FRAMEWORK

2.1 The Importance of Context in IS Implementation

Information systems implementation and organizational change are related because implementation of information systems brings about organizational change, whether intended or unintended. The importance of organizational context in information systems implementation is thus important and has been recognized by many IS researchers. For example, information systems and organizational change have been considered as socially embedded action, studied through social constructionist and situated research perspectives [Orlikowski 1996; Ciborra and Associates 2000]. Rather than being neutral tools with generally useful functionality, information systems and their associated technologies and techniques are understood to inscribe social preferences that have been shaped historically in the environment in which they have been developed [Akrich, 1992], and we add, *and implemented*.

Research that takes a related view of information systems is that of social systems perspective. This perspective acknowledges the formal (rules and procedures) and informal (politics, norms and culture) subsystems of the organization coupled with wider environmental factors [Walsham 2001; Heeks 2000]. Research adopting the wider social systems view in IS has used Gidden's theory of structuration [Giddens 1984], particularly the concept of the duality of structure that refers to the recursive and dynamic interactions of social structures and technology. Research has illustrated the technology's potential to change the social and organizational structures and simultaneously be affected by these social and organizational structures in its design, implementation, and use [Walsham and Waema 1994; Rodrigues and Waema 1992].

Although the research we cite above acknowledges the importance of organizational context in general, we hereby argue that it applies to implementation context of IS in developing country higher education institutions, which is the subject of this paper.

2.2 Theoretical Framework

Drawing on the innovation implementation framework [Gallivan 2001] and the IT-change management model [Orlikowski and Hofman 1997], we conceptualize the organizational implementation process as consisting of a secondary adoption process, an organizational assimilation process and a continuous organizational learning process requiring continuous change management interventions. By reviewing [Gallivan 2001], and [Orlikowski and Hofman 1997] frameworks, the authors enhanced [Gallivan 2001] implementation framework by incorporating organizational learning, change management interventions and feedback loop to the implementation context (see Figure 1). Although in Gallivan's framework the secondary adoption construct is used to refer to the individual level, the advantage of the framework is its applicability to multiple levels of analysis. Hence, our notion of the secondary adoption is at the adopting unit level rather than at the individual level, thereby focusing on initiation and adoption decisions and actions at the unit level. The organizational assimilation is then conceptualised as the cumulative organizational adaptation and acceptance of the IS, with continued use and reliance resulting to routinization and infusion of the information system. The fact that we acknowledge and are informed by extant literature on the role of organizational learning to the implementation process, we enhance the view of organizational implementation by adding organizational learning to the implementation signifying the role of reflective actions by actors involved in the implementation process [Wausi 2009].
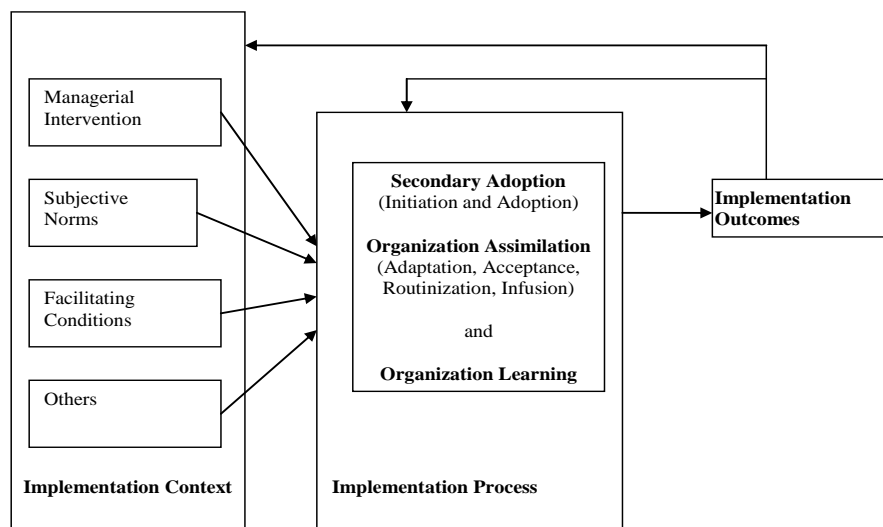
Figure 1 : Theoretical Framework: Implementation Context, Process and Outcomes [Wausi 2009]

The organizational implementation process happens in an organizational context and the context influences the process. The notion of implementation contexts for IS concerns an identification of various systems and structures in an organization that influence the implementation process [Walsham 1993]. Research, for example [Heeks 2002;Avgerou 2001; Walsham and Waema 1994;Walsham 1993] has shown that context influences the shaping of technology use in an organization. The context influences the implementation process by enabling and/or constraining the implementation process. The context is not constant and is influenced by the implementation process. Therefore the context illustrates systems such as power, cultural, economic, human resources and management structures within which the implementation process occurs which form an important basis for an interpretation of the process. The concept of context is thus wide, and in operationalizing the implementation context, we focus on actions and interpretations of events by people involved in facilitating the process. Further, not only do aspects of the context viewed as constraining or enabling the process need to be identified but also are illustrations of their influences deemed necessary in understanding the implementation process. The Table 1 defines the theoretical constructs that concern managerial interventions only in the framework. The complete definitions for all the frameworks can be found in [Wausi, 2009].

We focus on managerial interventions in this paper and only examine managerial and change interventions used in the case university towards efforts to effective implementation.

Construct	Explanation	Operational Definitions
Managerial interventions	a) Managerial actions that are geared to creating an enabling environment	Actions and events that • Indicate the provision, acquisition, allocation and enhancements of human and computing resources. These involve financial resources implicitly; • Indicate actions towards mandating, motivating or negotiating use of computerized application systems; and • Infer to monitoring and evaluation of process.
	b) Change management strategies and actions taken to counter resistance and enhance the adoption and	Strategies and actions taken by implementers and the organization • To enhance anticipated changes in response to the implementation process;

Construct	Explanation	Operational Definitions
	assimilation of computerized application system at unit and organizational level	• To respond to user experiences from use of the computer application system; and • To respond to opportunities provided by the implementation process.

Table 1: Theory Constructs definitions [Wausi 2009]

3. METHODOLOGY

3.1 Research Approach

To understand the organizational implementation of IS as innovations in the HEIs, we adopted an interpretive qualitative approach. The interpretive perspective, having its root in social science, is based on the ontological assumption that reality and our knowledge thereof are social constructions incapable of being studied independent of the social actors that construct and make sense of this reality [Khazanchi and Munkvold 2000] Individuals' perceptions about the world are influenced by experiences they have had. Thus, the interpretive approach tries to understand the phenomenon under study in a holistic way by offering explanations for observations made.

The research strategy used was qualitative and involved the use of qualitative data, such as interviews and project documents. A social setting is not controllable and continuously changes and we had no prior declared hypothesis to test and measure. Therefore we found the case study approach suitable for our topic.

A case study consists of a detailed investigation, often with data collection over a specified time period, of phenomena under study within their context [Hartley 2004]. Case study research has been used to study varied IS phenomena, particularly in system development and implementation [Pollock 2003; Rodrigues and Govinda 2003; Walsham and Waema 1994].

3.2 Identification of Organizations and Gaining Access

Our case study approach required a selection of sites within the higher education sector because our problem was investigating information system implementation phenomena in HEIs. The selection of the IS innovation in the organizations had to be done carefully to bring out a detailed understanding of the IS implementation in a typical HEI context. This therefore required that the IS application in the HEI had to meet the following criteria: be on *roll-out phase*, *had just been rolled-out* and *involved as many units as possible* within the organization. This criterion enabled us to reconstruct the history of the case, thereby circumventing the risks of "memory loss" of critical events by the participants.

Once the institutions that met our criteria had been identified, we negotiated access to these institutions. Factors crucial in gaining access to any organization for research purposes are the availability of informal contacts, the sensitivity or confidentiality of the phenomena under study and the perceived gain or loss that the "gatekeeper" approached for access has on the results of the study. A further issue is the relative power the individual approached to grant access has within the organization.

Our interest being on the implementation process, we sought to interview project team members of the implementation team, heads of departments, users of the IS selected to be cases, and the management staff of the institutions.

The adopted theoretical framework formed the basis for the development of data collection interview guides, qualitative questionnaires and document summary form, which were applied to data collection methods of interviews and document analysis. The interview guide and qualitative questionnaires were used concurrently. All qualitative questionnaires, based on the interview guide for the various categories of interviewees were emailed to participants prior to the interviews. The questionnaires enabled the participants to familiarise themselves with the questions and give more elaborate responses during the interview sessions. An open discussion at the end of each session was encouraged to capture interviewees' comments and emphasise on issues that interviewees deemed important. Discussion sessions where applicable were used to clarify information found in documentary evidence. Each interview session on average lasted between thirty to forty-five minutes, and all the interviews were tape-recorded.

The other key source of data was primary documentary evidence. This included minutes of relevant meetings, internal correspondence on the case and written reports. The documents provided not only a mechanism for constructing a chronology of key events but also extra data that participants interviewed had omitted. In addition, the documentation enabled us to validate and crosscheck what participants had expressed during interviews, thereby using it as a means of triangulation.

3.3 Data Management and Analysis

Before analysis could proceed, all the data collected had to be prepared and managed. A research database was created and was used to store all documents deemed appropriate for storing. These included document summaries and coded texts which eased reference to data.

The voice data collected during the interview sessions was listened to repeatedly and transcribed to textual data (transcripts). Despite the interview transcripts producing large amounts of textual data, data reduction was achieved by the use of a coding strategy. Guided by the adopted framework and the interview guides, a set of codes was developed prior to data collection. This set of codes was modified as the analysis progressed. Coding, according to Miles and Huberman [1994], is analysis and forms the first steps to an analysis of qualitative data.

Similarly, for the documents collected, each was read and the contents were summarised to capture essential data. Concepts that were frequently emerging in the texts were interpreted as key issues. These various categories facilitated insights, the comparison and the development of thematic analysis.

The second phase of data analysis involved data transformation of the collected data and working with it to create an "authoritative written account" of the case. Data analysis occurred simultaneously with data collection and was an iterative process.

The case data represented here is a portion of a wider Doctoral research, conducted to study the implementation of an information system in a case HEI, over a period of ten years. The case institution is referred to as Hekima, and the implementation of the Student Management System (SMS) is the focus of this paper

4. CASE STUDY -SMS ADOPTION AND ASSIMILATION (MID-2002—2006)

4.1 SMS Deployment

Earnest deployment of Student Management System started immediately after the completion of its development with three key activities: data migration, training, and a workshop held for Hekima's management board and directors of schools.

The first training was directed to specific users from the central administration who were directly involved with the nominal roll and the examinations modules of SMS. This group of users was trained on not only the operations of the modules but also technical aspects of report production using the ORACLE platform[†]. Although the training was sufficient to perform tasks such as updates and printing of pre-formatted reports, the users perceived the training as inadequate as they could not perform minor changes to the data such as change of dates on transcripts before printing and had to keep on relying on the developers for support. Said one user:

> *People said ORACLE is high level but maybe I needed the basics on how to change minor things such as how to change the years from one to another…I might try and then mess the data, yet with some training I could work well.*

Training sessions were mounted where all the central administration's academic section middle managers and schools' administrators were trained on the nominal roll and examinations modules. The developers doubled up as the trainers and all training sessions were mostly carried out at the IT function premises or student computer laboratories. In the early stages of implementation, the users trained did not have computing facilities in their offices to try out what they had been taught. As explained by an

---

[†] ORACLE report production tools used were the in-built reports and query-builder. These tools need some basic understanding of the Relational Database concepts.

examinations officer, "Initial training was not adequate; some of us had no access to computers...you could not practise what you trained in the first initial training."

Although the IT function facilitated basic computer literacy training for Hekima's top management, the same basic computer literacy training was not available for the envisaged users of SMS. The trainers made an assumption that staff who attended the training on the operation of Student Management System were computer literate, an assumption that later on became costly. Further, a training needs analysis for the envisaged users was not carried out prior to the training, leading to a situation that presupposed that the system implementers had adequate knowledge of the training needs.

Although the initial training created awareness and exposure for the middle managers, who later on became computer literate, the management role of this cadre of staff was not catered for in the system, or as explained by an admissions officer:

> We would go for training and be taught how to key in data; it is not I who keys in the data…Management were not trained how to use management reports. Most of us in management are not using SMS for management reports, to assist as a basis in making decisions, and at our levels, that is what we should be doing.

The third session of training was mounted for all users who would be involved in the first online registration process. Each School was required to appoint persons who were computer literate for the two-day training on SMS operations, and also, all IT function staff was trained to assist the users during the registration process.

Training continued after the first registration process that occurred in October 2002. All middle managers comprising administrative registrars from schools were invited for training in readiness for student course registration in the schools. This training was deemed crucial as the administrative registrars were directly responsible for student records at the school levels. Unfortunately, at the supervisory level, the administrative registrars could not perform the updates role and some opted to train clerks in their schools to perform the updates thereby causing varied results.

Contrary to the views of users on the issue of the appropriateness of the training, the IT function explained it was driven by the need to impart adequate training to perform the next job that included mostly operational work of data entry and the production of pre-specified reports. As explained by the IT Director and the former Project Manager, this approach to training was attributed largely to limited human resource; a situation that changed with the added human resource committed to the SMS project.

Training continued to be conducted, especially in 2004, after the redevelopment of SMS using web technologies. By the end of 2004, and after the third registration process, staff from schools that had adopted the Student Management System were fully trained. With a critical population of users trained, training continued to be mounted on demand, on the request by schools.

4.1.1 Workshops and School Academic Boards

Hekima's management board and directors of schools attended a two-day workshop in September 2002. The workshop's objective was to discuss student academic and financial records management, including the use of ICTs in Hekima. The SMS development committee used the workshop to get critical policy issues discussed and solutions recommended for implementation by middle managers. An example was the regularization of self-sponsored students' admissions to only two intakes a year that eased the management of academic processes in the central administration units. Academic processes and delays caused by schools were illustrated during the workshop and their effects on records management clarified. The SMS developed was demonstrated and its interactions with Hekima's policies, business processes, and delays in information flows illustrated. In summing up the workshop, the Chief Executive commissioned the Student Management System and asked all schools to adopt SMS for efficiency.

As several other workshops within the university were organized, the SMS development team was invited to present progress of implementation and demonstrate the operation of the system.

The growth of the ICT infrastructure in Hekima necessitated the devolvement of ICT services to the schools and, in due time, as information and communication technology issues became critical to the schools, the IT function staff were required to attend School academic board meetings to respond to ICT issues. In some instances, where such information and communication technology issues concerned the management of student records, the IT Project Leader in charge of SMS development would be invited to demonstrate SMS to the board members. Indeed, social relationships created in the course of providing

ICT services within Hekima also provided a means by which some users would feel obliged to listen to the SMS "story." The slow response to actively use the SMS according to the IT Project Leader was the perception that the implementation of SMS was an IT function project. However with the adoption of Results Based Management (RBM) at Hekima in the later years of the implementation effort, all schools were required to adopt and use SMS for students' records management. This requirement pushed late adopters of the SMS to comply and report progress as part of performance contracting within the University.

We illustrate the adoption of SMS at Hekima using two units, Central Administration and School A.

4.2 Adoption at Central Administration

The central administration middle management officers were involved in the development of the SMS and hence adoption and use of the SMS was more acceptable. This acceptance was mainly because the middle managers, especially the admission, examinations, and finance officers had been exposed to the benefits of computer systems from the earlier versions of COBOL and dbase IV systems. Further, the finance section was running computerized payroll services.

The finance section, driven by the need to produce accurate financial reports concerning student fees, continued to work with the developers towards improving the fees module immediately after the first online registration. This included counter-checking fees transactions against the manual receipts for accuracy, the development of the necessary functionalities, and the training of staff from the section. The collection of fees for government-sponsored students was under the central administration's finance section. The Finance Officer, who headed the section, was not only conversant with computer-based applications but was also required to produce financial reports related to students' fees. This background provided an environment in which the Finance Officer took over the championship of the fees processing module with ease. By July 2003, he was spearheading meetings concerned with this module.

Although initially after the introduction of the online receipting there were some users who preferred the manual receipting, it however dawned on them that their supervisors' and indeed the top management's need for reports on collection of fees as the registration of students was on-going and the students' demand for fees statements would not allow any excuses. By the end of 2004, all finance officers in Hekima were using the fees subsystem and, by 2005, they were very well versed with the fees subsystem and used the system for fees transactions. As observed by the SMS Project Leader, this single module was quite successful; he attributed this to users achieving immediate tangible benefits – increased revenue collection.

The initial adoption of the academic modules (Nominal Roll, Course Registration and Examination Processing) by the central administration academic section was acceptable due to the involvement of most administrators, except the head of section, the Academic Registrar, who was not very interested in the whole process. Some staff from the examinations section, despite having been involved throughout the development of SMS was more uncertain. For a start, the system introduced changes in the work roles of the section, in which the section was required to relinquish data entry of student marks to be done at the source, the schools. The concept did not settle well initially, but on realization that the section was not going to cope with the amount of work and the immediate benefit to their workloads, the changes in role was acceptable. One examinations officer said:

One of the things which made us sceptical on this was the data entry of the marks, from time immemorial the marks would come here and we work on them ourselves. Nevertheless, later it emerged that with the large numbers of data from the schools and we only had two data entry clerks, we were not going to manage and that was the only way out.

The notion of data being safe in a shared centralized computer was a new idea for the section, and it took time for the users to shift their belief system and trust the security mechanisms within the ORACLE RDBMS and the SMS. Prior to this, the section stored marks in offline hardcopies and in diskettes that would be loaded when needed for the production of transcripts. Copies of transcripts printed would be kept in student files and stored in the archives.

Unlike the fees processing module which was adapted and owned by the finance section wholly under the guidance of the head of section, the Finance Officer, the academic modules of the system (Nominal Roll, Course Registration and Examination Processing) were not owned immediately by the head

of section, the Academic Registrar. While the Academic Registrar sent his immediate deputy and senior administrators to the system development committee and various meetings concerning SMS, his participation and ownership of the process was clearly missing. One admissions officer blamed the slow pace of implementation of additional requirements to the lack of participation of his boss.

Interviewees had various explanations for the observed lack of leadership by their boss. Some participants attributed it to his personal character, while others were of the view that he was about to retire and had never used computers directly despite having one in his office and, therefore, he was not interested in the system. Despite the leadership gap, the SMS operations in the central administration's academic department continued to be championed by the middle management who rose up the ranks and became in charge of the section.

4.3 Adoption in School A

School A had always lagged behind in the processing of examinations, and hence the course registration and examinations subsystem was crucial in operations at the School. Reports from the data migration exercise carried out to facilitate the initial deployment of the course registration and examination processing modules indicated non-availability of data due to non-submission to the central administration's examinations section. In the early developmental stages, the School was identified as one where piloting would be done due two key factors. One, the School had the largest number of students; approximately 30% of all Hekima students, and, two, the School's students were edgy on the delays of examination results. The previous SMS Project Leader, responsible for development of the Students Management System indeed sought to assist in the collating of the available marks to Excel format for migration. While initial visits to the School were welcomed by the administrators, the Director of the School was not supportive of any efforts. On realization that some student marks had been migrated to SMS, the Director barred the SMS Project Leader from visiting the School offices and access to the computer for SMS-related work was subsequently denied. Efforts to put more computers to an available room where staff would work on the students' data were thwarted by the Director, who locked up the room. The resistance by the Director later emerged to have been driven by the motive of engaging a private contractor to do the computerisation of students' records in the School.

However, by May 2003, the School was under new leadership and through interactions with the School staff, the new Director got to learn about the Students Management System and made further enquiries from the IT function about the SMS. That marked the turning of events in the School and paved way for a deliberation meeting between the SMS team and the School in May 2003 that charted the way forward for the Students Management System implementation in the School. The Director described his motivation for adopting SMS as a tool to run the School more efficiently and provide students with results. The inspiration for use of the Students Management System was also necessitated by the transfer of the School administrator who was well versed with the practised examination rules and regulations and that were not documented, making the task of dealing with student records more difficult for the Director. At the same time, the Director realized that the huge challenges in dealing with manual procedures were an enormous task especially with the increase of student numbers.

A working team comprising staff from the School and the IT unit embarked on data migration and validation while the Director of the School facilitated the process by motivating his staff and providing resources such as the creation of a student records' office where students' data-related activities were carried out using shared resources. Although computing facilities initially were not enough, this did not deter his efforts to be efficient with the meagre resources. He said:

We did not have enough facilities and even now we do not have enough, the School is not completely networked and the computers are not enough. However, I did say that we must make a start with the few facilities that we have.

The users at the School gained additional training and support as they worked with the IT staff, hence gaining more confidence. These initial efforts were geared towards government-sponsored students, and transcripts for the School became easy to produce. This lessened the pressure on the Director from students and Hekima's management, and subsequently reduced tendencies of chaos by the School's students because of late examination results.

Nevertheless, resources and human-related problems affected the examinations process and hence reflected in the timeliness of report production. Key among them were delays in the submission of marks

from the departments, partly due to the examination process itself that required chairpersons of each department to get results from each member of staff and collate the results for onward transmission to the Director's Office for further processing through SMS[‡]. The Director expressed his experience, saying: "Sometimes you find a chairperson who is not able to actually do their work in the department and that delays us."

At the departmental level, lack of resources, especially PCs, made the implementation efforts slow. To enhance the process, the School planned to acquire more PCs for distribution to each department for the purposes of consolidating students' records at that level.

The turnaround of the School, from being inefficient, to a situation where results were available at the end of each semester, something the School had never done before, was a major achievement. The use of the Student Management System in the School was now considered a normal practice, with the manual ways replaced by and the examination rules and regulation incorporated into SMS.

5. ANALYSIS AND INTERPRETATION

5.1 Managerial Interventions

The university top managers and unit managers that embraced SMS, in varying efforts, tried to mediate the implementation process in various ways. Five themes emerged as mechanisms by which the various actors involved in the implementation process intentionally used to enhance and create an enabling environment in the course of the case study period. These intervention mechanisms were training and support, the recruitment of additional staff, the enhancement of computing resources, mandating and motivating the use of SMS, and the monitoring of progress of the implementation process. The management of changes brought about by the Students Management System were mediated by the use of participative approaches, seminars, demonstrations and workshops. These interventions are outlined below.

a) <u>Training and on-site support</u>: The general view of the training provided was that of inadequacy with respondents calling for the need for continuous training, especially in the early stages of SMS adoption and use. The impact of the inadequate training was evident in the critical events of students' registration; especially the first student registration that took place in October 2002, and continued to emerge during such events, leading to a lack of confidence in use of computers and the emergence of data errors. To overcome this challenge, training sessions were scheduled a few days prior to the annual registration process at the start of each academic year. These training sessions continued to be carried out.

Despite the emphasis laid on and effort put into training in the early years, a recurring issue that affected the quality of the training was the unavailability of computers for people to use once they returned to their offices. The IT department carried out the training in anticipation of availability of computing resources which in some instances were delayed due to the procurement process. The trained staff would quickly forget how to perform tasks without access to a computer. They would require a refresher course on the processes in SMS, leading to the implementers having to train a person several times. Sometimes the implementers would need to provide more personalised training as users performed the tasks with the computer. This was not an efficient way of utilising the scarce technical human resources. Although the IT department recognized the need for training, the lack of adequate technical staff, where SMS developers doubled up as trainers, forced the department to adopt a need-based training approach. This only entailed a person being taught how to operate the system to perform the task required. The users perceived the training offered as inadequate as users had to rely on calling IT staff to sort out small problems as they used the system. In addition, the inappropriateness of the initial training in some scenarios, especially where the middle management was trained on operational tasks, did not

---

[‡] The devolvement of SMS to capture data at source by the lecturers was planned to take place at a later phase

entice middle managers to use the system. The non-alignment of the training with the availability of computing facilities hindered the learning of the SMS while the inadequate training produced incompetent users, thereby slowing acceptance of SMS in the initial stages of organizational assimilation.

The increase of human resource capacity in the IT department changed the training approach. After the classroom training, on-site support was introduced, and staff continued training users at their workstations as they used the system, creating user confidence in the use of the system and providing opportunities for more clarifications on the work flow as implemented in SMS. The provision of on-site support enhanced the skills of the users, leading to routine use of the Students Management System. At the close of the case period, it was observed that most of the SMS users were competent, and training sessions continued to be mounted as need arose with refresher courses for persons affected by transfers from one unit to another.

a) Recruitment of additional staff: Starting with one technical member of staff in the early years of SMS development, the employment of more personnel in the IT function who were later dedicated to the implementation of the Students Management System improved the process. Despite this, staff in the IT unit was not adequate for all ICT-related activities in Hekima, and thus caused deployment of SMS to be carried out one school at a time, slowing the pace of the roll-out of the system. The hiring of temporary staff, facilitated by various unit managers, to perform massive operational tasks when the need arose, such as the data capture in the central administration's examinations section, enhanced the adoption of SMS and showed commitment to the system by the concerned managers in the process. In other units, the managers restructured work tasks to cater for the frequent and continuous operational tasks that were under their mandate. Examples of these tasks included the redefining of roles for secretaries in the central administration's admissions section and clerks in the schools who after undergoing training took up data capture and validation roles in their respective units.

b) Enhancement of computing facilities: Although in the early years of the Students Management System implementation, the available computing resources, especially PCs, were cited as a hindrance to acquiring ICT skills, the IT function tried to distribute the resources equitably. This was achieved, especially after the first registration, by distributing the available computers equitably to schools to facilitate the progression of SMS operations. All officers involved in the system operations preferred to have PCs in their office, and where that was not possible the creation of centralized students' offices with shared resources was implemented as an alternative. However, as the university's exposure to the use of SMS and other ICT areas expanded, such as the use of email and internet, access to PCs became much easier as departments purchased them for their members of staff. By 2006, all staff required to use SMS had access to a PC in their offices.

The continued enhancement of central computing resources, especially the servers, notably after the second online registration and again after the fifth online registration, reflect interventions to increase the capacity of ICT facilities within Hekima to accommodate the increasing demand of the Students Management System.

(d) Mandating and motivating use: The Chief Executive Officer had knowledge about the need of SMS, especially the benefits of registration and fees collection, and mandated the use of the online registration and the fees processing modules in the central administration's units. Similarly, the later leadership in various units sent clear messages about the change to SMS, thus mandating use. Although mandating use led to the adoption; the acceptance and use of the Students Management System were enhanced by the ensuing support provided by the authorities such as logistical and resources accorded for the adoption to be fruitful.

A general incentive system in the university was lacking, and there was no punishment for lack of use of the SMS. However, during the annual registration participants in the exercises were rewarded with some monetary payments, while in some schools overtime work was paid. These rewards were not inducements for the system use. The motivation for the use of SMS stemmed from individual users especially where users who were ICT literate, and their leadership in the various units such in School A. For example, the Director of School A, who knew about the business need of the system, used his leadership skills to motivate staff by supporting them in

organizing and following up on problematic areas raised and keenly followed and monitored the process.

c) <u>Monitoring and evaluation</u>: The absence of a university-wide monitoring and evaluation schedule was perceived as a weakness in the implementation process, and resulted in difficulty of getting progress feedback of the total project at the university-wide level. Although the SMS team at the IT function submitted reports indicating how the schools were progressing in the use of the system and in the examinations data captured in the SMS, the general lack of an overall implementation time schedule made evaluation of the progress difficult. However, in the later years, especially with the adoption of Results Based Management (RBM) systems at Hekima and the automation of students' records as one of organizational capacity development indicator provided a means by which the overall computerization process could be evaluated. The extent of the implementation of SMS in schools was one of the key performance indicators in the Performance Contract between the University and the Units and this helped in the adoption of SMS, especially by the later adopters.

d) <u>Change management interventions</u>: Change management interventions were evident, and included workshops where participation of the various participants from the SMS development committee elicited challenges involved in the implementation process and proposed solutions for the adoption of the system where possible. IT staff were invited and demonstrated the system functionalities expounding the advantages of the system while bringing out the various roles of the different stakeholders.

The implementation of the SMS adopted participative approaches such as the involvement of the users and holding problem-solving meetings with users. However, a key component of managing change seemed to lack in the early phases of SMS development - communication to the university community. This lack of communication changed once deployment was started with frequent communication to other stakeholders and not just the development committees. However, technical changes tended to be a preserve of the IT function staff and were not shared much with the other users. A typical example was the decision by the IT staff to overhaul the client-server environment without involving the stakeholders. Although there were good technological reasons to do so, some interviewees observed that their input was not sought and they only found a replacement of the previous system. Thus communication emerged as critical to building interest in and support for the Students Management System. It was during some of these sessions of communicating to users the strategic agenda, operational issues and expected results from SMS, in a workshop for example, that social relationships were created between the implementers and the users that contributed to a commitment to the SMS project.

The presence of a university-wide plan for the implementation of SMS was not there, and the change management model that emerged from the case study pointed to improvisational, responding to change as the implementation process proceeded.

No structural changes at Hekima were implemented as a result of SMS, but several changes were found in the practices or processes, culture and the technology itself (SMS). Mechanisms through which the changes were recognized included system demonstrations, workshops and online registration review meetings and actions agreed upon in these forums taken by the implementing unit. User training sessions were also another key avenue for managing change. By training the users and, in the later years of implementation, providing on-site training and support smoothed the changing work practices.

5.2 Context as Enabling and Constraining Managerial Actions

The deliberate actions to mitigate challenges within the implementation context and manage change within the case demonstrated a closely intertwined relationship between the actions of the managers on one hand and the general context on the other hand. Indeed, the intervening actions emerged out of the need to reshape the context and make it more suitable for the adoption and the assimilation of SMS to occur, while the context constrained those actions. This relationship was illustrated by the training and support interventions which, while geared towards enhancing the user skills set, were constrained by the availability of computing resources. Likewise, the development and enhancement of the computing resources was driven by the availability of financial resources. Due to this, managerial decisions such as

the phased implementation which was aligned to the development of the ICT infrastructure, continuous scheduling of training as a result of continuous enhancements of access to computing resources was shaped, driven and influenced by the context. Workshops and seminars were fundamental change intervention mechanisms effectively used in Hekima. These created forums where discussion about SMS were carried out and may be viewed as forums that created windows for consensus building. Indeed, negotiation and consensus building have been identified as social logics embedded in the cultural values of African societies [Olivier de Sardan 1999].

The relationship between the actions of the managers and the context displayed a dynamic interaction between the various organizational structures, especially resources, culture and managerial actions, thereby linking factors and the process. In Gallivan's theory, this dynamic relationship is linked to facilitating conditions, where the context is viewed as both enabling and constraining the technology implementation process. From this interpretation, we illustrate that the organizational context shapes managerial interventions and decisions (see Table 2). This finding is indeed similar to the findings of various studies that exemplify the importance of the implementation context such as Walsham [1993], Walsham and Waema [1994], Avgerou [2001], Walsham [2001], Krishan and Walsham [2005], and Walsham and Sahay [2006].

Activity	Enabling Context	Constraining Context	Managerial Interventions
SMS Deployment	• IT Leadership • Availability of Technology • Adoption of Results Base Management towards end of case study period	• IS/ICT knowledge barriers • Inadequate technical skills • Inadequate project management skills • Inadequate ICT human resource • Lack of an overall monitoring and evaluation schedule of implementation efforts	• Continuous ICT training • On-site Support • Recruitment of additional human resources • Participative approaches (Workshops, Presentations in Academic Board Meetings)
Adoption at Central Administration	• Technology adoption leadership in some units • Availability of computing infrastructure within the Central Administration • Leadership mandating use ICT technically skilled human resources	• Lack of technology adoption leadership in some units • Prior history of use of computerized systems	• Participative approaches • Use of Middle Managers to mitigate leadership gap
Adoption in School A	• Technology adoption leadership • Continuous motivating use of SMS • Availability of keen users	• IS/ICT knowledge barriers • Inadequate technical skills • Inadequate computing resources	• Aligning the secondary adoption and assimilation of SMS to the availability of computing infrastructure • Continuous user training and on-site support

Table 2: Illustration of enabling and constraining context and the Interventions used

6. CONCLUSIONS

A general conclusion is that the implementation process must be understood in the context within which it occurs. The case illustrated the organizational context shaping the managerial interventions and

actions. This is in agreement with the literature which has stressed the importance of context [Heeks 2002; Avgerou 2001]. The implementation process results in organizational change that requires continuous change management mechanisms. This conclusion, again, is indeed in agreement with observations in literature [Orlikowski and Hofman 1997; Macredie and Sandom 1999; Cunha and Cunha, 2003] that organizations often require continuous actions in response to change outcomes associated with IS implementations. This is typically due to the continuous interaction of the technology and the social context that result in planned and unplanned changes. Additionally, challenges such as knowledge barriers, lack of resources are evident in adoption of new technologies and require interventions such as training, hiring of staff with the appropriate skills for the implementation process to proceed.

In this paper we used an enhanced Gallivan's framework [Gallivan 2001] and specifically the managerial construct to illustrate the relationship between organizational context and the IS implementation process. We have presented a case study that demonstrates the efforts of implementers towards creating and enabling environment for successful implementation of a case application in the higher education in a developing country. Implementation and use of IS often results in changes, creating potential for conflict and resistance, and hence using appropriate managerial and change intervention mechanisms improves adaptation to the information system.

7. REFERENCES

AKRICH, M. 1992. The De-scription of Technical Objects. In *Shaping Technology/Building Society*, W.E. BIJKER AND J. LAW, Eds.: MIT Press, Cambridge. 205–224.

AVGEROU, C. 2001. The significance of context in information systems and organizational change. *Information Systems Journal 11,* 43-63.

CADLE, J. & YEATES, D. 2004. *Project Management for Information Systems*, Prentice Hall.

CIBORRA, C.U. AND ASSOCIATES. 2000. *From Control to Drift.* Oxford University Press, Oxford.

CUNHA, M. P. E. & CUNHA, J. V. D. 2003. Organizational improvisation and change- two sysnthesis and a filled gap. *Journal of Organizational Change Management 16,* 169-185.

GALLIVAN, M. J. 2001. Organizational Adoption and Assimilation of Complex Technological Innovations: Development and Application of a New Framework. *The DATA BASE for Advances in Information Systems 32,* 51 -85.

GIDDENS, A. 1984. *The Constitution of Society.* Polity Press, Cambridge.

HARTLEY, J. 2004. Case Study Research. IN. *Essential Guide to Qualitative Methods in Organizational Research,* G SYMON. AND C. CASSELL, Eds. Sage Publications, Newbury Park CA.

HEEKS, R. 2000. Information technology, information systems and public sector accountability. In *In Information technology in context,* C. AVGEROU AND G. WALSHAM, Eds. Hampshire.

HEEKS, R. 2002. Information Systems and Developing Countries: Failure, Success, and Local Improvisations. *The Information Society 18*: 101-112.

KHAZANCHI, D. AND MUNKVOLD, B. E. 2000. Is Information Systems a Science? An Inquiry into the Nature of the Information Systems Discipline. *The DATA BASE for Advances in Information Systems 13*, 24 - 42.

KRISHAN, S. AND WALSHAM, G. 2005. Implementing Public Information Systems in Developing Countries: Learning From a Success Story. *Information Technology for Development 11*, 123-140.

MACREDIE, R. D. AND SANDOM, C. 1999. IT-Enabled Change: Evaluating an Improvisational Perspective. *European Journal of Information Systems 8*, 247-259.

MILES, M. B. AND HUBERMAN, A. M. 1994. *Qualitative Data Analysis: an expanded sourcebook*. Sage, Thousand Oaks.

OLIVIER DE SARDAN, J. P. 1999. A moral economy of corruption in Africa? *Journal of Modern African Studies 37*, 25-52

ORLIKOWSKI, W. J. AND HOFMAN, J. D. 1997. An Improvisational Model for Change Management: The Case of Groupware Technologies. *Sloan Management Review Winter***,** 11-21.

ORLIKOWSKI, W.J. 1996. Improvising Organizational Transformation over Time: A situated change perspective, *Information Systems Research 7(1)*,63–92.

POLLOCK, N. 2002. The informational view of the University. Pre-published draft In Digital Academe: New Media in Higher Education and Learning, William H. Dutton and Brian D. Loader Eds. Routledge.

POLLOCK, N. 2003. The 'Self-service' Student: Building Enterprise-wide Systems into Universities. *Prometheus 211, 101* - 119.

RODRIGUES, A. J. AND GOVINDA, S. 2003. Towards an integrated management information system: A case of the University of Mauritius. *Information Technology for Development 10*, 41–56.

RODRIGUES, A. J. AND WAEMA, T. M. 1992. Computer-based Information Systems in their Social Context: Use of Different Perspectives. In *Social Implications of Computers in Developing Countries*, S. C BHATNAGAR AND M. ODEDRA, Eds. Tata McGraw-Hill, New Delhi.

SENG, D. AND CHURILOV, L. 2003. Business Process-Oriented Information Support for a Higher Education Enterprise. *In Proceedings of the 7th Pacific Asia Conference on Information Systems,* Adelaide, South Australia, May 2003 , HANISCH, J., FALCONER, D., HORROCKS, S AND HILLIER, M, Eds. 1055-1074.

WALSHAM, G. 1993. *Interpreting Information Systems in Organizations*. John Wiley and Sons, Chichester.

WALSHAM, G. 2001. *Making a world of difference: IT in a global context*. Wiley, Chichester.

WALSHAM, G. & WAEMA, T. 1994. Information Systems Strategy and Implementation: A Case Study of a Building Society. *ACM Transactions on Information Systems 12*, 150-173.

WALSHAM, G. AND SAHAY, S. 2006. Research on Information Systems in Developing Countries: Current Landscape and Future Prospects. *Information Technology for Development 12*, 7-24.

WAUSI, A.N. 2009. Organizational Implementation of Information Systems Innovations: Case University in Kenya. Doctoral Dissertation. University of Nairobi, Kenya.