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Digitizing Institutional Research Output of University of Nigeria, Nsukka

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Introduction

Libraries all over the world have always placed emphasis on the preservation of recorded information and this has posed serious challenges to librarians and other information managers. Preservation no doubt, has increasingly continued to take a centre stage in information management and handling particularly with the proliferation of publications and other recorded information in different formats. The present global information environment propelled by information and communication technologies has made preservation of information resources, particularly institutional repositories more critical to information professionals than ever before. Research outputs of any institution are considered to play critical roles in the assessment of intellectual and cultural growth of any society particularly in developing countries where knowledge production and dissemination have been considered very low. The preservation and dissemination of these research outputs to a very large extent add to the international prestige of the institution.

The major goal of any preservation technique is to hand over the society's civilization to another generation and equally make them available and accessible to the international scholarly community. Therefore, transmission of institutional repositories which are part of the cultural heritage of a people is paramount to library and information professionals and record managers (Banjo 1998). As part of the cultural heritage of a people, these research outputs will eventually form part of the of the organization's institutional repositories which evolve gradually from research and other intellectual work of people in a community particularly in an academic community (Etim, Ukpak and Ukpanah, 2009). An institutional repository is like a growing organism which accumulates with the organization particularly universities which have the mandate to continuously produce knowledge through teaching, learning and research. The digitization of research outputs of an institution is a step in the right direction for the building of institutional repositories of such organization. This is based on the fact that without electronic version of the research outputs institutional repositories will be difficult to establish.This perhaps gave rise to the definition of institutional repository as "a repository established, owned, developed and managed by public or private institution or organization, and/or its surrogate" (Mohammed, 2009). According to Mohammed, the repository contains active and inactive documents which accumulate over time in the life of the institution. Usually IR is mainly a

collection of grey literature and other publications from the staff of the institution.

The rationale for the collection and preservation of institutional repositories has been underscored by Crow (2002) when he explained that IR creates ennobling environment for scholarly publishing and makes the research productivity of a particular institution more visible globally. It therefore adds value the credibility of a university in terms of its intellectual capital. In any organization, institutional repositories play very important roles in establishing the identity, the accomplishments and values of the people. Masakazi (2009) has therefore argued that in the present information society every nation has to ensure the preservation, promotion and dissemination of its arts, culture and the overall heritage using the tools in the present age. This is because IR as a heritage material is a source of strength and confidence that puts the changes of the society into perspectives and therefore, enables the society to build a better future.

Over the years, the library has accepted the challenge of preservation of cultural heritage of the people it serves. The present information age where revolution technology is compressing the world into a global village has made preservation of IR much more relevant than ever. The consequence of inability to preserve one's heritage materials will be a loss of identity and influence in the global community.

Preservation of recorded knowledge in the present information environment is basically through digitization (Tsebe 2005; Gaston, 2008, Masakazi, 2009). According to Masakazi, digitization is the creation of multimedia databases enhanced by digital information and thus offering easy access to cultural and scientific heritage for large population of the users. Digitization therefore, involves the conversion of non-digital materials to digital formats. Tsebe (2005) has identified materials that can be digitized as follows: maps, manuscripts, moving objects, audio materials and in addition institutional repository and other heritage materials.

Masakazi (2009) noted that digitization of heritage materials was pioneered by organizations such as European Union. According to him the European Union adopted a policy action on digitization in 2002, and in 2004 made recommendations on digitization, preservation and online accessibility of cultural materials. The G7 countries had earlier given prominence to digitization at the G7 and Information Society Submit held in Naples in 1994. The leaders laid emphasis on the need to encourage worldwide information society. The G7 countries and European Commission selected projects where international co-operation could be beneficial to all the role players. Therefore, these have created awareness of the benefit of digitization to both developed and developing countries. In line with this Tsebe (2005) has noted that digital imaging technology provides unprecedented advantages to institutions with some collection of some scholarly resources since these resources can be accessed by wide range of users no matter their location. The implication of this is that digitization encourages globalization of local information resources and localization of globalized information resources.

In Africa, digitization is still a novelty (Kanyengo, 2006), and as a result Tsebe (2005), Britz and Lor (2004) have regretted that most digitization projects in Africa have always originated from outside Africa. Britz and Lor have even argued that digital technology is a form of cultural imperialism since very little digital resources are in African languages. However, Africa cannot afford to ignore digitization of the continent's resources in the present knowledge-based economy where nations are assessed in relation to their information power. What Africa may take serious is to initiate digitization project in Africa by Africans so that we can preserve our own heritage materials ourselves.

Some digitization projects in African have been identified by Tsebe (2005). Some of these include:

- The German colonial society collections of 55,000 photographic impressions from Africa, which was completed in 1999.
- The West African Research Centre completed the digitization of 150 colonial reports in 2002
- Sabinet online digitized 40 scholarly journals in 2002 and by 2004 another 141 titles were completed.
- The University of Cape Town in co-operation with the National Library of South Africa digitized 345 drawings of the Black collections in 2003.

- Michigan State University had digitized ten African journals by 2004
- The National Library of Egypt had digitized 100,000 pages by 2004.

From available literature (Brit & Lor 2004; Tsebe 2005; Kanyengo 2006 Masinde & Rajai 2008; Masakazi 2009;) South Africa is far ahead of other African countries in the digitization of heritage materials from Africa. The National South Africa Library and the National Museum were involved in the Digital Imaging Project of South Africa (DISA) and have done tremendous job in the digitization projects in South Africa: DISA's aim according to Masakazi is to investigate and implement digital technologies from around the world to access South African materials of high socio-political interest which otherwise would have been difficult to locate and use.

The low level and slow pace of digitization projects in Africa has been attributed to African's low Internet connectivity and other infrastructure related problems (Tsebe, 2005; Masakazi 2009) Digitization project according to Masakazi is capital intensive requiring extensive resources in terms of software and hardware technology, highly skilled personnel and other necessary infrastructure such as adequate power supply which many African countries lack. Similarly Tsebe identified organizational and management problems which are critical factors in any digitization project. For instance in some institutions, a department is created to handle digitization projects while some make use of external bodies to handle it. A key factor with any digitization initiative is the selection of materials to be digitized. Alagbeleye (2009) identified the problems militating against digitization in Africa as lack of expertise, legal copyright laws, poor funding and lack of organizational infrastructure. Agreeing with this, Shibanda (2001:4) believes that a major challenge facing digitization projects in Africa is that availability of skilled manpower. According to him,

"the real challenge for African digital information is to put in place an information management or professionalism that possesses the skill and competencies that can develop meaningful programs that supports and activate that use of information and communication technology… such skills and competencies should evolve around providing which direction

Africa takes to be part and parcel of digital information based on the description in the light of:

- Information society initiative
- Sectoral national-regional information infrastructure that will facilitate the development of an
- information and communication system targeting the connection of libraries, information centers and institutions through internet connectivity.
- Promote the use of on-line communication by putting in place a functional system as above.
- Development of national information strategy with backup decisions for participation as partners in the global information superhighways.

In Nigeria, digitization projects have been rarely reported. In a recent work by Olatokun (2008) of the fifteen universities studied on preservation techniques they use, shows that digitization is rarely used by the university libraries studied. This according to him is basically due to lack of awareness. This development is discouraging for even when Tennet (2002) and Anbu (2006) in separate works have called for institutional repositories as a way of handling African digitization problems very few institutions have done much in digitizing their local contents.

Digitization Initiatives at University of Nigeria, Nsukka

As part of the efforts to preserve institutional repositories and to ensure global accessibility of these information resources, the University of Nigeria, Nsukka started a digitization project in 2008. The ICT centre which was completed recently with modern information and communication facilities is used for the digitization initiative. The main objective of the project is to digitize local information resources such as undergraduate research projects, postgraduate theses and dissertations generated over the years by the university and publications authored by staff of the university.

The Nnamdi Azikiwe Library is taking a centre stage in the digitization initiative with most of the librarians participating in the project. In addition to the librarians, technical staff were recruited

to handle such jobs like scanning of documents, book-marking, rasterization and uploading of the documents into the Internet. Librarians are involved in supervision of the work, appending digital signature, ensuring that the scanned documents are properly done and discharge other supervisory functions.

Number of theses scanned	16,819
Number of publications of scholars scanned	5,494
Uploaded works	20,207

This paper therefore, intends to evaluate this project so as to identify some necessary measures which will guarantee the successful completion of the exercise. The specific objectives of the paper are to:

(a) Ascertain the adequacy of skills possessed by the personnel involved in the project.

(b) Establish if there has been any improvement in the skill acquisition of the personnel as a result of the project.

(c) Examine the reliability of the software and hardware used for the digitization.

(d) Ascertain the adequacy of personnel involved in the project

(e) Identify some managerial problems associated with the project.

(f) Identify strategies for the improvement of the digitization exercise

Research Methods

The methods adopted for this study is the use of questionnaire and document analysis. Two sets of questionnaires were designed by the researchers to collect data from 22 librarians and 25 technical assistants that are participating in the project (see appendixes 1 and 2). There was 20 valid questionnaire returned by the librarians giving a valid return rate of 90.9%, while the same 20 valid questionnaire were returned by the technical assistants giving a valid return rate of 80%. Document inspection was used to obtain information on the number of materials that has been digitized and uploaded so far. Data from the questionnaire was analyzed using frequency and percentages and presented in tables and charts.

Analysis and Discussion of Data

Table1: Results for Level of Proficiency in the use of the following digitization skills for Librarians & Technical Assistants

Variables	Librarians		Technical Assistants	
	Frequency	Percentage	Frequency	Percentage
Computer Literacy skill	19	95	20	100
Book-marking skill	10	50	19	95
Internet surfing skill	18	90	11	55
Rasterization skill	9	45	19	95

Signing of digital signature	15	75	7	35
Web-linking	14	70	7	35

Table 1 shows the level of proficiency of personnel involved the digitization project in terms of the use of digitization skills. One can infer from the table that the librarians' computer literacy skill is very high at 95%, however, the computer literacy skills of the technical assistants is higher. In fact, the entire technical assistants have very high level of computer literacy skill. The table also shows that the librarians have low rasterization and book-marking skills at 45% and 50% respectively while these skills are high among the technical assistants at 95% each. Similarly, signing of digital signature, web linking and internet surfing skills are high among librarian (90%, 70% and 75% respectively) but low among technical assistants (55%, 35% and 35% respectively).

Fig 1: Column Chart comparison of percentage level of proficiency in the use of digitization skills between Librarians & Technical Assistants
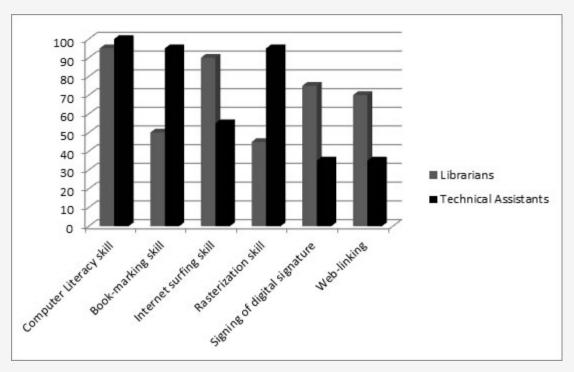
Table 2: Results for Level of skill acquisition as a result of the digitization initiative for Librarians &Technical Assistants

Variables	Librarians		Technical Assistants	
	Frequency	Percentage	Frequency	Percentage
Computer Literacy skill	19	95	20	100
Book-marking skill	15	75	20	100
Internet surfing skill	18	90	11	55
Rasterization skill	12	60	19	95
Signing of digital signature	15	75	7	35

| Web-linking | 15 | 75 | 7 | 35 |

Table 2 presents the results of improvement on the digitization skills as a result of the digitization initiative. The table shows that there was no improvement in the librarian computer literacy skills since it remains at 95% as before, while that of the technical assistant requires no further improvement since they are already at 100% mark. However, there is improvement on the boo-marking skills, rasterization and web linking skills of the librarians from 50% to 75%, 45% to 60% and 70% to 75% respectively. The table also shows that librarians showed more improvement in skills acquisitions more than the technical assistants because the technical assistants only showed improvement in book-marking skills and the increase is only 5%.

Fig 2: Line Chart comparison of the percentage level of skill acquisition as a result of digitization initiative amongst Librarians & Technical Assistants
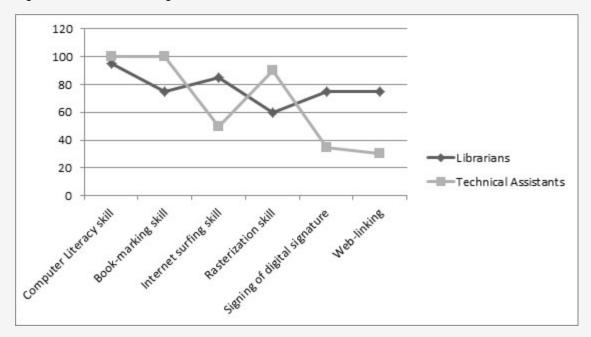

Table 3: Results for the reliability of hardware & software used in the digitization initiative for Librarians & Technical Assistants

Variables	Librarians		Technical Assistants	
	Frequency	Percentage	Frequency	Percentage
Computer Systems	15	75	16	80
Scanners	18	90	16	80
Acrobat Reader	17	85	20	100
Server	10	50	18	90
U.P.S	15	75	18	90

Results presented in table 3 show the reliability of the hardware and soft ware used in the digitization process. It can be inferred from the table that the computer systems are reliable. Both the librarians and the technical assistants working with the computer systems rated their reliability high (75% and 80% respectively). In the same way, the scanners, acrobat readers and uninterrupted power supply (UPS) are equally rated very high in their reliability. This is equally the case with server except that the librarians rated their reliability lower (50%) than the

technical assistants' 90%. The wide variation in the rating may not be unconnected with the technical assistants' low knowledge of internet surfing which very much require the high performance of the server.

Table 4: Results for the adequacy of personnel involved in the digitization exercise for Librarians & Technical Assistants in relation to:

Variables	Librarians		Technical Assistants	
	Frequency	Percentage	Frequency	Percentage
Facilities available	16	80	16	80
Volume of work to be digitized	15	75	16	80
Scanning of documents	15	75	15	75
Signing of digital signature	16	80	15	75
Uploading of Documents	13	65	14	70
Unraveling of the Theses	12	60	10	50

The presentation in table 4 is the result of adequacy of personnel involved in the digitization project. The results show that both librarians and the technical staff are comfortable with the adequacy of personnel in relation to facilities available, volume of work to be digitized, scanning of documents and uploading of documents. The librarians' response on these items are 80%, 75%, 75%, 80% and 65% respectively, while technical staff has 80%, 80%, 75%, 50% and 70% respectively. The response of both groups is low in terms unraveling of theses with 60% and 50% respectively.

Fig 3: Column Chart comparisons for the percentage adequacy of personnel involved in the digitization exercise between Librarians & Technical Assistants in relation to:
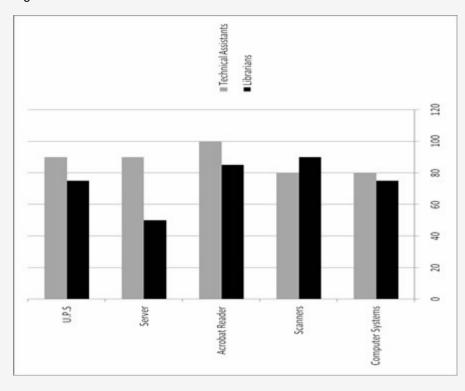
Table 5: Results for Managerial Problems of the Digitization initiative

Variables	Librarians Frequency Percentage		Technical Assistants Frequency Percentage	
Inadequate power supply	11	55	9	45
Problem of selecting materials to be digitized	8	40	8	40
Inefficient supervision of Project	9	45	3	15
Facilities not reliable	12	60	8	40
Slow movement of materials from Library to digitization centre	9	45	7	35

Table 5 shows the results for managerial problems associated with the digitization project. From the librarians' response, unreliable facilities top the major problem with 60%, followed by inadequate power supply which has 55%. Inefficient supervision of the project and slow movement of materials to digitization centre have 45% each. The least problem from the librarians' view is the problem of selecting materials to be digitized which has 40%. However, the technical assistants rated inefficient supervision of the project least among all the problems with 15% followed by slow movement of materials with 35%, while inadequate power supply was rated the greatest problem with 45%. From their response, problem of selection of materials and unreliable facilities are rated 40% each.

Fig 4: Line Chart comparison of the percentage of Managerial problems of the Digitization initiative amongst Librarians & Technical Assistants
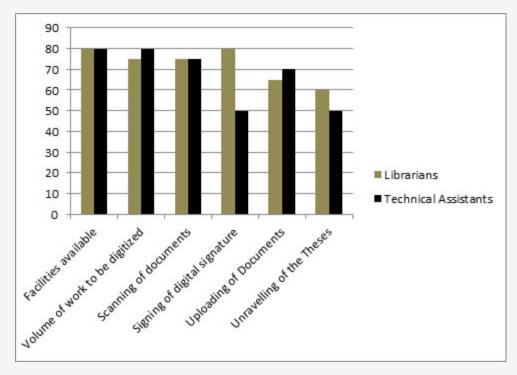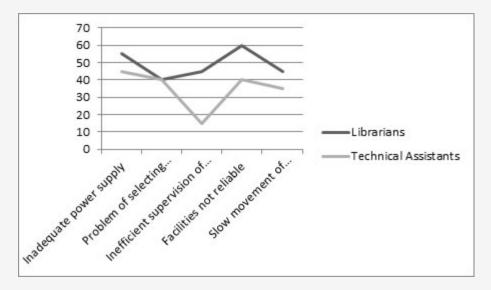

Table 6: Results for strategies for improving the digitization initiative for Librarians & Technical Assistants

Variables	Librarians		Technical Assistants	
	Frequency	Percentage	Frequency	Percentage
Library should fully take over the project	18	90	13	65
Librarians should be sent for training on digitization skills	20	100	17	85
Digitization skills should be integrated into library school	19	95	14	70
Enhanced technical collaboration between library and MIS	19	95	18	90

In table 6, the result of the strategies for improving the digitization initiative is presented. Response from the librarians shows that sending librarians for training on digitization is uppermost in the strategies with 100% followed by integrating digitization skills in library schools and enhanced technical collaboration between the library and MIS with 95% each. Taking over of the project by the library also ranked high with 90%. The response from the technical assistants almost followed similar pattern with the librarian, but they ranked collaboration of the library and MIS as the most ideal of all the strategies with 90%. This is followed by sending of the librarians for digitization which has 85%, while integrating digitization skills in library schools has 70%. Unlike the librarians, the library taken over fully the digitization project ranked the least among the strategies with 65%.

Fig 5: Bar Chart showing the percentage comparisons of strategies for improving the digitization initiative by both Librarians& Technical Assistants

Discussion of Findings

Findings from the digitization project in university of Nigeria. Nsukka is quite revealing. The personnel involved in the digitization initiatives do not fully possess the required digitization skills. The librarians need to improve on their rasterzation and book marking and digital signature skills while the technical assistant need to improve on web linking and internet surfing skills. Digitization skills have been identified as the greatest problem facing digitization of local resources in Africa as has been pointed by Kanyengo (2006). Training of the personnel involved particularly the technical assistant is therefore very necessary as we have observed from the findings that showed little improvement on their digitization skill.

Findings show that hardware and software facilities in use for the project are adequate and reliable. This is a welcome development since these have been major impediments in digitization initiatives in many African countries. However, it important to address the problem of

the server which the librarians identified that it is not quite reliable in the project.

In term of adequacy of personnel involved in the project in relation to facilities available and work schedule, the findings show that the number of personnel engaged in the project is adequate. The librarians whose duties are mainly to sign digital signatures, do the web linking and supervision of the work seem to be enough for the job. However, the numbers of people who unravel the documents before scanning can take place are not quite adequate. This may be the reason for some delays before scanning can be done. Inadequate personnel is one of the greatest problem facing digitization projects in Africa as has been identified by Mazakazi 2009 and Fsebe (2005). The digitization project as has been pointed out is capital intensive and requires the hiring of adequate personnel in terms of quality and numbers.

From the findings, the most nagging problem in the digitization project is attracting the required skills for troubleshooting of equipment such as computer systems, scanners among others. Inadequate power supply is equally a serious problem. Although there is an alternative power supply in the ICT centre, incessant power failure generally in the country requires that huge sums of money be spent on purchase of fuel. This fund is not released all the time. Apart from this, often, the generating machine has to be put off to avoid the break down of the machine. The delay associated with this development slows down the speed of the project.

One the strategies to improve the digitization process, the respondents agree entirely that training of the personnel's involved in the exercise is necessary. This training is required to acquire necessary digitization skills which are critical for the success of the project. Actually, the librarians believe that the University library should take over the project. This will help in controlling the movement of personnel involved in the project. Staff especially non-librarians are often transferred from one department to the other, thereby slowing down the project as new staff will inevitable need some time to master the skills. Tsebe (2005) has noted that is some places a department is created to handle the exercise, therefore, the library could in fact handle the exercise by creating a special department for it as is proposed by the university of Nigeria Nsukka.. The findings equally show that it is ideal that digitization skills be integrated into the curriculum of library schools so to encourage the exercise in the country. Enhanced collaboration between the library and Management Information Systems(MIS) is equally ideal to enhance sharing of ideas, facilities and personnel which will add value to the project.

Conclusion and Recommendations

In conclusion the digitization project is a novel initiative which most Nigerian libraries should get involved with as the project creates new ways to search and access library content, opening up ones collections to the library's immediate patrons and users throughout the world. This in no small way encourages the resource sharing of local content between and among libraries. Recommendations are hereby proffered to enhance the smooth running of digitization projects in Nigeria.

- The library involved in a digitization project should constantly solicit the support of the institutions department of management and information systems. A synergistic relationship with this group is seriously advocated for since it helps to fast-track the work.
- Training of librarians in the technical know-how of the digitization process is seriously advocated for. Librarians need competencies such as technical skills in metadata, checking, verifying for quality control and selection of hard and soft ware.
- There needs to a well accepted guideline and standard for digitizing works with regards to intellectual property rights. All universities should have same policies/standards. This is presently, not the case in Nigeria, and because libraries digitize resources written by their staff and published by other organizations, there is always a problem with regards to the ownership of such works. This often might lead to litigation if not properly handled.
- Libraries should constantly budget for the digitization of their local content. Some libraries believe in constantly procuring more resources without caring much about the preservation of the invaluable resources within their repository.
- Digitization skills should be included in the library and information science curriculum in Nigeria. This is because digitization will continue to grow in importance as it creates visibility not only of the library's content but the scholars within the university.

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Appendix 1

Nnamdi Azikiwe Library

University of Nigeria, Nsukka.

16th April, 2009

Dear Respondent,

Please, kindly respond to the questions below. It is strictly going to be used for academic exercise. Your honest response will be appreciated.

Yours faithfully,

Dr (Mrs) C N Ezeani and

Mr Ifeanyi J. Ezema

SECTION A

1. Academic qualification

BA, B.Sc, BLS MLS Ph.D

2. Job designation

Assistant Librarian Librarian II, Librarian I Senior Librarian Principal Librarian University Librarian

3. How many years have you been a librarian? Less than 5 years, 6 – 10 yrs 11 – 15 yrs 16 – 20yrs 21 – 25 yrs 26 – 30 yrs, Above 30 yrs

4. Age: 24 34 yrs 35 – 45yrs 46 – 60 Above 60 yrs

Librarians Questionnaire

A. What is your level of proficiency in the use of the following digitization skills?

		Very high	High	Low	Very Low
1	Computer literacy skill				
2	Book-marking skill				
3	Internet surfing skill				
4	Rasterization skill				
5	Signing of digital signature				
6	Web-linking skill				

B. What is the level of your skill acquisition as a result of the digitization initiative?

		Very high	High	Low	Very Low
1	Computer literacy skill				
2	Book-marking skill				

3	Internet surfing skill			
4	Rasterization skill			
5	Signing of digital signature			
6	Web-linking skill			

C. How reliable are the hardware and software used in the digitization initiative?

		Very Reliable	Reliable	Unreliable	Very Unreliable
1	The computer systems				
2	The scanners				
3	The Acrobat reader				
4	The Server				
5	The U.P.S				

D. How adequate are the personnel involved in the digitization exercise in relation to the following?

		Very adequate	Adequate	Inadequate	Very inadequate
1	Facilities available				
2	Volume of work to be digitized				
3	Scanning of the documents				
4	Signing of digital signature				
5	Uploading of the documents				
6	Unravelling of the theses				

E. What are the managerial problems of the digitization initiative?

		SA	A	D	SD
1	There is inadequate power supply				
2	There is problem of selecting materials to be digitized				
3	There is inefficient supervision of the project				

		SA	A	D	SD
4	The facilities are not reliable				
5	Movement of materials from library to the digitization centre is slow				

F. What are the strategies for improving the digitization initiative?

		SA	A	D	SD
1	The library should fully take over the project				
2	Librarians should be sent for training on digitization skills				
3	Digitization skills should be integrated into the library school				
4	There should be an enhanced technical collaboration between the library and MIS				

Appendix 2

Nnamdi Azikiwe Library,

University of Nigeria,

Nsukka.

16th April, 2009

Dear Respondent,

Please, kindly respond to the questions below. It is strictly going to be used for academic exercise. Your honest response will be appreciated.

Yours faithfully,

Dr (Mrs.) C. N Ezeani and

Mr Ifeanyi J. Ezema

FOR TECHNICAL ASSISTANTS

SECTION A

1. What is your highest academic qualification?

BA, B.Sc HND ND SSCE FSLC

2. Age: 16 – 25yrs 26 – 35yrs 36 – 45yrs Above 45yrs

3. What is your specific function in the digitization project?

(a) Scanning of documents (b) Book marking & rasterisation

(c) Uploading of documents (d) Web-linking

(e) Others (please specify) _____

4. Have you had any experience of the job you are doing before now?

Yes No

5. If yes for how long?

(a) Less than 5yrs (b) 6 – 10yrs (c) Above 10yrs

TECHNICAL ASSISTANTS QUESTIONNAIRE

A. What is your level of proficiency in the use of the following digitization skills?

		Very high	High	Low	Very Low
1	Computer literacy skill				
2	Book-marking skill				
3	Internet surfing skill				
4	Rasterization skill				
5	Signing of digital signature				
6	Web-linking skill				

B. What is the level of your skill acquisition as a result of the digitization initiative?

		Very high	High	Low	Very Low
1	Computer literacy skill				
2	Book-marking skill				
3	Internet surfing skill				
4	Rasterization skill				
5	Signing of digital signature				
6	Web-linking skill				

C. How reliable are the hardware and software used in the digitization initiative?

		Very Reliable	Reliable	Unreliable	Very Unreliable
1	The computer systems				
2	The scanners				
3	The Acrobat reader				
4	The Server				

5	The U.P.S			

E. How adequate are the personnel involved in the digitization exercise in relation to the following?

		Very adequate	Adequate	Inadequate	Very inadequate
1	Facilities available				
2	Volume of work to be digitized				
3	Scanning of the documents				
4	Signing of digital signature				
5	Uploading of the documents				
6	Unraveling of the theses				

F. What are the managerial problems of the digitization initiative?

		SA	A	D	SD
1	There is inadequate power supply				
2	There is problem of selecting materials to be digitized				
3	There is inefficient supervision of the project				
4	The facilities are not reliable				
5	Movement of materials from library to the digitization centre is slow				

G. What are the strategies for improving the digitization initiative?

		SA	A	D	SD
1	The library should fully take over the project				
2	Librarians should be sent for training on digitization skills				
3	Digitization skills should be integrated into the library school				
4	There should be an enhanced technical collaboration between the library and MIS				