

Challenges and Prospects of Using Software Products in Ethiopian Higher Educational Institutions

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Abstract: Information Technology implementation process is the study of design, development and implementation of computer-based Information Systems, particularly in software applications, computer hardware and networking in the organization. Software application usage in higher educational institutions has become an integral part of Information and knowledge management process tools. To this end most universities now has ICT department, which are responsible to design, develop and implement software's applications.

The focus of this paper is to examine the challenges and prospects of using software products in Ethiopian higher education institutions. A survey was conducted at six universities to collect data about the extent, challenge and prospects of using software products by questionnaires, in-depth interview and observation.

The overall analysis of the data shown that, In Ethiopian higher educational institutions, software products are not used sufficiently. Most of the departments are not supported by software's to perform tasks and provide standardized service. The challenges for the universities face not to use software products adequately are many directional. The major challenge goes to managers and leaders of the university; they are ignorant or not aware about the importance of using software products. In addition to this, resistance to use new technology, Lack of documentation / user manual, poor standardized infrastructure, poor internet connection, electric power interruption, shortage of trained professionals and staff turnover are serious challenges.

Keywords: Challenges of software usage, Software in higher education, Software usage.

I. INTRODUCTION

Though IT usage has been identified as a significant construct, significant gaps remain in our understanding of how IT is used by different organizational members [1].

In today's digital era, software is indispensable aids of doing every activity. It drives our computers and allows us to collect, organize access, analyze, and share information on a large scale

and with efficiency. Legitimate software use by governments will encourage the private sector to follow suit, thereby leading to growth of the domestic software industry which creates jobs and generates revenue. A single government organization might be using hundreds of computers and mobile devices deployed at dozens of locations running numerous types and versions of operating system and application software.

According to higher education proclamation No. 650/2009 [2] of Ethiopia Higher education is categorized by universities, university colleges and specialized institutions. Specifically this research proposal focuses on only public universities. In these proclamation higher education are deemed to be provide bachelor degree and above. They are under the responsibility of the Ministry of Education except Addis Ababa science and Technology University and Adama Science and Technology University, which are under the govern of Science and Technology Minister.

The expected growth and transformation of Ethiopia public higher education institution cannot easily be realized without software usage. In this undergoing research proposal, I will investigate the software usage, challenges and prospects the institutions cannot be managed by the old ways and means to reach the pinnacle of success.

II. STATEMENT OF THE PROBLEM

Tertiary institutions are centre for excellence, places where people are trained to become professionals who contribute the knowledge and skills acquired to national development.

It is, therefore, important to fully apply software usage in tertiary institutions. This will enhance individual, institutional and national development tradition. The use of Software in higher institution holds out a bright prospect of filling the vacuum created by manual system. The use of software could also facilitate the keeping of accurate records in the areas of library, procurement and finance, Registrar, Human resource management and Academic Unit [3].

Application and services of Information and Communication Technology (ICT) are integral to any meaningful development

in the education sector in all respects. Thus the efficiency of employing ICT (software) systems in governmental organizational unit may be seemingly difficult if the basic challenges of ICT are not addressed. Oshodin and Idehen [4] identified poor installation of Software related facilities and poor maintenance culture, as problems facing software usage. Other problems facing the use of software in governmental organization as adapted from Emetaron [5], Sajjad A and Khawaja M [6] [7] and Hossein Z [8] are: Lack of Basic Education and ICT Skills, Lack of ICT Technicians and Personnel, operation and maintenance of software [9] [10].

These institutions strive to achieve the educational millennium development goal of the country. In order to achieve this goal the different organizational unites of the universities such as library, registrar, human resource and academic unites needs to use tremendous software products to do their daily activities. This research identifies the basic inspect its prospect and challenges that hurdle on their daily goings-on and to.

Hence, the main concern of this study is to investigate the challenges and prospects of software usage in Ethiopian public Higher education institution.

III. OBJECTIVE AND SIGNIFICANCE

The following general and specific objectives are outlined in order to solve the problems that initiate this study.

A. General Objective

The main objective of this study is to identify the software usage practice that involves managing, deployment, maintenance, utilization and software applications and its challenges within Ethiopian public Higher Education Institution in particular.

B. Specific Objectives

- To identify what type of software (open source or commercial software) the institutions use.
- To know the prospects of using software in higher education institutions.
- To find out challenges to use these software.
- To assess the extent of software usage.
- To suggest possible solutions for challenges.

C. Significance of the Study

The Research will have the following Significance or benefits to the Academic Higher institution:

- The institutions can easily identify the challenges to deploy and use different software.
- Improves Departmental effectiveness through sharing their perspective on managing the daily on-going task (if any).

- Ensures efficient & effective use of resources and proactive management of business academic.
- It motivates the governmental organizations to engage in using software and improve the efficiency and effectiveness of the institutions.

IV. METHODOLOGY AND APPROACH

The following methods, techniques and tools will be used with the aim of achieving the general objective of this research.

A. Techniques

The Ethiopian higher education institutions, which are under the direct control of ministry of education, are thirty three in number. They are further classified in to three generations. First generation universities are Addis Ababa University, Haramaya University, Gonder University, Bahirdar University, Jimma University, Mekele University, Arbaminch University, Hawassa University. The Second Generation University Include: Debre Berhan University, Kotebe University, Axum University, Mizan Tepi University, Debre Markos University, Wollo University, Ambo University, Wellega University, Dilla University, Medewellabu University, Wolaita Sodo University, Dire Dawa University, Jigjiga University and Semera University. Third Generation Universities include: Wolkite University, Wachemo University, Debere Tabor University, Adigrat University, Weldia University, Bullehora University, Assosa University, Asela University, Metu University and Gambela University. This categorization is done by Ministry of Education.

Hence, I used *Stratified sampling method* to categorize the universities into three as stated in the above and I used *Systematic random sampling* method to give an equal chance to be selected for each member of all categories. From each generation I was select two universities by using table of random method. Finally, six universities were selected from the total population by using the Stratified random sampling method.

The selected universities are here:

- Addis Ababa University and Bahirdar University from first generation.
- Debre Berhan University and Wolaita Sodo University from second generation.
- Wolkite University and Adigrat University from third generation universities.

B. Data Collection Methods and Verification

The data for this study collected through a survey *questionnaire and observation*. Before the questionnaire is distributed, a pilot test questionnaire survey was conducted at Addis Ababa University because the researchers are in nearby to this University. The questionnaire survey approach was used for its various benefits: such as to detect relationships that are common across the organizations, exhibit considerable

precision in collecting and reporting data [11], an inexpensive approach for collecting data, and offering anonymity [12] [13]. The questionnaire was structured to obtain data on current usage and challenges in the university. The questionnaire was sent to ICT Director of the selected universities based on the modeled sample design. They are responsible to collect the data about their university software usage, challenges and prospects in different working units such as library, Procurement and Finance, Registrar and Academic unites.

This study took 12 months from 1st January to 30th October 2017. According to Ethiopian ministry of education universities are categorized into three main categories: first, second and third generation universities. The Questionnaires was sent to the selected ICT directors to distribute to the concerned units / departments. In order to collect the data through observation and questionnaire a month period of time is allocated. After carefully collected the data by using the above two methods the data was verified by the researcher to make sure that the data is free from error.

V. DATA ANALYSIS AND RESULT

Data analysis and interpretation is performed in line with the study research questions and objective. Therefore, the data collected using questionnaires and observation was analyzed and interpreted regarding to usage and challenges of software by using charts, graphs and tables.

A. Present Status of Information Technology

Under this section, the researcher tried to understand the attitude / interest of IT staffs towards IT or software usage at their job / University, the availability of ICT infrastructure and other related issues.

From the graph below (Fig. 1) we understand that almost all IT staffs (around 89%) have excellent interests to use software products at their University to be productive and efficient at their work place.

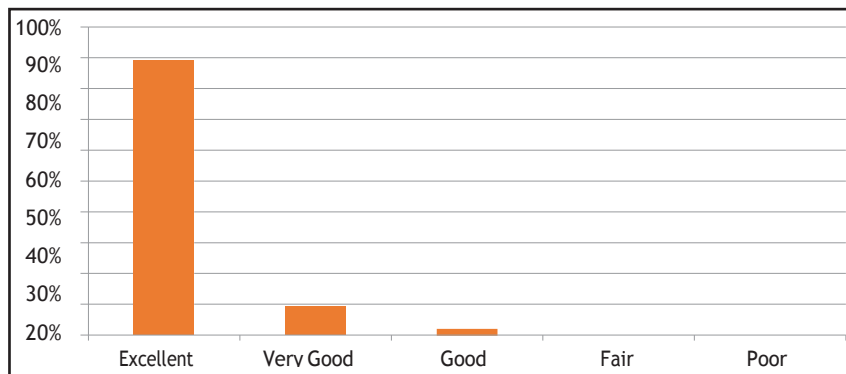


Fig. 1: Attitude Towards Software Usage

Information delivered at the graph below (Fig. 2) is about the opinions of the end users about sufficient availability of Hardware Infrastructure. The majority of the respondents (61.9%) expressed that sufficient availability of Computer System and Printers. 38.1% of the respondents expressed that

not sufficient availability of Computer System and printers. The majority of respondents (57.14%) expressed not sufficient availability of peripherals. 42.86% of the respondents expressed the availability of sufficient peripherals. It is clear from the above information that most of the end users agree that there is not sufficient availability of peripherals.

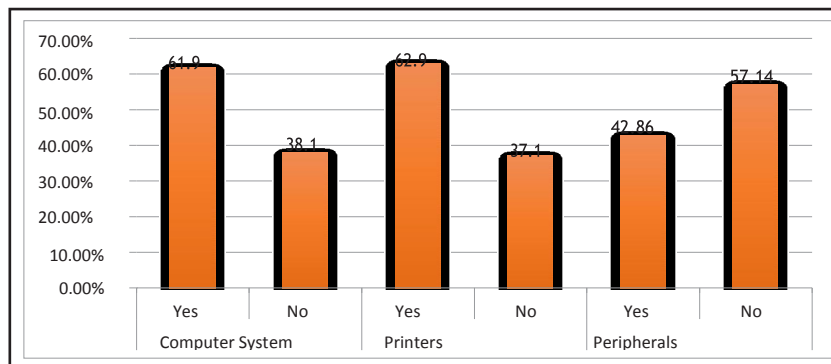


Fig. 2: Opinions of Users about Availability of IT Infrastructures

Next to this, the researcher tried to understand the availability of an in-house Management Information System or Data

processing software's. The result is shown in the chart below (Fig. 3):

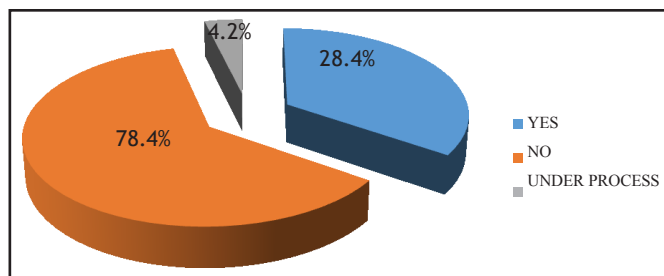


Fig. 3: Availability of an In-house Management Information System

As presented in the above chart, the in-house development and usage of software products in Ethiopian higher educational institutions is very limited. Only 28.4% of the universities use in-house developed software, and 78.4% are not using in house softwares. Especially most the third and some the second generation universities are not using in-house software products.

The result implies that either the universities have no trust on the capabilities of IT professionals working in the university or the IT professionals have limited resources to develop an in-house softwares.

In the next section, the researcher has presented the *present status of software in various departments* in the Universities.

The table below shows the percentage of the presence of software’s at different departments in the universities.

From the table below (Table I), it is observed that the majority of the departments in Ethiopian higher educational institutions are not supported by software products. It is clear from above information that most of the end users agree that software products are not sufficiently available. Currently, the statuses of software’s at different departments in the universities are described as follows:

University ICT Departments

The ICT department of every university has an objective to provide ICT services for the entire departments in the university. The main tasks of ICT department are IT support (Networking, maintenance, software development etc.), IT Security (licensed antivirus), IT auditing, etc. Regarding the usage of software products at the above sub-departments of ICT, most of the services are performed manually.

University Finance Departments

In finance department of the universities, almost all the activities of the departments are operated manually, except the purchasing in which 33.3% software used fully and 16.7% software used partially in the budgeting department.

TABLE I: PRESENCE OF SOFTWARE’S AT DIFFERENT DEPARTMENTS IN THE UNIVERSITIES

Department	Sub Department	Software Used Fully	Software Used Partially	No Software Used
ICT	IT Support	0	33.30%	66.70%
	IT security (Licensed anti Virus,)	33.30%	16.70%	50%
	IT auditing	0	0	100%
	Bug tracking	0%	0%	100%
Finance	Budget	0%	33.30%	66.70%
	Accounting	0	0	100%
	Purchasing	33.30%	16.70%	50%
	Stock management	0	0	100%
	Auditing	0	0	100%
	Project management	0	0	100%
Registrar	Student registration	33.30%	16.70%	50%
	Grading system	33.30%	16.70%	50%
	Course distribution	0%	33.30%	66.70%
	Scheduling	0%	33.30%	66.70%
	Classroom management	0%	33.30%	66.70%
Human resource	Selection / recruitment & appointment			100%
	Attendance system			100%
	Payroll system			100%
	Personnel record management	0%	0%	100%
Library	Automation	83.30%	16.70%	0%
	Digitization	83.30%	16.70%	0%

Department	Sub Department	Software Used Fully	Software Used Partially	No Software Used
Student service	Cafeteria			100%
	Dormitory			100%
	Cost sharing			100%
	Clinic			100%
Vehicle and building management	Office facility mgt			100%
	Maintenance			100%
	Vehicle management / fleet			100%
	Residence mgt			100%

University Registrars

As presented in the above table, the registrar departments of the universities used software products relatively in a better way than the other departments. The percentage of using software products fully at Student registration and grading system are 33.3% and 33.3% respectively. Course distribution, scheduling and classroom managements used software products partially.

University Libraries

As clearly shown in the above table, the university libraries use software products to digitize their collection and automate the services. Automation, digitization and digital repositories are fully supported by software products especially, in the first and second-generation universities. The percentage of usage of software products shown in the table for Automation and digitization are 83.3% and 83.3% respectively. The types of softwares used are Greenstone, Koha and Dspace open source softwares.

Human resource management, student service, vehicle and building management etc. of the universities do not use software products at all.

Therefore, from above table it is possible to conclude that the usage of software products in higher educational institutions is very limited. Even though, some of the departments, such as libraries use softwares in a good and satisfactory stage, most of the departments do not use software products in general.

B. Assessment of Opportunities, Challenges and Prospects of Using Softwares

In this section, an attempt has been made to investigate the important facts about the opportunities, challenges and prospects of using software products at work in the Ethiopian higher educational institutions.

Hence, in the table below, the challenges, opportunities and prospects of using software products at the office to perform different tasks effectively and efficiently is presented. The data collected from the selected universities have been presented in a tabular form as follows:

TABLE II: OPPORTUNITIES OF USING SOFTWARE PRODUCTS

Measuring Criteria	Excellent	Very Good	Good	Fair	Poor
Consistency of the system	78.4%	18.4%	2.6%	0.6%	
Accuracy for decision making	95%	5%	0	0	0
Relevancy	97.3%	2.2%	0.5%	0	0
Efficiency in time	98.9%	1.1%	0	0	0
Attractiveness of the system	79.6%	14.2%	6.2%	0	0
Simplicity to use	88.1%	6.3%	3.2%	0.4%	0

As presented in the above table (Table II), the majority of the respondents said that using software products at work is important and necessary to perform tasks with high quality and minimum possible time. It is also observed that most of the respondents require new versions of softwares to use at their work.

Having the above opportunities of using software products at the work place in mind and the insufficient usages of softwares at different departments, the researcher has tried to find out the challenges of software usage.

The graph below (Fig. 4) furnishes the information about the main challenges / problems of using software products in the Ethiopian higher educational institutions.

According to the respondents the challenges are ranked as follows:

- Leadership problems (Interdepartmental coordination, Limited awareness of Decision makers, Absence of Employees cooperation).
- Management Problems (lack of Strategic planning and Financial support for implementing softwares).
- Organizational and Environment problems (Changing technology / resistance to use new technology, Organizational culture).
- Technical problem (Lack of Documentation / user manual, standardization, poor internet connection, lack of electric power).
- Personal problems (Lack of trained staff, High professional turnover, Lack of continuous training).

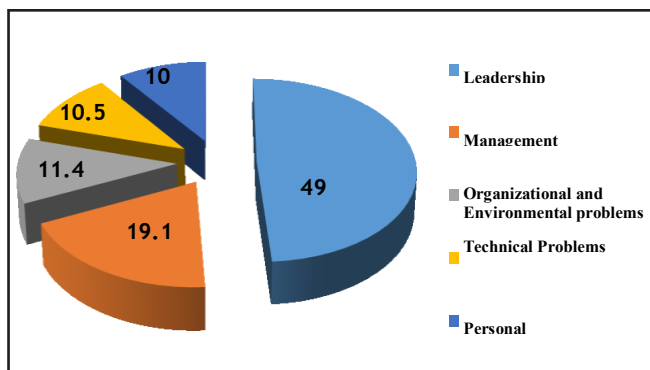


Fig. 4: Challenges to Implement and Use IT Products

So from above Fig. 4 it is possible to conclude that leadership problems (49%) take the lion share, management problems takes the second position (19.1%), Technical problem, Changing Technology and Personnel problem (i.e. Lack of Trained staff available, training and staff turnovers) are

also very problematic factors for implementing IT in the universities.

Further, in this study, the status of the IT professionals at different qualification is presented as follows (Fig. 5).

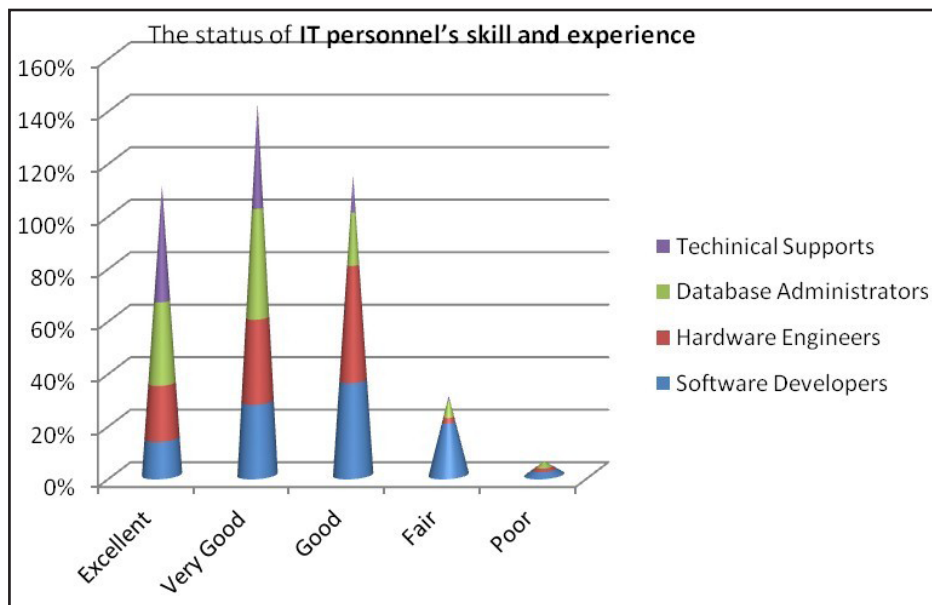


Fig. 5: The Status of IT Personnel Skill and Experience

From the graph above, we observe that the majority of the respondents expressed that the statuses of IT personnel's are in a very good status, specially, technical support staffs are well qualified. On the other hand, software developers and hardware engineers are well qualified. Therefore, the IT Personnel's available are inadequate to develop and use software products in Ethiopian higher educational institutions.

directly or indirectly all aspects of the world in general and life of individuals in particular. Among the largest organizations affected by the technological innovations are higher educational institutions.

Among the important fruits of ICT, software is widely used in most organizations in the world to standardize services and perform efficiently and effectively.

In Ethiopian higher educational institutions, software products are not used sufficiently. Most of the departments are not supported by softwares to perform tasks and provide standardized service. The challenges for the universities face not to use software products adequately are many directional and could be outlined as follows:

VI. CONCLUSION AND RECOMMENDATION

A. Conclusion

Following the innovation of the internet, computer technology and the World Wide Web, most of the organizations in the world are forced to digitize their resource and automate their services. The influence and impact of technological innovations affects

- *Management and Leadership Problems / Challenges:* Most of the managers and leaders of the university are

ignorant or lack awareness about the importance of using software products. They do not include the issues of software products into their strategic planning such as required budget, staff training, departmental cooperations etc.

- *Organizational and Environment Problems / Challenges:* (Changing technology / resistance to use new technology, Organizational culture) most of the staff members in every department are not ready and welcome for new technologies. They resist when new technologies are introduced.
- *Technical Problems / Challenges:* Software development and use at any level needs good infrastructure including computer hardware and peripherals, people who know procedures and trained end users etc. There must have a Local Area Network (LAN) in their premises for computerized coordination, multiuser facility, good quality application service, improvements in old procedures, selection of appropriate equipment. According to this study some of the technical challenges identified are the following: Lack of Documentation / user manual, standardized infrastructure, poor internet connection, and electric power interruption, etc.
- *Personnel or ICT Staff Problems / Challenges:* There is shortage of trained and qualified ICT professionals in the universities to develop, install and customize software products effectively, to assist end users and maintain software products effectively, train the end users and prepare user manuals timely. Continuous on job staff training is also low. There are also high ICT staff turnovers.

B. Recommendations

In the future, based on the results of this study, it is possible to provide an extensions research to produce valuable documents for the concerned body. The following recommendations are made for the way forward:-

- Management bodies and leaders of universities need to be aware of the importance of using software products and support software development and usage.
- There is a need to follow a scientific approach for selecting hardware and software as well as network infrastructure with the help of experts.
- There is need to reengineering because the old / manual system has its own limitations.
- There is a need to change employee mindset focus on IT.
- Continuous IT staff on job training, experience sharing, and incentives must be done.
- Further research can be conducted out of higher educational institutions such as government office or private sectors.

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APPENDIX

Questionnaire to be Filled by IT Professionals and End Users

Dear Sir/Madam,

In today’s digital era, software is an indispensable aid of doing many activities. A single government organization might be using hundreds of computers and mobile devices deployed at dozens of locations running numerous types and versions of operating system and application software to automate organizational operations and products. While using the softwares, in addition to their advantages, challenges are also common.

I am conducting a research on “*Challenges and Prospects of Using Software Products in Ethiopian Higher Educational Institutions*”, sponsored by Vice President for Research and Technology Transfer Office of Addis Ababa University, I aim at exploring the extent software products that are used in higher education institutions, identifying opportunities, finding out challenges and predicting prospects. Therefore, I kindly request you to attempt all the questions listed in the questionnaire carefully, as this will help to complete the study successfully.

The information given will be confidential and will be used only for the purpose it has been collected for. There is no need to write your name. Your assistance will be highly appreciated.

Thank you!

PART 1: GENERAL INFORMATION

1. Name of your University ____
2. Address ____
3. Name of your Department ____
4. Qualification (BSc, MSc, PhD) _____
5. Designation _____
6. Years of Service ____
7. No. of campuses under your university _____

PART 2: PRESENT STATUS OF INFORMATION TECHNOLOGY

1. How is your attitude / interest towards IT or software usage at your job?
 Excellent Very Good Good Fair Poor
2. Does your organization have implemented IT? Yes No
 If yes, please state the year of IT implementation _____
3. Please state the IT infrastructure of your organization (internet connection, computers...)
 Excellent Very Good Good Fair Poor
4. Does your organization have an in-house Management Information System or Data processing software?
 Yes No
5. Please state the present status of software in various departments at your University (if all listed points at the sub departments are done using softwares, select 'Software used fully', if some points only automated, select 'Software used partially', else no software used. Also write the name of the software).

Department	Sub Department	Software Used Fully	Software Used Partially	No Software Used	Name of Software
ICT	IT Support				
	IT security (Licensed Anti Virus,...)				
	IT auditing				
	Bug tracking				
Finance	Budget				
	Accounting				
	Purchasing				
	Stock management				
	Auditing				
	Project management				
Registrar	Student registration				
	Grading system				
	Course distribution				
	Scheduling				
	Classroom management				

Human resource	Selection / recruitment & appointment				
	Attendance system				
	Payroll system				
	Personnel record management				
Library	Automation				
	Digitization				
Student service	Cafeteria				
	Dormitory				
	Cost sharing				
	Clinic				
Vehicle and building management	Office facility mgt				
	Maintenance				
	Vehicle management / fleet				
	Residence mgt				
Others				
				
				
				
				

6. Do you have sufficient availability of ICT infrastructures in your organization to have the required operations using software?

Yes No

If no, which ICT infrastructure do you require?

A. B. C.
 D. E. F.

7. What type of software is most widely used at your University? (Multiple answer possible)

Licensed Open source In-house Pirated / cracked

Please explain why?

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PART 3: ASSESSMENT OF OPPORTUNITIES, CHALLENGES AND PROSPECTS OF USING SOFTWARES

1. Please state the opportunities of using software products at your university with regard to the extent you use the product at your office in the following table.

Measuring Criteria	Excellent	Very Good	Good	Fair	Poor
Consistency of the system					
Accuracy for decision making					
Relevancy					
Efficiency in time					
Attractiveness of the system					
Simplicity to use					

2. What challenges have occurred in your University regarding using softwares? (Please specify the degree of problem in the following table)

Category Challenges	Sub Category of Challenges	Problematic	Somewhat Problematic	No Problem
Leadership problem	Interdepartmental coordination			
	Absence of Employees cooperation			
	Organizational support at different levels			
	Limited awareness of Decision makers			
Management problem	Strategic planning			
	Financial support for implementing softwares			
Organizational	Organizational culture			
Environment problem	Changing Technology / resistance to use new technology			
Technical problem	Lack of Documentation / user manual, standardization			
	Security issues			
	Lack of internet, electric power			
Usability problem	Complicated User interface			
Personnel problem	Lack of trained staff			
	High professional turnover			
	Lack of continuous training			

Please write additional challenges if you have any:

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3. Please state the status of IT personnel's skill and experience at your University.

Man Power Position	Excellent	Very Good	Good	Average	Fair	Poor
Software developer						
Hardware engineer						
Database administrator						
Technical support						

5. Please give your idea on how to overcome problems in the future software development and usage.

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Thank You for Your Wonderful Cooperation!