ACADEMIC JOURNALS
expand your knowledge

International Journal of Library and Information Science

Full Length Research Paper

Pre-implementation failure of information systems in public universities in Kenya: A case study of Moi University, Kenya

Harrison Bii* and Monica Rukwaro

School of Information Sciences and Knowledge Management, University of Kabianga, P. O. Box 2030-20200 KERICHO, Kenya.

Moi University was established in 1984 and its first decade of growth and expansion necessitated the adoption and utilisation of Information and Communication Technology (ICT) to manage information generated by its operations. Through Dutch Joint Financing Programme for Cooperation in Higher Education (MHO) and other donors' assistance, it established an ICT centre charged with, among other functions, initiation and development of information systems, including the Academic Register Information System (ARIS). Many challenges slowly cropped up and choked ARIS and other systems before implementation. This study was undertaken to ascertain and investigate issues that led to pre-implementation failure of information systems in one of Kenya's public universities, using a case study of Moi University. This paper presents the views of Moi University's ARIS and other Information System (IS) project participants on the factors that led to their systems' failure to reach their operational phase. Although the findings may sound critical of certain aspects of IS and general organisational management at Moi University (MU), they provide real examples of what can happen to IS projects in practice. They provide valuable opportunities for learning, especially in typical sub-Saharan Africa's public universities.

Key words: Pre-implementation failure, failure factors, information systems development, public university, Kenya.

INTRODUCTION

The development of information systems is a complex and resource-demanding process that must be meticulously undertaken and monitored to ensure success and minimise the chances of failure (Davies, 1999; Fitzgerald, 1996; Ganesh and Mehta, 2010; Malaurent and Avison, 2015). But a universal recipe that assures implementation success is almost impossible to come up with due to the very complexity and weather-like unpredictability of the socio-technical networks that make up information systems (Berg, 2001; Kreps and Richardson, 2007). In that respect, a huge number of methodologies, critical factors, metrics, models, and approaches have been proposed to guide IS development (Cauter et al., 2014; Chepa et al., 2017; Ganesh and Mehta, 2010; Goldfinch, 2007; Iivari et al., 1999; Lambert et al., 2006; Malaurent and Avison, 2015;

Rose, 2000), but none of them is prescriptive enough to ameliorate all the problems inherent in the process of IS development (Avison et al., 1998; Goldfinch, 2007; Hughes et al., 2016; Kautz et al., 2007; Lambert et al., 2006; Pan et al., 2007).   As part of organisations, information systems and information system projects are much more than just a technical rationality (Avison et al., 1998; Berg, 2001) in that they interact with other organisational elements, sometimes, resulting in conflicts or disequilibrium (Kleim and Ludin, 1998; Berg, 2001). Without proper control and informed management, the disequilibrium often leads to IS abandonment and/or failure (Fortune and Peters, 2005; Kleim and Ludin, 1998). IS failures usually have devastating consequences not only to the organisation but also to the wider society as was the case in France in 1993 when a computerised train reservation system failed (Pan et al., 2008; Pan et al., 2007; Newman and Zhao, 2008).

While not all information system projects fail (Krishna and Walsham, 2005; Pan et al., 2008), a huge proportion (over 70%) of them do so (Gauld, 2007; Heeks, 2002; Kumar and Gupta, 2012; Pan et al., 2008; Poon and Wagner, 2001; Smith and Keil, 2003) and particularly, in the public sector (Poon and Wagner, 2001; Fortune and Peters, 2005; Gauld, 2007; Goldfinch, 2007). Some studies show a failure rate of 84% in this sector (Gauld, 2007). A sizeable part of these failures occur before implementation (Liebowitz, 1999; Rose, 2000; Schneider and Sarker, 2006), even in the early stages of systems development. The early stages of systems development are quite inseparable from their social contexts (Rose, 2000) and are, consequently, susceptible to various factors that impinge on the choice, implementation and maintenance of an information system (Rose, 2000). Given that the social contexts vary from organisation to organisation, country to country, and so on (Heeks, 2002; Krishna and Walsham, 2005; Poon and Wagner, 2001; Wanyembi, 2000), there could be factors that are specific to public universities in Kenya (Wanyembi, 2002) and the wider, resource-deficient sub-Saharan African region. Although the evidence base for IS failure in developing countries is not strong (Heeks, 2002), there are indications that their IS failure rates are higher (Heeks, 1999, 2006; Krishna and Walsham, 2005). Empirical knowledge of IS failure in various sectors of the African economies is necessary if effective information systems are to be developed and implemented for better decision-making. This paper reports on a study that examined pre-implementation failure of information systems in Moi University (MU), Kenya.

CONTEXTUAL SETTING

Over the past few decades, Kenya's public universities have initiated, developed and implemented information systems mainly for their educational administration and communication services (Bii and Gichoya, 2006; Mutula,

2001; Mwiria, 2007; Wanyembi, 2002). While it is not quite clear what proportion of their IS projects progress up to implementation phase, a UNESCO survey indicates that some of these information systems fail for lack of sustainability (Farrell, 2007). As public universities grow and continue to embrace and rely on computer-based systems, more and more information system projects might join the growing list of failed systems (Farrell, 2007). A brief background to MU places this study in context.

Moi University was established in 1984 as a second, science and technology-oriented, public university in Kenya. It began as a single faculty of forestry and wildlife resources with about 100 students but has since grown in terms of physical facilities, academic faculties and schools, and the staff as well as student population. With staff strength of about 3,000 members, it offers over 190 degree programmes to over 20,000 students in 14 schools. This growth necessitated the adoption of information and communication technology in the management of data resulting from the university's academic, research, administration, and other activities. MU's stock of ICT equipment has grown mainly out of donations, solicited and unsolicited, as well as occasional departmental- and school-based computer purchases. Following advances in ICT infrastructure, increased awareness and appreciation of information and ICT by the university community as well as suggestions from the donors, the university established an Information Resource Management (IRM) Centre, now ICT Centre, in 1998 to coordinate its information communication and management function, formulate ICT policy, and provide technical expertise on ICT/IS to other departments of the university (Tanui, 2003). The centre's stated mission is to conceive, develop, implement, and manage appropriate information systems and other ICT services to support MU's vision, mission, and objectives (Moi University, n.d).

It is perhaps due to this commitment that the centre initiated a number of IS projects in the university. With financial and technical support from the Dutch Joint Financing Programme for Cooperation in Higher Education (MHO) and the Flemish VLIR as well as its own resources, the university has developed an information policy plan, increased its ICT equipment stock, and installed fibre optic networks at its Main and Eldoret Town campuses. Almost all its schools, centres and institutes have local area networks (LANs) running proprietary and locally developed applications. Through these facilities, the university offers various ICT services, including email, web access, and ICT training to the university community (Moi University, n.d). The next section presents the methodology adopted for data collection.

METHODOLOGY

As part of a larger study on the same problem in Kenya's public

universities, this case investigated pre-implementation failure of information systems in Moi University in Kenya. Its specific objectives were to: examine information system projects initiated in MU over the 2000-2010 decade; determine how pre-implementation failure of information systems manifested itself in MU; and investigate the factors responsible for pre-implementation failure of information systems in the university.

The foregoing objectives were pursued using a descriptive design in two broad ways. Firstly, a review of extant literature on information systems development and IS failure, in general, and critical examination of grey literature on information systems development at MU, in particular, were carried out. Secondly, primary data on information systems and their development in MU were collected and analysed. The university's ICT Centre was requested to identify all the project team members and other direct participants in ARIS, as well as any other failed/challenged IS projects in MU between 2000 and 2010. Semi-structured face to face interviews with the identified IS development participants were carried out. At the end of a 3-month study period, from August to November 2016, we had reviewed various documents and interviewed 18 members of staff from various units of the university, ICT director, and two administrators. We also obtained email responses from one former IRM/ICT director of the university. The next section presents the major findings of our study.

FINDINGS AND DISCUSSION

A majority (78%) of the respondents interviewed had participated in at least two IS projects over the past decade. Some of the IS projects cited were Alumni IS, Academic Register Information System (ARIS), Bookshop MIS, Intranet design and Cabling, Examination IS, Helpdesk IS, Human Resource IS (HuRIS), Financial Information System (FIS), and Mosoriot Patient Records System. Of all these projects, ARIS was the largest, well funded project whose implementation was unsuccessful. Due to this, we describe it a little further because most of the verbatim comments from the respondents concerned it.

The ARIS Project

A review of in-house documents revealed that work on ARIS began in 1996 following the selection of MU, earlier in June 1994, to participate in the MHO Programme of the Netherlands (MHO, 2002, 2003, 2004; Moi University, 1996). The ARIS project was the first sub-project within the MIS component of the Central Administrative Services Project undertaken with the Delft University of Technology as the main contractor. It was designed to be a university-wide academic affairs information system for the collection, storage, retrieval and management of data related to students, curricula, enrolments, courses, examinations, lecturers, and other teaching resources. By the end of the project period in 2004, it was the only information system that developed to near maturity. The other sub-projects that were planned to follow were the human resource management, financial management, records management, library system, and communication and office automation. According to the project papers, the entire project was prompted by a need to strengthen

the university's central administrative services through staff training and modernisation of the university's management system through introduction and implementation of ICT-enabled information systems (MHO, 2003, 2004; Moi University, 1996, 2004). The project had some vital assumptions for successful implementation, including:

(1) availability of trainable staff;
(2) high retention of staff;
(3) adaptation to the change by staff and students;
(4) guaranteed and continuous support from the university management; and
(5) favourable conditions within the university and its neighbourhood (Moi University, 1996).

The last quarter of 1996 and early part of 1997 was spent gathering and analysing user requirements in all the units of the university. MHO-appointed consultants from the Netherlands worked with volunteer 'internal consultants' to gather and verify the requirements. The production and presentation of a requirements document to the university management in 1997 marked the end of overt activities undertaken on the ground. The design and development of ARIS were undertaken in the Netherlands without MU's technical representation but with periodic visits to the site by consultants, supervisors, and the university management. ARIS prototypes were demonstrated to the management and end users, a number of times thereafter.

An implementable ARIS was released as the entire MU-MHO Central Administrative Services Project approached its sunset years in 2003. Due to various factors, it was neither fully implemented nor used by the end users. According to Moi University, *"… ARIS project was not completed as specified, hence not in use"* (Moi University, n.d.). Apparently, some internally funded IS projects went on during the same period and some of them became operational while others such as Examinations and open-source Library systems were abandoned.

It was established that over the 2000-2010 decade, MU was involved in a reasonable amount of information systems development activities, reflecting the institution's core and non-core services of teaching, research, dissemination of knowledge, and various other support services. The university obtained donor support for the acquisition of hardware and software, training of personnel, and IS project management. Interviews also revealed that while some systems were acquired off-the-shelf, others were developed in-house or by donor institutions for the university. Some signs of impending failure of IS projects are presented in the next section.

Signs of impending failure

To attain the second objective, respondents were asked if

they witnessed or experienced activities or conditions that made them think that the IS projects they participated in were facing difficulty and, consequently, were unlikely to be successfully implemented. Most of them responded in the affirmative, citing a decline in user support of the IS activities, change of project team leader before implementation, reduced communication among stakeholders, little or no progress at some IS stages, a reduction in the frequency and time available for ICT training, an increase in project schedule violations, and appearance of some undesirable events. Other signs cited by respondents include evidence of unattained major objectives, a decrease in organised internal project reviews, indications of donor pulling out before implementation, complaints from end users, and delays in approval of IS project budgets. Some verbatim comments by our respondents on selected signs of difficulty are elaborated in the following paragraphs.

Declining user support

A majority of our respondents' comments (15 out of 18) showed that IS project participants and managers as well as the top university management were not always caught unaware by the abandonment and/or failure of their information system. In this case, therefore, pre-implementation failure was preceded by a reduction in end user confidence in and support for the IS development activities and, where it was available, it was usually inadequate or users demanded a reward for additional workload. A typical respondent's comment was:

"*They [end users] also had a perception that they had to be motivated ... they had to be paid something for them to do data entry ... they did not take it as their own system that will assist them ... but they saw it as an external system for which they had to be paid to input data ... they saw it as something over and above what they are meant to do on a daily basis, so they wanted to be paid for the additional workload ...*"

As will be explained subsequently, this perception may have been due to both a precedent set by earlier practices in the IS development and ineffective communication among the stakeholders. Extant literature reveals similar situations obtained in similar projects in developing countries (Cauter et al., 2014; Chepa et al., 2017; Ganesh and Mehta, 2010; Hughes et al., 2016, Malaurent and Avison, 2015; Sweis, 2015).

Management interference

Some decisions by the top university managers were seen by the study respondents as interference with

project team leadership that they were accustomed to. According to the respondents, this interference set in motion a number of other events unfavourable to the ARIS project. One respondent said:

"*ARIS project team manager was replaced by a second one who did not take up the appointment. That was the beginning of the end … after that we stopped having meetings kabisa! [completely], it came to an end … no progress updates, no more communication. All that because the vice chancellor, Prof … did not believe that Mr. …, our project team manager could do it. He wanted a member of the teaching staff, he opted for a professor who refused to take up the appointment. The project team manager got demoralised … and left [the service of] the university.*"

It should be noted that biased appointment of information systems team members and leaders has been considered a risk in IS development. As a highly complex and unpredictable process, information systems development does not just require an efficient and effective leadership but a continued and dedicated one (Gauld, 2007; Goldfinch, 2007; Krishna and Walsham, 2005; Supramaniam and Kuppusamy, 2010). This implies that the top management should ensure continuity of IS project team leadership for as long as such leadership is attaining the set project objectives (Sweis, 2015).

Ineffective communication and change management

More than a half (61%) of the respondents said there was reduced, largely ineffective, communication between the top management and the IS project team and between the project team members and the end users. The review of in-house documents and further interviews with members of ICT Centre staff revealed that during ARIS testing, data entry clerks were paid for the extra workload. Due to this failure in communication, the transition from testing to data conversion became unclear and, consequently, users preferred maintenance of status quo at a time when MHO project was coming to an end. On the same issue, some of these respondents argued that unlike what happened for successful projects, communication for challenged projects was minimal and, as a result, certain major project activities found them by surprise. One comment was:

"*… end user training was not done because the senior people selected themselves to go abroad for technical training meant for project team members or technical staff, not so much for knowledge and skills but I think because of the allowances they draw each time they go abroad. When the time came to train the end users, less exposed middle level members of staff just sat back to see if the seniors would train them. The system was*

finally not implemented."

However, a review of MU-MHO project papers indicated that ARIS project was considered a change that required good management through, among others, induction, training, and re-training of over 16 senior and 50 middle level staff in Kenya and abroad (Moi University, 1996). Therefore, the general misconception that senior management selected themselves for training as alleged in the aforementioned comment is perhaps the result of poor communication among the stakeholders.

Slow progress and schedule violation

Ten out of 18 (56%) respondents suggested that challenged IS projects registered increasingly slow progress as issues were postponed and deadlines were not strictly adhered to. This issue of scope and adherence to deadlines has featured in other projects (Hughes et al., 2016). One of our interviewees pointed out that:

"*The replacement of the team leader slowed down the progress of the IS project. We stopped meeting … and it reached a point where the donor complained because they were no longer getting regular updates.*"

Certain undesirable events or questionable activities also began to take place. Respondents alleged, for instance, that the replacement of the ARIS project leader was done with an argument that a technology professor was better placed to steer the project team. When the preferred professor refused to take up the appointment, delays that changed the destiny of the project resulted.

Conflicts over personnel training and financial support

Another decision that was perhaps not communicated to the ARIS team and other end users is highlighted in the following comment by one interviewee:

"*Our project was well-funded … we had an expert seconded to our university by the donor to monitor and guide the local IS project team. But I started feeling a little uncomfortable when a team was to go [abroad] for training. A majority were senior members of the university management who selected themselves and added one or two others … leaving out ordinary end users and real technical team members, who felt sidelined, overworked …*"

The foregoing comment reveals that ARIS project had a resident sponsor's representative at the university to provide guidance and technical support to the project team and management. Although ARIS was donor-funded and, as the mentioned comment implies, less likely to suffer internal financial problems, most (88%) respondents argued to the contrary asserting that ARIS experienced financial delays. Their claims are vindicated by ARIS's main donor who, in some of its annual reports, observes that:

"*Implementation of the project is being hampered by considerable delays … attributable to burdensome financial procedures at Moi University*" (MHO, 2002: 37).

"*… the level of MHO exit-scenario implementation at MU can be considered satisfactory. Four of the seven projects are well under way. Others have experienced delays or specific problems, generally because of cumbersome administrative procedures, slow decision-making, inadequate staffing, or a lack of funding …*" (MHO, 2003: 18).

Besides confirming that the donor expected MU to commit additional funds to MHO-sponsored projects, the aforementioned excerpts clearly reveal the challenges that face co-sponsored projects in resource-deficient parts of the developing world. The aforementioned sentiments agree with those of Tanui (2003) that IS projects at MU suffered delays due to conflicts in management styles between the university and its counterpart in the Netherlands, the Delft University of Technology. This implies that prior to commencement of co-sponsored projects, MU management should have undertaken a careful evaluation of the sponsor's management styles so as to harmonise with its own style for effective and efficient IS project management and associated service provision. The sponsors should exclude from their assistance packages requirements that are incognisant of the recipient's financial realities. For example, in the ARIS case, it would have been more fruitful to train some ICT staff and directly involve them in ARIS software and database development in the Netherlands to have a part in the ownership of the programs and to be able to modify and maintain them upon the end of the donors' sponsorship.

According to a majority (60%) of our interviewees, at the height of almost all these symptoms of difficulty and impending failure of ARIS and other information systems, either no remedial action was taken or the actions taken did not reverse the situation. This finding clearly shows that the warning signs did little to nudge IS project managers to take appropriate (and/or adequate) actions to avoid impending failure. In the next few paragraphs, the factors that interviewees attributed to their systems failure before implementation are presented.

Pre-implementation failure factors

The abandonment and/or failure of information systems, particularly after implementation, has been documented

Table 1. Pre-implementation failure factors.

Factor	N*	Mean
Change of project team leader	10	4.9
Lack of top management support	14	4.4
Lack of user participation in the IS project	15	4.3
Unfavourable organisational culture	14	4.1
Inadequate ICT training of project team members	13	3.8
Poor (or lack of) communication among IS stakeholders	11	3.7
Inadequate experience of project team members	14	3.7
Improper vendor selection process	12	3.6
The IS project was not university's initiative	11	3.5
Unrealistic or overambitious IS project scope	11	3.4
Use of inappropriate technology	10	3.4
Lack of additional financial provisions	16	3.3
Donor support decreased	16	2.5

N* =Number of respondents citing factor; Mean = mean of rating with n=N*.

in literature (Gauld, 2007; Malaurent and Avison, 2015, Samoilenko, 2008; Sweis, 2015). However, while it is appreciated that the factors responsible for the abandonment or failure vary widely by sector or region, the evidence base of these phenomena in developing countries is weak (Heeks, 2002, 2006) and the situation may be worse in sub-Saharan Africa. In that respect, this study sought to answer the question:

"*Are there conditions or factors that contribute to pre-implementation failure of information systems in MU? If so, what specific factors are these?*"

Most (90%) of our respondents had participated in an IS project that they considered to have failed, including ARIS. Asked to describe the factors that led to pre-implementation failure of ARIS and other projects, the respondents cited various factors. They were further asked to rate each of the cited factors on a 5-point scale depending on how they thought the factor influenced the eventual failure (where 1=lowest and 5=highest impact). Their responses are summarised in Table 1.

Table 1 shows that the first four highly rated factors for pre-implementation failure concur with the signs of difficulty examined in the previous section. Most of these factors do not differ significantly from those in the findings of some studies in developed countries (Pan et al., 2008; Pan et al., 2007; Malaurent and Avison, 2015; Newman and Zhao, 2008). However, top management interference with IS project leadership, unfavourable organisational culture, ineffective communication, poorly trained and less experienced project team, and lack of ownership of the IS initiative deserve some elaboration. This is because the failure factors appear easily surmountable but they cost MU the implementation and use of ARIS and other information systems. With the exception of

those discussed previously, the respondents' views on each of aforementioned factors are elaborated in the following paragraphs.

Unfavourable organisational culture

The respondents said that MU's legacy systems and organisational culture were a hindrance to success in IS development. A typical comment was:

"*ARIS is a classic example of a failed IS project. … ARIS project had major challenges. These include the fact that the university management was not ready for change through computerisation of its functions … Another challenge was top management mistrust of IS managers' recommendations which appeared alien to the existing institutional culture.*"

Another respondent said:

"*On examination records, for example ... the legacy is that you still have to have those things [paper-based examination forms]. Those forms must be there. They have to be there because they have to be signed by the external examiner and have to be ... kept for over ten years.*"

These two comments highlight a possible lack of ICT-readiness among the top MU management of that decade that may have resulted from established institutional culture and other legacy systems. A technological solution that implied a change to these systems in a radical manner was bound to face some resistance. In its annual report, ARIS sponsor hints at a possible lack of commitment and an unfavourable culture when it notes:

Table 2. Respondents self-rating at time of participation in IS project.

How would you rate yourself, just before you participated in the cited IS project, in terms of:	VW	W	Av	S	VS
Educational achievement on ICT?	0	3	**4**	**10**	1
Professional ICT training?	1	**7**	7	2	1
Prior experience in IS development?	**7**	6	3	2	0
Communication with IS team members?	2	**7**	5	4	0
Communication with project leader?	1	**10**	5	2	0

VW, W, Av, S and VS mean very weak, weak, average, strong, and very strong, respectively.

"*During their monitoring mission to Moi University, Nuffic staff organized a half-day workshop on sustainability. This workshop, held at the end of the mission, was attended by representatives of MU management, by a number of deans, and by all the MHO project coordinators and supervisors … The participants did not agree on the roles to be played by MU management and by the faculties and departments*" (MHO, 2002: 35).

A year later, in 2003, the same sponsor reiterated that:

"*Since 2002 considerable efforts have been deployed to address the difficulties of setting the process of organizational change at MU in motion. The decision-making structure was found inadequate for rapid decision making on issues pertaining to the whole university.*" (MHO, 2003: 17).

The mentioned sentiments confirm our respondents' claim that MU's legacy systems and organisational culture were not conducive for the success of IS development and implementation. This finding implies that MU management, and those of similar institutions in Kenya, and the sub-Saharan Africa in general, should streamline their business operations and change their culture to facilitate effective and efficient decision making and service provision.

Lack of experience

Following the citation of ineffective communication and lack of experience by 11 (61%) and 14 (78%) respondents, respectively, as factors that may have led to ARIS and other IS projects' failure, the respondents were asked to talk about their educational background, professional ICT training, and experience on IS/ICT just before their participation in ARIS and other IS projects. As shown in Table 2, they rated themselves as strong in education, weak or average in professional training, and weak or very weak in terms of experience and interpersonal communication, respectively.

The aforementioned data shows that MU lacked qualified and experienced ICT personnel at the inception of ARIS and other failed information systems. This means

that ICT staff training and IS development were undertaken almost side by side or in parallel. As observed earlier, some ARIS project team members and end users had reservations and misconceptions about the selection of these staff members for workshops and training abroad. To enhance the chances of implementation success in developing countries, staff training and exposure to modern ICT issues and awareness creation and communication on IS project matters should be strengthened prior to and during IS development (Chang et al., 2015; Malaurent and Avison, 2015; Sweis, 2015). This will not only reduce the misunderstanding of IS project activities but will also ensure that all the stakeholders naturally own the projects.

External initiator

Some respondents claimed that one of the failed IS projects was externally initiated, it was not MU's own initiative. They argued that perhaps the project failed because it was not the result of a felt need. One respondent said:

"*ARIS system was kind of borrowed, from outside …, they just wanted to bring it and implement. There was no needs assessment as such, and it was a top-down decision.*"

This finding implies that donor institutions and/or countries should give recipient institutions in developing countries a chance to identify information systems that they need to support their operations. If this was done, the IS project would be owned by the stakeholders and would receive appropriate user and management support.

Other factors

Earlier works have underscored the importance of top management support, user involvement and participation, vendor selection, IS project scope, use of appropriate technology, and financial support in determining the

success or failure of an IS initiative (Abdinnour-Helm et al., 2003; Fortune and Peters, 2005; Goldfinch, 2007; Liebowitz, 1999; Lyytinen and Robey, 1999; Poon and Wagner, 2001; Samoilenko, 2008; Schneider and Sarker, 2006). However, this study shows the specific ways in which each of these factors contributed to the failure of ARIS and other IS projects at MU differ from those reported in the extant literature. This means that successful development and implementation of information systems in Kenya's public universities require that particular attention be paid to each of these factors.

CONCLUSION AND RECOMMENDATIONS

This paper presented a case of IS development and associated abandonment or failure in a typical public university in sub-Saharan Africa. It reported that MU was involved in a reasonable amount of information systems development activities. These activities were likely to increase as the country has joined the rest of the world through faster undersea fibre cable (Anyanzwa, 2009; CET, 2007) and as the university exploits information technologies for teaching, learning, research, and dissemination of knowledge (Kenya Republic, 2006). While some systems initiated and pursued during the period studied succeeded, some of them were abandoned before implementation. The abandonment or failure of the information systems, including ARIS, was not always a surprise to IS project participants and the university management. Certain signs were usually experienced by those involved before failure occurred. This means that university management and other stakeholders in IS development should take all signs of difficulty very seriously and devise appropriate measures to resolve any issues for successful initiation, development, and implementation of information systems. The findings of this study provide a learning experience for developers of information systems in donor-assisted public institutions of sub-Saharan Africa. They underscore the importance of the need to detect early warning signs of possible implementation failure so that appropriate steps may be taken to avoid it.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

REFERENCES

Abdinnour-Helm S, Lengnick-Hall ML, Lengnick-Hall CA (2003). Pre-implementation attitudes and organizational readiness for implementing an enterprise resource planning system, European Journal of Operational Research 146(2):258-273.

Anyanzwa J (2009). Optic Cable to Spur Outsourcing Boom, The Standard, March 14th, The Standard Group, Nairobi.

Avison DE, Wood-Harper AT, Vidgen RT, Wood JRG (1998). A further exploration into information systems development: the evolution of Multiview2, Information Technology and People 11(2):124-139.

Berg M (2001). Implementing information systems in health care organizations: myths and challenges, International Journal of Medical Informatics 64:143-156.

Bii H, Gichoya DM (2006). Challenges of Establishing and Managing an IRM Centre in a Kenyan Public University: A critical Review of Papers by Moi University's IRM Centre Staff, Electronic Journal of Information Systems in Developing Countries 26(4):1-11.

Cauter LV, Snoeck M, Crompvoets J (2014). PA Meets IS Research: Analysing Failure of Intergovernmental Information Systems via IS Adoption and Success Models. In: Janssen M, Scholl HJ, Wimmer MA, Bannister F (eds) Electronic Government. EGOV 2014, Springer, Berlin, Heidelberg. Lecture Notes in Computer Science 8653:72-83.

Centre of Educational Technology, University of Cape Town (CET) (2007). Kenya – Status Report, ICTs and Higher Education in Africa, University of Cape Town, Cape Town, South Africa.

Chang B, Kuo C, Wu CH, Tzeng GH (2015). Using Fuzzy Analytic Network Process to assess the risks in enterprise resource planning system implementation. Applied Soft Computing 28:196-207.

Chepa N, Noorhayati MDJ, Abu Bakar NA (2017). How change management can prevent the failure of information systems implementation among Malaysian government hospitals? AIP Conference Proceedings 1891 (020037):1-6. Available at: https://doi.org/10.1063/1.5005370.

Davies WS (1999). The Systems Development Life Cycle. In: The Information System Consultant's Handbook: Systems Analysis and Design, edited by Davis, W.S. and Yen, D.C. London, CRC Press.

Farrell G (2007). ICT in Education in Kenya. In: Survey of ICT and Education in Africa: Country Reports, Washington, DC: infoDev / World Bank. Available at http://www.infodev.org/infodev-files/resource/InfodevDocuments_353.pdf [Accessed on: 01/03/2017].

Fitzgerald B (1996). Formalized systems development methodologies: a critical perspective, Information Systems Journal 6:3-23.

Fortune J, Peters G (2005). Information systems: achieving success by avoiding failure, John Wiley and Sons, Chichester.

Ganesh L, Mehta A (2010). Critical Failure Factors in Enterprise Resource Planning Implementation at Indian SMEs. Asian Journal of Management Research 1(1):44-57.

Gauld R (2007). Public sector information system project failures: Lessons from a New Zealand hospital organization, Government Information Quarterly 24:102-114.

Goldfinch S (2007). Pessimism, Computer Failure, and Information Systems Development in the Public Sector, Public Administration Review, September/October edition: Pp. 917-929.

Heeks R (1999). Reinventing Government in the Information Age: International Practice in IT-Enabled Public Sector Reform, Routledge, London.

Heeks R (2002). Information systems and developing countries: Failure, success, and local improvisations, The Information Society 18(1):101-112.

Heeks R (2006). Health information systems: Failure, success and improvisation, International Journal of Medical Informatics 75:125-137.

Hughes DL, Dwivedi YK, Rana NP, Simintiras AC (2016). Information systems project failure – analysis of causal links using interpretive structural modelling, Production Planning and Control 27(16):1313-1333.

Iivari J, Hirschheim R, Klein HK (1999). Beyond Methodologies: Keeping up with Information Systems Development Approaches through Dynamic Classification, Proceedings of the 32nd Hawaii IEEE International Conference on System Sciences. Available at: http://ieeexplore.ieee.org/iel5/6293/16786/x0220773.pdf [Accessed: 01/03/2017]

Kautz K, Madsen S, Norbjerg J (2007). Persistent problems and practices in information systems development, Information Systems Journal 17(3):217-239.

Kenya Republic (2006). Transformation of Higher Education and Training in Kenya to Secure Kenya's Development in the Knowledge Economy: Report of the Public Universities Inspection Board, Government Printer, Nairobi.

Kleim RL, Ludin IS (1998). Project Management Practitioner's Handbook, AMACOM Books, New York.

Kreps D, Richardson H (2007). IS Success and Failure – The Problem of Scale, The Political Quarterly 78(3):439-446.

Krishna S, Walsham G (2005). Implementing Public Information Systems in Developing Countries: Learning from a Success Story, Information Technology for Development 11(2):123-140.

Kumar A, Gupta PC (2012). Identification and Analysis of Failure Attributes for an ERP System, Procedia - Social and Behavioral Sciences 65(2012):986-991.

Lambert JH, Jennings RK, Joshi NN (2006). Integration of Risk Identification with Business Process Models, Systems Engineering 9(3):187-198.

Liebowitz J (1999). A look at why information systems fail, Kybernetes 28(1):61-67.

Lyytinen K, Robey D (1999). Learning failure in information systems development, Information Systems Journal 8:85-101.

Malaurent J, Avison D (2015). From an apparent failure to a success story: ERP in China - Post implementation. International Journal of Information Management 35(5):643-646.

MHO (2002). Joint financing programme for cooperation in higher education (MHO): Annual report, 2002, https://www.nuffic.nl/en/

MHO (2003). Joint financing programme for cooperation in higher education (MHO): Annual report, 2003, Available at: https://www.nuffic.nl/en/

MHO (2004). Joint financing programme for cooperation in higher education (MHO): Annual report, 2004, Available at: https://www.nuffic.nl/en/

Moi University (n.d.). Moi University Website [Online] Available at: http://www.mu.ac.ke/ict/index.html [Accessed: 03/01/2009]

Moi University (1996). Moi University Central Services Project: Efficient Management of Central Administrative Services, Moi University, Eldoret. (Unpublished document).

Moi University (2004). Computerization of Student Records: ARIS Status Report, Moi University, Eldoret. (Unpublished document)

Mutula SM (2001). The IT environment in Kenya: implications for libraries in public universities, Library Hi Tech 19(2):155-166.

Mwiria K (2007). Public and Private Universities in Kenya: New challenges, issues & Achievements, East African Educational Publishers, Nairobi.

Newman M, Zhao Y (2008). The process of enterprise resource planning implementation and business process re-engineering: tales from two Chinese small and medium-sized enterprises, Information Systems Journal 18:405-426.

Pan G, Hackey R, Pan SL (2008). Information Systems implementation failure: Insights from prism, International Journal of Information Management 28:259-269.

Pan G, Pan SL, Newman M (2007). Information Systems Project Post-Mortems: Insights from an Attribution Perspective, Journal of the American Society for Information Science and Technology 58(14):2255-2268.

Poon P, Wagner C (2001). Critical success factors revisited: success and failure cases of information systems for senior executives, Decision Support Systems 30:393-418.

Rose J (2000). Information Systems Development as Action Research – Soft Systems Methodology and Structuration Theory, PhD Thesis, Aalborg University, Denmark. Available at: http://www.cs.aau.dk/~jeremy/pdf files/thesis.pdf [Accessed: 03/01/2009].

Samoilenko S (2008). Information systems fitness and risk in IS development: Insights and implications from chaos and complex systems theories, Information Systems Front. 10:281-292.

Schneider C, Sarker S (2006). A case of information systems pre-implementation failure: pitfalls of overlooking the key stakeholders' interests, Journal of Cases on Information Technology. Available at: http://www.igi-online.com/details.asp?ID=6799 [Accessed: 01/03/2017]

Smith HJ, Keil M (2003). The reluctance to report bad news on troubled software projects: a theoretical model, Information Systems Journal 13:69-95.

Supramaniam M, Kuppusamy M (2010). ERP System Implementation: A Malaysian Perspective, Journal of Information Technology Management 21(1):35-48.

Sweis RJ (2015). An Investigation of Failure in Information Systems Projects: The Case of Jordan, Journal of Management Research 7(1):173-185.

Tanui T (2003). Information Resource Management Centre: the formative years, 1995–2000, paper presented at IRM evaluation workshop, 16-18 May, Sunset Hotel, Kisumu, Kenya.

Wanyembi G, Looijen M (2000). A model for improving ICT management, Proceedings of the 2000 IEEE International Conference on Management of Innovation and Technology, 12-15 November, Singapore 2:508-513.

Wanyembi G (2002). Improving ICT management in public universities in Kenya, PhD Thesis, TU Delft, The Netherlands.