Risk Factors in the Collaborative Development of Management Information Systems for Nigerian Universities

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ABSTRACT

The authors discuss the risk factors associated with the collaborative development of information systems (IS) within the university environment in Nigeria. They use observations and reviews of relevant reports of the project as well as a variation of the Delphi Study in presenting their findings. The study shows that risks were associated with funding, top administrators' commitment, the number of participating universities, the role of the donor, as well as other factors. In addition, the challenges posed by each risk factor and the lessons learned are presented. Primarily, the study reports the scenario of IS development by universities in a developing economy in which the development process is characterized by collaboration. Opportunities for future research on the issue are also outlined. © 2006 Wiley Periodicals, Inc.

Keywords: management information systems; risk factors; collaborative development

1. INTRODUCTION

Universities all over the world generate voluminous amounts of data daily because of the nature of their administrative and research activities. To make effective use of such data,

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many higher learning institutions have utilized management information systems (MIS; Gordon, Li, Lin, & Yang, 2004; Simon & Fielden, 1998; Stedman, 1999; Walko, 1999). The top decision-making body responsible for higher education in Nigeria—the National Universities Commission of Nigeria (NUC)—believed that developing an MIS for their country's universities would go a long way in effectively managing information for all the stakeholders in the university systems; namely, teachers, students, administrators, staff, etc. (NUC, 1989). The MIS project was expected to create an administrative computing environment that handled records, data, and financial information relating to all aspects of the academic environment. Unfortunately, universities in Nigeria are known not to co-operate among themselves (see for example, Ojo, 1996). However, in this case, because of the limitations and constraints that the capital or funding resource would impose on such a project, NUC decided to consolidate resources from a number of universities in the country. A collaborative development approach was adopted including the National Universities Commission, 22 federally owned universities, and external consultants. Although the collaboration was among 22 universities, only 4 universities were selected as pilot programs for the project. A *collaborative development approach* as defined here refers to the involvement of several teams or groups of people from the various universities in the country working together on the development of an MIS project for the benefit all the participants. The collaboration also includes the participation of external consultants and donors in the project. Similar participatory or collaborative approaches in developing information systems (IS) for universities have been undertaken by other university systems. For example, in 1988 in the United Kingdom, the MAC (Management and Administrative Computing) project (Fielden, 1998) used a similar approach as did the Australian initiative, CASMAC (Core Australian Specification for Management and Administrative Computing) in 1989 (Lund, 1998; Fielden, 1998). Accounts of African universities using a similar approach to develop integrated computer-based MIS for use have also been documented (Lund, 1998; Fielden, 1998). In addition, this approach is similar to participatory or cooperative design, which has Scandinavian origins (Ehn, 1993; Flyod, Mehl, Reisin, Schmidt, & Wolf, 1989). Essentially, it entails the collaboration of designers, workers, and other principals within an organization in the development of IS in an atmosphere that supports democratic participation and skill enhancement.

This approach was viewed as appropriate for Nigeria because a high degree of similarity exists in the core functions and activities needed to support the administrative and management functions of the local universities (Lund, 1998). Uniform software would be developed at a cost shared by all the participating institutions and parties, which could easily be customized to suit each university's individual needs. A Technical Committee (TC) was set up by NUC to actualize the project. The committee, in conjunction with a programming team produced a technical report of the design, developed, and guided the implementation of the software in the universities (NUC, 1991). As was mentioned earlier, the MIS software was developed using resources from the universities and NUC.

As the information systems project was initiated and implemented, there were risks at every step. Here we will present the risk factors that surfaced as the MIS project progressed. We hope that our findings will help to guide other developing countries on the risk factors they may encounter in their own IS projects in a similar setting. Although some UK researchers have come up with a framework for managing IS projects in higher education (Anonymous, 2002), it is in the context of a highly developed society. Using such a

framework for a region of the world whose MIS project risk factors—specifically those peculiar to higher-learning environments—have not been adequately studied would be ineffective. Very limited information exists with regard to the risks encountered in the course of developing IS projects within a university environment in the developing world with the exception of a few anecdotal accounts as gleaned from the work of Fielden (1998), Lund (1998), and Nwamarah (2002). Nwamarah (2002) asserts that the lack of funds, the lack of commitment by university administrators, and the lack of infrastructure are some of the constraints responsible for the slow development of computer networks in Nigerian universities. This study presents an empirical study of the development an MIS project within the Nigerian educational sector. Our justification for this study is as follows: First, it provides a good opportunity to discuss in depth the results of a collaborative systems development project by universities in a developing country—Nigeria. Second, some researchers (Castells, 1999; Sachs & Warner, 1997) have debated the import attached to this sector as many African developing countries (DCs) make efforts to shake off the yoke of underdevelopment. The development, use, and diffusion of IS within the educational environment in the developing countries is strongly advocated as a panacea to chronic underdevelopment in many countries in sub-Saharan Africa (Odedra, Lawrie, Bennett, & Goodman, 1993; Woherem, 1996). In addition, on the list of priority areas that information and communication technology (ICT) could be used to enhance sustainable development in Africa, education came second only to health (Expanded Joint Secretariat [EJS] Report, 1992; Gokhale, 2001).

Hence, our study on the collaborative development approach of an MIS for Nigerian universities and the requisite risk factors will invariably have implications for practice and research with regard to comparable efforts by other universities in similar settings. Our approach incorporates a variation of the Delphi Study (Kendall, 1977; Schmidt, 1997) Members of both the technical committee and programming team were drawn from the initial four pilot universities and NUC. Specifically, we aim to answer the following research questions:

- What are the risk factors involved in developing a MIS for Nigerian universities using the collaborative development approach?
- What challenges do such risk factors present for the successful deployment of the MIS in Nigerian universities and what lessons are learned from the project?

Admittedly, we hope to provide insights into the factors that could contribute towards the overall success of IS projects in the higher education environment in developing economies, when collaborative development of MIS is used in lieu of other alternatives such as buying "off-the-shelf" applications, etc.

2. LITERATURE REVIEW

Developing any information systems (IS) whether it is based in a commercial organization or within a university environment, is an activity that is fraught with risks (Charette, 1989, 1996; Karolak, 1996; Lucas, 1981; McFarlan, 1981; Stedman, 1999). Moreover, when such project risk factors are not properly or successfully managed (Boehm, 1991; Lyytinen, 1988; Charette, 1989, 1996; Flowers, 1996) failure is the inevitable outcome

(Ewusi-Mensah & Przasnyski, 1994, 1995; Lyytinen, 1988; Lyytinen & Hirschheim, 1987). Risk, in accordance with the definition given by Ropponen and Lyytinen (2000), denotes a particular aspect or property of a development task, process, or environment, which if ignored, will increase the likelihood of project failure. Other definitions of risk include a condition that can cause threats to the finishing of a software development or an ISD project (March & Shapira, 1987). Barki, Rivard, and Talbot (1993) explain project development risk by constructing a mathematical equation relating uncertainty associated with the project and the magnitude of potential loss with the project failure. In a similar vein, our notion of a successful MIS project is one in which a particular MIS project meets its set objectives and goals, cost escalations are minimal and/or manageable, end users' satisfaction and management support is gained, to mention but a few. Conversely, a failed MIS project refers to an initiative where the stakeholders experience significant undesirable outcomes (Heeks, 2002; Lyytinen, 1988; Standish Group, 2001).

Interestingly, Al-Wohabi, Masoud, and Edwards (2002) have observed that most of the existing literature on risk factors affecting IS implementation tend to dwell more on commercial and business enterprises than on government or state-controlled environments, of which universities are a part. In Nigeria, the government owns and controls up to 90% of all the universities in the country. Furthermore, a majority of studies on risk factors also concentrate on the developed world. There are a few studies on risk factors in IS development and implementation in the developing countries that highlight the social, cultural, and organizational differences in government agencies (Mursu, Lyytinen, Soriyan, & Korpela, 2003; Tettey, 2002;). There are also numerous accounts in extant IS and other trade literature of failed information systems globally (Drummond, 1996; Lyytinen & Robey, 1999). Unfortunately, studies have shown that up to 90% of all IS projects fail to meet their goals (Clegg et al., 1997). Similarly, Ward (1994) reports that up to 25% of large systems development projects were cancelled, 60% experienced cost overruns, 75% had quality problems, and less than 1% of all the systems developments projects studied met schedule. Other studies confirm that the majority of IS projects are late, cost overruns or escalation are very common, and in some instances, the IS projects are cancelled (van Genuchten, 1991; Standish Group, 2001; Clegg et al., 1997).

Several researchers have investigated various approaches aimed at improving the success rates of IS projects and at the same time, decreasing the incidence of failures. Some examples of such approaches used in the IS domain include the *Critical Success Factors* proposed by Rockart (1979) and *Risk Management Theory* (Alter & Ginzberg, 1978; Boehm, 1991; Charette, 1989; Schmidt, Lyytinen, Keil, & Cule, 2001). Regardless of which approach is used, identifying the risk factors in any project is always the first step towards ensuring success for any IS project.

In general, several risk factors have been associated with IS project development and implementation, a few of the widely discussed ones are presented in Table 1 (See Barki et al., 1993; Schmidt et al., 2001; Wallace & Keil, 2004 for more factors.)

Specifically, with respect to collaborative development of MIS projects within university environments other risk factors can also emerge. Chief of which is the size or number of the participating institutions and the organizational and cultural fit between the participants (Lund, 1998). The organizational structure of the development arrangement (Fielden, 1998) is another factor. Furthermore, the activities of external donors in the project may pose a problem when the proper coordination is not instituted (HMSO, 1997; Udo & Edoho, 2000).

TABLE 1. Information Systems Developments Risk Factors

Risk Item/Factor	References
Unclear/Misunderstood scope	Keil et al. (1998), Standish Group (2001)
Project size	McFarlan, 1981, Barki et al. (1993)
IT illiteracy among users	Ojo (1996); Odedra et al., (1993)
Resistance to change	Tettey (2002); Anderson Narasimhan (1979)
No or inadequate planning	Standish Group (2001), Lucas (1981)
Misunderstanding the requirements	Standish Group (2001) Clegg et al. (1997)
Irregular energy supply	Mursu et al. (2000, 2003) Ojo (1996)
Lack of required IS skills in team	Alter (1979), Al-Wohaibi et al. (2002)
Changing requirement/scope	Schmidt et al., (2001), Keil et al. (1998)
Lack/insufficient of funding	Mursu et al. (2003), Barki et al. (1993)
Lack of effective PM skills	Land Somogyi (1987), Standish Group (2001)
Wrong development strategy	Standish Group (2001), Alloway (1976)
Insufficient/inappropriate staffing	Keil et al. (1998), Standish Group (2001)
Artificial deadlines	Standish Group (2001), Boehm (1989)
Changing team	Barki et al. (1993), Zmud (1980)
Lack of users' involvement	Beath (1983), Robey et al. (1989)
Poor control of project	Boehm (1989), Standish Group (2001)
End-users' expectations	Keil et al. (1998), Beath (1983)
Control over vendors	Boehm (1989), Wallace Keil (2004)
Frequent conflicts among team	Flowers (1996), Casher (1984)
Unstable organizational environment	Wallace & Keil (2004)
Lack of top management support	Beath (1983), Schmidt et al. (2001)
Lack of "people skills" management	Schmidt et al. (2001), Keil et al. (1998)
Lack of frozen requirements	Keil et al. (1998), Standish Group (2001)
Conflicts between departments	Robey et al. (1989), Casher (1984)
Inadequate users' training	McFarlan (1981), Jiang & Klein (2001)
Complexity of the project	Zmud (1980), Beath (1983)
Failure to gain users' commitment	Beath (1983), Barki et al. (1993)
Inadequate support from vendors	Boehm (1989), Barki et al. (1993)
Introduction of new technology	Barki et al. (1993), McFarlan (1981)
IT illiteracy among top management	Ojo (1996), Mursu et al. (2000, 2003)

Note. IT, information technology; IS, information science; PM, project management.

3. THE NIGERIAN UNIVERSITIES' COLLABORATIVE MIS PROJECT DEVELOPMENT

Staff of NUC and representatives of the 22 federally owned universities jointly developed the MIS system. The project cost was estimated to be approximately $250,000. The Overseas Development Administration (ODA; University of East Anglia, Norwich, UK) through the British Council (BC) supplied hardware for the pilot universities and provided training and some consultancy services. As the supervisory body to universities in Nigeria, NUC is statutorily required to obtain information from the universities relating to academic standards, funding, etc. To be able to advise government appropriately, the body initiated an IS that could harmonize the activities of local universities. Although the universities are autonomous, they were willing to collaborate on this project because of its perceived benefits and because the costs would be borne by NUC.

At the time the MIS project was planned, most of the universities were using different types of ad hoc software, which were inadequate (NUC, 1994). The proposal to develop an integrated software system largely funded by the NUC was therefore an attractive option.

Another factor that facilitated collaboration was the similarity in the administrative and academic structures of the federally owned universities. Additionally, the Committee of Vice Chancellors, the Committee of Registrars, the Committee of Bursars, and Directors of Academic Planning in Nigeria, consisting of officers and administrators across institutions, also played major roles in setting the foundation for the collaborative MIS software initiative. Minor groups such as the Student and Staff Working Group and the Finance Working Group, comprised of the Directors of Academic Planning and Bursars helped to produce the MIS users' requirements for the project. The broad spectrum of players ensured and to some degree, guaranteed that whatever system was produced would meet the requirements of the different universities. The MIS Project Steering Committee and the TC were set up with an equally diverse membership. Members of both the TC and programming team were drawn from the initial four pilot universities and NUC. The universities supported and participated in the collaborative development approach not because they were directed to by the supervisory body, but because they were involved in the organs of decision-making as well as directly participating in the development activities.

3.1 The Question of Software Acquisition Versus In-House Development

After determining the specifications for the requirements and producing the design report, the TC was faced with the task of deciding whether to develop the software in house or acquire appropriate software from outside developers. A number of factors affected the decision to go for in-house development. First, upon completion of a survey of the application software market at that time (early 1990s), an integrated, scalable, multiplatform product that fit all the stakeholders' requirements was not found. Most of the software available could only address limited application areas involving students' records, human resources, accounting, and stock/inventory control. In addition, the various application software packages required diverse and incompatible hardware, operating systems, and database platforms. The student records software sampled was not comprehensive enough and could not meet all of the requirements without extensive customization. The other application software was tested and found to be inappropriate. Second, with the evolutionary and dynamic nature of activities in the universities, having or securing access to the source code of any developed MIS is crucial to facilitate future maintenance and upgrade of the software. None of the vendors consulted showed any willingness in parting with the source code. Although the vendors demonstrated an ability to offer technical support and backup services for their products, engaging them to develop the systems was not viewed as a good option because in the long term, the transaction costs would be substantial.

While these two weighty points questioned the use of vendor-supplied software (at least for the core applications), the other option was in-house development. Similarly, other questions arose with respect to the adequacy of in-house resources, the experience level of the development team, the duration of project, and above all—funding. However, upon resolving these issues, it was decided that the Data Management Department of NUC would provide the necessary computer hardware, software, office space, and support services for the programming. The TC members and the programmers were selected from a pool of submissions from the universities' Departments of Computer Science and Computer Centers. However, a few members of the team dropped out either because of inadequate motivation or resignation from their jobs. This was a source of concern; nonetheless, they were easily replaced by other staff. It should be emphasized that the success recorded

TABLE 2. Participants' Demographic Profile

Group size	6 members	
Age	Mean: 52 years	
Gender	Male:	100%
Job title	Director (4):	66.7%
	Deputy Directors (2):	33.3%
Education	Bachelor's (1); Master's (4); Doctorate: (1)	

in developing the software in-house was because of the stability and commitment of the original/founding team.

In fact, although the MIS software developed is currently being used successfully in 22 out of 37 universities in Nigeria, a number of serious difficulties were encountered in the course of its development. Operational problems are still being encountered in some universities and a few bugs have been found. Enormous technical, financial, and management challenges lie ahead in further developing the software to its full potential, and in extending it to other universities. Above all, the re-orientation of users and other stakeholders within the university community as to the significance of adhering to the rules of using the software is proving a Herculean task.

4. METHODOLOGY

We used a combination of direct observations, interviews, and the Delphi Study (Kendall, 1977; Schmidt, 1997) in carrying out this study. Almost all of us are key participants in the Nigerian University MIS project in the capacity of Directors. As such, we were able to meet with all the other stakeholders—the Vice Chancellors, Registrars, Academic Planners, Bursars/Financial Directors, the Project Steering Committee, Technical Committee, Application-Specific Working Groups, the Programming/Development Team, and External Consultants/Donors. Meetings, discussions, and workshops among the various groups as well as the reports generated by NUC (1995, 2000) were used in this study.

Second, a variation of the Delphi Study (Kendall, 1977; Schmidt, 1997) was used to ascertain the degree of concordance of the participants in this study with the generated risk factors noted in the NUC publications. The relative ranking order of each item is also noted. Subsequently, e-mail and telephone interviews were conducted with some of the participants to shed more light on some of the risk factors. The participants came from pilot universities in the project. Their profiles are given in Table 2.

More importantly, the risk factors used in this study are not dissimilar to those obtained from the generic risk factors encountered in developing IS within Nigerian universities (Ifinedo & Uwadia, submitted) and in the country (Mursu et al, 2003). However, with respect to the observations and meetings with other stakeholders in the project in addition to the reports of NUC; 13 risk items were given to the participants to rank. They are discussed in the next section.

5. RESULTS AND DISCUSSION

The Kendall's W coefficient of concordance among our participants was 0.833, which is an acceptable value for this kind of study (Schmidt et al., 2001). The test statistics are shown in

TABLE 3. Relative Ranking of Risk Factors for Collaborative Information Science Development in Nigerian Universities

Risk factor	Minimum	Maximum	M	SD
Funding	1	3	1.83	.75
Top administrator commitment	1	5	2.17	1.60
Project team composition and stability	2	6	3.67	1.86
Technical complexity and team expertise	1	9	4.50	2.59
Role of external donors and consultants	4	7	5.33	1.03
Artificial deadlines	4	8	6.00	1.41
Project management skills	3	8	6.00	2.37
Number of the collaborating institutions	7	9	7.83	.75
Users' commitment and support	6	10	8.67	1.37
Lack of information technology literacy among users and top administrators	4	13	9.83	3.13
Organizational or cultural affinity	11	12	11.17	.41
Proximity of collaborating universities	10	12	11.50	.84
Intellectual property rights ownership	10	13	12.50	1.22

TABLE 4. Test Statistics

N	6
Kendall's W	.833
χ^2	59.956
df	12
Asymptomatic significance	.000

Table 4. The Delphi Study was stopped after the first round for two reasons: (a) Assurance of further participation was becoming difficult, and (b) a good concordance value of more than 0.5 had been reached. The Kendall's W coefficient of concordance is anchored: 0 (no agreement) and 1 (total agreement). The relative ranking of the risk factors is shown in Table 3.

5.1 Funding

The absence of resources is inimical to any project (Barki et al., 1993; Boehm, 1991). Mursu et al. (2003) has discussed the relevance of funding to systems development in Nigeria against the backdrop of the socioeconomic limitations of Nigeria. Nigeria is not a rich country (U.S. Counter-Intelligence Agency [CIA], 2004). The federal government of Nigeria provided the seed funding to the Nigerian universities MIS project through NUC. The responsibility of funding the start-up in the nonpilot universities was to be borne by the individual universities; they procured the equipment and provided the staff; however, the MIS software was installed at the nonpilots at no cost to them. Each MIS unit was expected to have local area network (LAN) facilities, which was to be connected to a university-wide network; ageing and obsolete hardware were to be replaced or upgraded regularly; staff were to undergo regular refresher courses; and funding was to be made available to recruit more IT staff. Unfortunately, it is apparent that over the last few years, funding from NUC for the development of the software has been reduced drastically. Universities whose

expectations are not being met are becoming understandably impatient. The inability to sustain the project's funding would cause the project to fail. It is important to note that at the outset of the project, an external source of funding through the British Council was enlisted.

5.2 Top Management Commitment and Support

Top management commitment and support has been found to be of critical importance to the success of ISD projects (Beath, 1983; Ewusi-Mensah & Przasnyski, 1995; Lucas, 1981; Newman & Sabherwal, 2001; Schmidt et al., 2001). In fact, it is the most important risk factor among the set of risks that (Keil, Cule, Lyytinen, & Schmidt, 1998) contend as having universal relevance. In this study, it was recognized that the key to the success of the project lies in the total commitment, active support, and participation of the Chief Executive Officers—the Vice Chancellors—of the Nigerian universities and the executive secretary of NUC. To ensure the sustainable development and growth of the project, certain structures were created. A National Implementation Committee was in charge of control and monitoring of project development stages; the committee, which currently sets out policies for the growth of the MIS, consists of members from the universities and NUC. At the NUC level, an MIS unit headed by a director was created under the Office of the Executive Secretary. The unit handles MIS operations in NUC, and coordinates the activities of the TC and programmers on technical matters affecting the project; it also offers support services to MIS units in the universities. At the university level, each university has an MIS unit headed by a director under the Office of the Vice Chancellor. Recently, it would appear that some of these structures are losing their relevance and effectiveness because of waning interest and commitment by the top administrators/management. The indications include:

- The National Implementation Committee has met only once since the year 2000 instead of twice each year.
- The Technical Committee meetings have been sporadic. There have not been four meetings per year as specified.
- Requests for technical assistance by universities are not handled on time by the National Universities Committee; this is tempting some universities to consider third-party MIS software that they could procure.

5.3 Project Team Composition and Stability

There is an inherent risk in having a team that is not stable (Alter, 1979; Barki et al., 1993; Zmud, 1980). Likewise, the level of expertise possessed by the team could have bearing on the success of the IS project (Anderson & Narasimhan, 1979; Barki et al., 1993; Boehm, 1989; Standish Group, 2001). For the Nigerian MIS project, all personnel involved in the project were fulltime staff of either NUC or the participating universities. They worked part-time on the project and were released when required by their respective employers. Inadvertently, this impacts the project negatively as members leave the team and new members are brought on.

5.4 Technical Complexity and Team Expertise

Several researchers have written about the risk factor associated with the technical complexity (Barki et al., 1993; Beath, 1983; McFarlan, 1981) of the project and the technical know how of team members (Anderson & Narasimhan, 1979; Standish Group, 2001; Wallace & Keil, 2004). For the Nigerian universities' MIS project, the software architecture was jointly produced by the TC, while coding and testing were performed by the programming team under the supervision of the TC and external consultants from the British Council/Overseas Development Agency. Although the MIS development was successfully carried out within schedule, there were risks based on the fact that the level of expertise of the team was limited and did not cover all the application areas being developed.

5.5 The Role of External Donors and Consultants

As was mentioned earlier, the level of expertise in IS project management and implementation in developing countries such as Nigeria is somewhat limited (Arunkumar, 1999; Heeks, 1998, 1999; Ifinedo, 2004; Odedra et al., 1993; Ojo, 1996; Woherem, 1996). Hence, the services and expertise of external consultants and donors are often sought with respect to such development activities. At the onset of the project's conceptualization in 1987, NUC acknowledged that embarking on it alone would be a difficult and risky task. It therefore sought the collaboration of the British Council (BC). The British Council agreed some level of funding and the provision of consultancy services. Specifically, the BC was expected to supply computer hardware and systems software to the pilot universities, to provide technical advice, and to conduct training at different levels of the project. These functions were performed on behalf of the BC by the consultants from ODA. Between 1988 and 1995, the ODA conducted sensitization and awareness training programs for user groups including Registrars, Academic Planners, Bursars, Physical Planners, and Chairmen of MIS units. Also, within the same period, the TC, Heads of MIS units, programmers, and computer technicians underwent a series of technical training locally and at the University of East Anglia, Norwich, United Kingdom, which was the base of the ODA (NUC, 1994, 1995).

There were schisms between the external consultants and the local TC members. For example, the ODA consultants were of the view that an MIS should produce only performance indicators (PIs); on the other hand, the TC believed the systems should generates not only PIs, but also function as a transaction processing system that could generate report listings as required by users from time to time. Other areas of disagreement extended to the configuration of hardware and software to be supplied to the pilot universities. The TC in its System Design Report (NUC, 1991) had recommended a multi-user/network hardware, UNIX/NOVELL operating system, C++ programming environment and an Oracle backend. For some inexplicable reason, these recommendations were not adopted; rather, the BC supplied standalone microcomputers with MS-DOS operating systems and DBASE IV, a database management system to each pilot site. Each pilot university was supplied with three computers. However, because the computers were not networked, the MIS software could only effectively operate one computer. This meant that the three computers supplied could not be utilized efficiently. The use of one computer system to capture thousands of students' records within limited time was grossly inadequate, and created severe bottlenecks in some universities. Overall, the role of the external consultants in this regard became a risk to the project. Interestingly, Udo and Edoho (2000) had noted that caution needs to be taken when transferring technology to African nations.

5.6 Project Deadlines

Delays are among the symptoms of failed projects (Standish Group, 2001). Universities who adopted the collaborative systems development approach also reported this risk factor. Common complaints by members of collaborating universities included ". . . slowness of software design by committee" (Lund, 1998) and ". . . a long period of planning blight, while universities waited patiently for the software to be delivered" (Fielden, 1998). The Nigerian initiative is characterized by similar complaints. The initial delivery schedule of the Nigerian university MIS project, named NUMIS (Nigerian Universities Management Information System) was to be 2 years, but delays and postponements were prevalent because of the hindrances caused by the risk factors discussed here.

5.7 Project Management Skills

Overall, this risk item has been noted as one of the primary reasons why IS projects fail (Barki et al., 1993; Ewusi-Mensah & Przasnyski, 1994; Lyytinen & Robey, 1999; Standish Group, 2001). Several researchers have noted that such skills are in short supply in Africa (Ifinedo, 2004; Mursu et al., 2003; Odedra et al., 1993; Ojo, 1996). With regard to NUMIS, many of the problems encountered during the project have their roots in poor project management. For example, there were instances when scheduled meetings with group members could not be held; project team members dropped out because of lack of motivation. Simon and Fielden (1998) had advocated for robust project structures and management for implementation of IS in universities; some of the recommendations such as the use of a Steering Committee had little effect in the management of the Nigerian MIS project.

5.8 The Number (Size) of the Collaborating Institutions

In the wider discourse of IS project risk management, the issue of relative project size has been argued as a risk factor by several researchers (Barki et al., 1993; Beath, 1993; McFarlan, 1981; Zmud, 1980). Specifically, for this project it became clear that drawing up requirement specifications for 33 universities was a cumbersome task. This invariably led to longer waiting periods for such specifications to arrive (NUC, 1991). Although the Australian CASMAC's initiative had 33 universities involved in the development of IS (Lund, 1998); it formed itself around three groups consisting of 19, 11, and 3 members, respectively.

5.9 Users' Support

The implications of wrong, unclear, and inadequate requirement specifications by users have been extensively discussed by (Barki et al., 1993; Beath, 1983; Keil et al., 1998; Maylor, 1999; Moynihan, 1997; Schmidt et al., 2001). The lack of support and involvement has featured among the top factors contributing to failed projects (Standish Group, 2001). User's support is vital (Beath, 1983; McFarlan, 1981) because research has shown that there is a positive and significant correlation between users' participation and their satisfaction in systems development (McKeen & Guimaraes, 1997). In this project, user groups offered cooperation and support as much as possible during the early stages of the development;

however, a report received during one of the last national MIS conferences (NUC, 2000) indicated that the lack of cooperation from users in some aspects, i.e., the noncompliance by some entities to the rules of using the systems, was hampering the effectiveness of the deployment of the MIS in some universities. In addition, IT illiteracy among users is a problem (Mursu et al., 2003; Ojo, 1996).

5.10 Lack of Information Technology Literacy Among Users and Top Administrators

This factor has been discussed as resulting from socioeconomic constraints in developing countries (Ifinedo & Uwadia, submitted; Mursu et al., 2003). Upon realizing the impact of such a shortcoming to the overall progress of the project, training programs were organized in clusters for Vice Chancellors, Registrars, Bursars, and Directors of Academic Planning by the ODA consultants and the TC members. Admittedly, the risk of having top administrators direct the affairs of this particular project may not be beneficial in the long term.

5.11 Organizational or Cultural Affinity

Wallace and Keil (2004) in their work discussed risk factors pertaining to the organization. In addition, Robey, Farrow, and Franz (1989) studied group conflicts in systems development. In relation to this study, the participating universities are located in differing regions of the country with diverse sociocultural undertones, the tendency to display dissimilar values cannot be ruled out. Although in terms of administration and operations, one might notice similarities. Lund (1998) reports that cultural differences, among the three South African universities that participated in collaborative development of IS led to lack of confidence on the part of some of the IT staff as a result of their inability to compete with more experienced staff from other institutions in the partnership.

5.12 Proximity of Collaborating Universities

At the outset of the project, involving only the four pilot universities, meetings and development activities were held at offices provided by NUC; therefore, physical location was not an issue. However, during postpilot implementation, the issue of proximity resulting from the expanse of the country came to the fore. Nigeria is a large country. Ideally, if collaboration were restricted to universities within close areas, this would ensure that logistical problems and associated costs would not be a problem. To lessen the impact of this constraint, universities were grouped into regions with one of the four pilot universities serving as a hub. Each zone is headed by a zonal coordinator, who is either a TC member or a high-level staff member in the NUC MIS unit.

5.13 Intellectual Property Right Ownership

One obvious benefit of in-house development of software versus employing the services of vendors is that source code is available for modification and maintenance. Owing to the fact that a number of universities were participating in the MIS development, the question of whom to pass the intellectual property right (IPR) to arises. Considering that NUC is

the major player in the arrangement automatically meant that it has custody of the IPR. Moreover, with a central body coordinating the source code; it is hoped that its reliability and wholesome nature will be maintained. Any modification is carried out by NUC in the universities' MIS unit. Unfortunately, because of inadequate resources such as staff, NUC is unable to perform the modifications in all the universities. Hence, the situation has resulted whereby different versions of the software can be found in the universities at any point in time. Enthusiasm over the use of the software is also waning in some universities because of the perceived inefficiency on the part of NUC. The risk here is that although the MIS software was developed from one source; it has nonetheless undergone varying degrees of modifications. The question is does the NUC own the IPR for the software? And, if the NUC issues directives to have all the universities "networked" on the software; won't this be a recipe for disaster?

6. THE CHALLENGES OF THE RISK FACTORS IN THE PROJECT AND LESSONS LEARNED

6.1 Funding

Although the seed funding came from special budgetary grants secured from the Nigerian federal government, the various participating universities were expected to contribute to the expenditure; the ODA also provided some funding. This was to be used for staff salaries, training, and equipment procurement. Each MIS unit was expected to have LAN facilities, which were to be connected to a university-wide network; ageing and obsolete hardware needed to be replaced regularly. In the course of collaborative IS development, some universities felt that expectations were not being met and began to procrastinate in their obligations to the project. Interviews with the participants indicate a unanimous consensus that this risk factor is unfavorable to the progress of the project. The lack of a secure source of funding has stalled development efforts, and the project is heading toward failure. The lesson we learned—a small-sized project with less demand on financial resources would have been a better option.

6.2 Top Management Commitment and Support

One ploy used to secure the commitment of the Vice Chancellors was to locate the MIS unit within their office to garner support. Whether this was effective is another story entirely. The top management of NUC needed to redouble its commitment to the development activities of the MIS project by making sufficient financial provision for crucial activities, which was available at the outset but waned as the project developed. From interviews with participants, it was found that the involvement and support of the Vice Chancellors in applying sanctions would have been an effective way of solving certain problems; for example, their sanctions might have prevented the late submission of input forms by both students and staff, a requirement of the project. Furthermore, if the Vice Chancellors had insisted on having certain key reports and PIs such as examination results sheets and program success ratios be produced by the MIS system, this would have compelled those involved in taking their responsibilities more seriously. Hence, the risk to the project was not having those at the top direct, guide, and support efforts to make the project a success.

6.3 Project Team Composition and Stability

All personnel involved in the project were fulltime staff of either the National Universities Commission (NUC) or the universities. However, in some instances some of the members had to leave because of lack of motivation or disagreements over remunerations, benefits, etc. This did hinder the success of the project. The project, however, was able to weather these departures mainly because the key personnel that started the project did not change. The lesson we learned was that having staff away—in instances where development activities were at the NUC office—from their home universities was not perceived to be advantageous to such personnel. Moreover, the issue of favorable and comparable remunerations with the private sector should have been addressed; it would have helped to stabilize the project in terms of staffing.

6.4 Technical Complexity and Team Expertise

The software architecture was produced by the technical committee and the coding and testing were performed by the programming team—all under the supervision of the BC/ODA Consulting Technical Committee. Contributory risk factors such as inadequately skilled IT staff, changing user requirements, and a lack of familiarity with the application areas were noticeable. Training was provided both locally and overseas to offset such failings; users were given training as well. We learned, however, that training staff in complex tasks should be initiated early or before the actual project development begins rather than during the development process.

6.5 The Role of External Donors and Consultants

The role of the donor of the project was multifaceted—the ODA acted as fund providers and as technical support or consultants. This promoted conflict. For example, the specifications of the local TC differed from those of the ODA. In accordance with the dictum of "he who pays the piper dictates the tune," the donor followed its own recommendations to the detriment of the project. Our lessons learned were (a) seek funding from external donors and carry out your development activities yourselves, or use the funding to pay knowledgeable consultants to design for you; or (b) alternatively seek technical support from the donor and forego using their technical expertise. This project clearly showed that having a bit of both was not beneficial. In light of the chronic resource constraints on governments—major sponsors of universities—in Africa, making the wise choice may not be easy.

6.6 Project Deadlines

The initial delivery schedule of the Nigerian project was 2 years, but delays and postponements resulted in an extension of this timeframe. As universities did not receive what was promised within this period, doubts began to surface and commitments equally waned. To maintain the support of participating entities, realistic project duration and delivery times need to be developed and communicated.

6.7 Project Management Skills

The aforementioned risk factor associated with the estimation of project deadlines is arguably a hallmark of a good project manager. Several commentators have noted that Africa is lacking expertise in this area (Odedra et al., 1993; Ojo, 1996). Directors of the MIS units from the pilot universities and other staff of the NUC went to the United Kingdom for courses in this regard. Such exposures enhance skills acquisition, which is put to good use.

6.8 The Number (Size) of the Collaborating Institutions

Though four universities participated in the actual development of the systems, having up to 22 universities providing specifications for the project was later seen as an unwise course of action.

6.9 Users' Support

A report received during one of the national MIS conferences (NUC, 2000) indicates the following in relation to the users involved in the project:

1. Deadlines for submission of input forms/documents were not adhered to.
2. There was a low level of computer literacy within the university.

For any IS to be effectively used, whether developed collaboratively or purchased externally, the cooperation of all user groups is a needed. The inability to gain users' commitment and support was agreed by all the participating directors to be inimical to the success of the project. In the words of one participant, ". . . this kills and causes a project to be abandoned." However, as one director noted ". . . they [users] were made part of the project right from the onset"; another added, "Users were sensitized and sold the benefit of the project." Furthermore, training strategy on the systems usage was extended to users' groups—staff, administrators, and students alike.

6.10 Lack of Information Technology Literacy Among Users and Top Administrators

The NUC (2000) noted the illiteracy level among users of the systems; unfortunately, the same level existed for top management in Nigeria. In fact, there is an ongoing program in Nigeria to sensitize top management about the benefits and use of IS/IT (Ifinedo, 2004). The lesson learned here is that for IS-related development activities to gain any modicum of success, those at the helm of affairs should be at least cognizant of the resulting benefits.

6.11 Organizational or Cultural Affinity

The universities involved in the project are from diverse ethnic, religious, and cultural settings. Nigeria is a nation of many small nations; there about 250 ethnic groups in the country. Further, Nigerian Universities are sometimes classified by "generations," which is based on period of establishment, student enrollment, and orientation/philosophy. The

first-generation universities were created between 1948 and 1969; they have enrollments ranging from 20,000–30,000 students, and have programs that cover the arts, sciences, and humanities. The second-generation universities were established in the 1970s and have enrollments ranging from 10,000–20,000 students and share a similar philosophy as the first-generation universities. The third-generation universities were set up in the 1980s and 1990s and have a student population of less than 10,000; their programs are technology oriented. Because of these differences, the requirements documents produced for all the universities were quite large and diverse. It would have been better to have institutions of similar orientations collaborate rather than having all participate in the venture.

6.12 Proximity of Collaborating Universities

This risk item results from the expanse of the country. Though regional or zonal units were established for the project; nonetheless, logistical problems existed in acquiring inputs and delivering outputs to the units. An arrangement that sees universities in proximity collaboration instead of nationwide endeavors might have offset this problem.

6.13 Intellectual Property Rights Ownership

This was the last of the risk factors. The participants do not really consider it a threat to the success of the project; however, it has been argued in the reports of NUC. The risk inherent in this factor would only surface if the various universities in the country modified the original software/systems outside the blessings of the chief financier—the NUC—as some have already started doing. Any attempt to network these differing versions of the system may present a technical risk of unimaginable magnitude.

7. CONCLUSION

In this article we have presented the results of the collaborative development and implementation of a computer-based management information system by federally owned Nigerian universities. We reported the risk factors encountered in the process in addition to discussing the lessons learned. A majority of the risk factors in this discourse compares with those in similar settings reported in the extant literature. The other risk factors specific to the collaborative IS development in Nigerian universities were equally highlighted.

Collaborative IS development, which refers to the coming together of different entities working together in producing an IS for the good of all was found to be beneficial to participating universities because development costs and other resources were shared. This does not suggest that the process was not without difficulties. In fact, it was fraught with risks, chief of which are the lack of funding and top management support. Next to these risks are team composition and team stability. In addition, the influences of donor and external consultants was seen to constitute a risk to the success of the IS development activity. Furthermore, the pervasive lack of project management skills in Nigeria with regard to IT/IS project management was mentioned as a risk factor. Other more minor risk factors discussed include illiteracy among users and top administrators, differing organizational orientations, and the proximity and number of the participating universities.

Additionally, the participants of this study who are themselves middle IT managers had the opportunity to discuss key lessons learned from the collaborative IS development

involving universities in the country. The main lessons learned from the project include the following: collaboration works better to the extent the success of the IS project is guaranteed when funding is available, top management support is gained, and the project team's stability is maintained. The motivation and skills of participants should be assessed at the outset and efforts made towards addressing gaps at the start of the project. In the same vein, the role of the donors regarding the sorts of assistance rendered must be clearly defined. Likewise, users' commitment and their levels of IT knowledge are vital to the success of the project. Importantly, the number of participating universities should be as few as possible and should be located within a close proximity. Above all, the collaboration's management and developmental teams should be cognizant of the organizational and cultural orientations of the participating entities.

Finally, there are limitations to this study, some of which relate to the sample size used. Arguably, six participants might be considered small; notwithstanding these participants occupy influential positions in the project and their viewpoints as experts are valued in this respect. The absence of commentaries from the users of the systems as well as other entities in the project may limit the findings of this study. Furthermore, the extent to which comparable risk factors as uncovered in this particular endeavor being reproduced in similar settings in Nigeria or elsewhere may be dependent upon the nature of project being executed and whose viewpoints are sought. As such, we do not claim that the risk factors discussed in this article are the only risks associated with collaborative IS development within university environments. Nonetheless, the contribution of this article is seen in its discourse regarding risk factors in collaborative IS development by universities in a developing country—Nigeria. The findings of the work could be of import to the practice of IS development by universities in the region or elsewhere that choose the path of collaboration IS development in lieu of buying MIS from the market. In brief, the lessons learned from this case study underscore the contributions of this particular endeavor. Future study could investigate the perceptions of the users and other entities of the IS systems developed collaboratively within the Nigerian university.

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